

Internet-delivered cognitive behavioural therapy in the treatment of psychiatric illness

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The effectiveness of cognitive behavioural therapy (CBT) is well established for many mental illnesses, including mood and anxiety disorders. CBT, which takes into account how thoughts affect emotions and behaviour, has been shown to be as effective for mild and moderate depression as medications. According to the depression guidelines of the Canadian Network for Mood and Anxiety Treatments, the combination of psychopharmacology and CBT is superior to either modality alone.¹ However, CBT is resource-intensive and consequently is not available to many patients.

Technology may be able to improve access by allowing delivery of CBT via the Internet. We reviewed the evidence for the effectiveness of Internet-delivered CBT and discuss here its applications, advantages and disadvantages, as well as potential future clinical directions for the delivery of this treatment modality. Internet-delivered CBT has been developed and tested in different forms for many common psychiatric diseases, including obsessive-compulsive disorder, post-traumatic stress disorder, and depression and anxiety disorders, both separately and together. The evidence for this review comprises mainly randomized trials and meta-analyses of intervention studies (Box 1).

What is Internet-delivered CBT?

Internet-delivered CBT is psychotherapy based on CBT principles, delivered via the Internet by an individual or program remote from the client. CBT is based on Beck's Cognitive Triad (people's thoughts, emotions and behaviours influence each other; patients cannot control the world, but they can take control of how they interpret things in that world). CBT isolates specific problems, and a therapist helps the patient to develop strategies to address those problems by changing thinking patterns and behaviours.² CBT has self-contained modules and clearly defined goals; it can be scripted and requires minimal therapist intervention.³ Thus, CBT is uniquely suited for implementation online. There are various types of Internet-delivered CBT programs; however, they share many features, being made up of short-term, patient-guided, goal-

oriented sessions,⁴ typically consisting of 8 to 12 modules.⁵ They can be made available online or via a smartphone or tablet application (app), free or for a fee, and with or without therapist support (Box 2). Their content and delivery may differ according to the condition being treated.

What is the evidence for Internet-delivered CBT?

A systematic review of studies published between 2000 and 2012 identified 1104 articles reporting Internet-delivered or computerized treatments for common psychiatric disorders.⁶ Many of the early studies were not rigorously designed.⁷ Recently, the quality of studies has improved, and a more reliable body of literature has developed. Randomized controlled trials (RCTs) investigating Internet-delivered CBT differ with respect to the type of control group, the degree of therapist involvement, the types of communication and the format of the online modules, which makes it difficult to compare their findings.^{8,9} In addition to evidence from these RCTs, we also incorporate literature on smartphone and tablet apps.

We focus here on three conditions — anxiety, depression and emotional distress associated with physical illness — and consider special populations and long-term treatment effectiveness.

Anxiety

Internet-delivered CBT for anxiety has been evaluated in numerous RCTs and has thus been the subject of several meta-analyses. A 2009 meta-analysis evaluated 19 Internet- or computer-based CBT trials ($n = 1167$) for depression and anxiety.⁸ The length of treatment and post-treatment evaluation

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KEY POINTS

- Internet-delivered cognitive behavioural therapy (CBT) allows easier and quicker access to CBT with lower cost and greater convenience than traditional therapy.
- Strong evidence from randomized controlled trials indicates that Internet-delivered CBT can be used in clinical practice for many patients.
- Additional studies should include larger sample sizes, with stratification according to diagnosis and level of therapist support.

times varied among the studies included. The measures evaluated also differed substantially, but could be broadly classified into five categories: depression, anxiety, general distress, dysfunctional thinking, and functioning or quality of life. The effect size¹⁰ was calculated for each set of measures for all studies and individually for the four diagnostic groups: any anxiety disorder, post-traumatic stress disorder, panic disorder and phobia. After pooling the data, the authors found that patients who received Internet-delivered CBT had fewer symptoms in all clinical measures than did wait-listed controls, with effect sizes ranging from 0.48 to 1.14 (95% confidence interval [CI] 0.24 to 0.72 and 0.43 to 1.85, respectively). For comparisons of Internet-delivered CBT with placebo, the effect sizes ranged from 0.49 to 0.88 (95% CI 0.14 to 0.84 and 0.70 to 1.31, respectively). Reductions in symptoms with Internet-delivered CBT were equivalent to or better than in-person CBT (i.e., treatment as usual), with mean effect sizes ranging from -0.02 to 0.57 (95% CI -0.33 to 0.30 and 0.22 to 0.92, respectively). With regard to comparisons with wait-listed controls for the individual diagnostic groups, the mean effect sizes were 0.75 (95% CI 0.49 to 1.01) for post-traumatic stress disorder, 1.20 (95% CI 0.87 to 1.58) for panic disorder and 0.66 (95% CI 0.30 to 1.02) for phobia. For

comparisons with placebo control, the mean effect sizes were 0.93 (95% CI 0.49 to 1.38) for panic disorder and 0.81 (95% CI 0.44 to 1.19) for phobia. In addition, for comparison of Internet-delivered CBT with treatment as usual for panic disorder, the outcomes were comparable (mean effect size 0.30, 95% CI -0.001 to 0.61).

Another 2009 meta-analysis of 23 RCTs (*n* = 1432) examined the effect of computer-aided psychotherapy on anxiety disorders.¹¹ The length of treatment and post-treatment evaluation times varied across the studies: some studies measured outcomes only immediately after treatment, whereas others evaluated outcomes up to one year after treatment. Computer-based CBT showed a large mean effect size of 1.08 (95% CI 0.84 to 1.32) relative to non-computer-based CBT controls, with no difference between face-to-face and computer-based CBT (effect size -0.06, 95% CI -0.22 to 0.10).

A 2007 meta-analysis of 12 RCTs (*n* = 2334) evaluated the effectiveness of Internet-delivered CBT in alleviating depression and anxiety.¹² Again, length of treatment and post-treatment evaluation times varied. For anxiety, six studies were included, and both the fixed-effects and mixed-effects analyses found reduced symptoms, with an effect size of 0.96 (95% CI 0.69 to 1.24) for Internet-delivered CBT. When split into unguided and guided Internet-delivered CBT, the effect sizes were 0.24 (95% CI 0.11 to 0.37) and 1.00 (95% CI 0.75 to 1.24), respectively, which suggests that the guided form is more effective for anxiety disorders than the unguided form. In contrast, the 2009 meta-analysis evaluating depression and anxiety showed no significant differences for patients receiving Internet-delivered CBT with and without therapist contact,⁸ and the 2009 meta-analysis of anxiety disorders showed a small but significant difference in effect size with therapist guidance.¹¹

One large cohort study (*n* = 570) evaluated Internet-delivered CBT for panic disorder in routine psychiatric care.¹³ Panic-related anxiety and depression symptoms declined with guided Internet-delivered CBT. Therapist guidance averaged about two hours (total) per patient.

Internet-delivered CBT for anxiety, then, may increase benefits for patients and efficiency for health care professionals, and these data suggest that it may not sacrifice quality of care, despite needing fewer resources.

Depression

Depression has been the subject of numerous RCTs and subsequent meta-analyses. A 2009 meta-analysis of Internet- and computer-based CBT for adult depression included 12 studies.⁷ The

Box 1: Evidence used in this review

We searched PubMed using the search terms "Internet" and "cognitive behavioural therapy" (CBT). We chose the most relevant articles presenting results from randomized controlled trials, meta-analyses and reviews. The quality of the studies varied. We identified many well-controlled, randomized trials of Internet-delivered CBT for various psychiatric conditions. Adherence rates varied, with some studies reporting results for all patients whether they dropped out prematurely or not, and other studies reporting results only for those who completed the program. This discrepancy may dramatically skew effects among studies. In addition, most meta-analyses showed mixed results from studies using Internet-delivered CBT alone and those using other types of computer-assisted CBT. Finally, some meta-analyses mixed studies that included some level of therapist support with studies not including such support. Overall, the evidence supporting integration of Internet-delivered CBT into clinical practice was strong for specific conditions and specific populations.

We also searched the Internet using Google and the search terms "cognitive behavioural therapy," "cognitive behavioral therapy" and "app" to identify the most common apps.

Box 2: Models for using Internet-delivered cognitive behavioural therapy (CBT) in clinical practice

Level of therapist involvement	Description
Low	Patients are told about websites
Medium	Patients are given self-directed exercises with some follow-up
High	Internet-delivered CBT is included in the treatment plan, with Internet-assisted follow-up and discussion (e.g., online chats, forums, email)

depression analysis included 2446 participants, with a pooled effect size of 0.41 (95% CI 0.29 to 0.54) for Internet-delivered CBT versus all controls. The effect size increased to 0.61 (95% CI 0.45 to 0.77) for therapist-guided studies alone.

The 2007 meta-analysis of Internet-delivered CBT for depression and anxiety, described above, included four RCTs on depression with a total of 1865 participants.¹² The authors observed reduced burden of depression (effect size 0.22, 95% CI 0.03 to 0.41) with low heterogeneity.

A meta-analysis evaluating Internet- and computer-based interventions in university students was published in 2014.¹⁴ The length of treatment and post-treatment evaluation times was not assessed. Nine RCTs evaluated depression ($n = 712$), eight were CBT-based ($n = 537$), and only three reported nonskewed outcomes ($n = 144$). The standardized mean difference of the nonskewed data was -0.67 (95% CI -1.15 to -0.20), favouring intervention over nontreatment. When all nine trials were included, the data still favoured Internet-delivered CBT, with a standardized mean difference of -0.43 (95% CI -0.63 to -0.22).

In an RCT comparing Internet-delivered CBT with treatment as usual in 160 young adults,¹⁵ patients were evaluated at weeks 0, 5, 10, 16 and 32 after enrolment. A small but significant effect size (0.20, 95% CI 0.00 to 0.50) was seen in patients who received Internet-delivered CBT relative to controls (treatment as usual), over 50% of whom had received traditional pharmacotherapy and/or psychotherapy.

The Australia and New Zealand Horizon Scanning Network completed a Prioritization Summary of Internet-delivered CBT for patients with depression,⁴ which included three RCTs and a systematic review evaluating an additional four RCTs. The investigation found that therapist-guided Internet-delivered CBT programs achieved substantially higher recovery rates based on the Beck Depression Inventory and the Patient Health Questionnaire Nine Item, and the improved outcomes were sustained for at least eight months.⁴

Overall, the Prioritization Summary⁴ and the three meta-analyses,^{7,12,14} which included a total of 25 RCTs, indicate that Internet-delivered CBT is effective for depression, relative to inactive controls. In addition, the large RCT showed that Internet-based CBT is equivalent to or marginally better than treatment as usual.¹⁵ These data indicate that Internet-delivered CBT could be an effective therapy for depression.

Physical illness

Internet-delivered CBT for mental health problems has been studied in patients with a range of

physical diseases, including diabetes mellitus,¹⁶ cancer^{17,18} and multiple sclerosis.¹⁹

One RCT evaluated this form of therapy for depression in 255 patients with diabetes.¹⁶ The program consisted of eight lessons delivered over eight weeks, and measurements were taken at baseline, immediately after treatment and one month later. In the intention-to-treat analysis, patients who received Internet-delivered CBT showed significant improvements in depression at one-month follow-up compared with wait-listed controls (effect size 0.29, 95% CI 0.17 to 0.40). In the per-protocol analysis, both depression symptoms and diabetes-related distress were reduced from baseline at one month post-treatment compared with wait-listed controls (effect size 0.70 [95% CI 0.59 to 0.82] and 0.58 [95% CI 0.38 to 0.78], respectively).

Another program, Cancer Coping Online, was developed to target distress among patients with cancer, using six modules delivered weekly.^{17,18} The pilot study,¹⁷ involving 12 patients evaluated at baseline and seven weeks after initiation of treatment, showed significant reductions in negative affect (effect size 0.53; significance determined by reliable change indices), hopelessness (effect size 0.64) and anxiety (effect size 0.43). Preliminary results of a larger RCT ($n = 60$)¹⁸ showed significant, sustained interaction effects for cancer-specific distress ($F_{1,92} = 4.94, p = 0.04$) for patients treated with Cancer Coping Online compared with an Internet-attention control (information-only version of the online program, covering the same six module topics but lacking interactive elements).

Recently, researchers developed a fully automated Internet-delivered CBT program called Deprexis to combat depression in patients with multiple sclerosis.¹⁹ The program included 10 sequential modules, with patients assessed at baseline, immediately after treatment and at six-month follow-up. The effect size for the total Beck Depression Inventory score was 0.53 ($p = 0.01$) compared with wait-listed controls, based on intention-to-treat analysis ($n = 90$).

Taken together, these studies support the conclusion that Internet-delivered CBT could be an effective treatment for emotional distress caused by medical conditions. In addition, it provides an opportunity for patients with mobility issues to access psychological care.

Special populations

Several studies have focused on Internet-delivered CBT for special populations, such as children and older adults. Some of these studies are summarized in Box 3.²⁰⁻²⁵

Long-term treatment effectiveness

Most studies of Internet-delivered CBT have limited follow-up (eight weeks to two years). However, one study looked at the efficacy of Internet-delivered CBT for social anxiety disorder over five years.²⁶ The program included nine text-based modules. Patients were randomly assigned to treatment and wait-listed control groups. The control group received Internet-delivered CBT after completion of pre- and post-treatment assessments for the experimental group. All patients were included in the one-year and five-year follow-up assessments. The authors observed large effect sizes relative to baseline across all

measures, and these were retained for up to five years. The effect sizes at five-year follow-up ranged from 0.63 (95% CI 0.15 to 1.10) for the Beck Anxiety Inventory and the Quality of Life Inventory scores in the Internet-delivered CBT group to 1.40 (95% CI 0.86 to 1.90) for the Liebowitz Social Anxiety Scale-Self Report score in the wait-listed control group following administration of Internet-delivered CBT.

There is also some evidence that “booster” sessions (i.e., additional sessions to refresh the principles learned) may be an effective long-term solution. For example, in a recent RCT evaluating booster sessions for patients with obsessive-compulsive disorder,²⁷ 93 patients received 10 weeks of guided Internet-delivered CBT. Following the post-treatment assessment, they were randomly assigned to booster and nonbooster groups. A three-module weekly booster treatment was administered at six months after completion of initial treatment. All patients were evaluated before treatment, immediately after treatment and at 4, 7, 12 and 24 months. For all groups, there was a large effect size for the primary measure, the Yale-Brown Obsessive Compulsive Scale (effect size 2.09 at 24 months compared with pretreatment assessment, $n = 87$ $p < 0.001$). The relapse rate was significantly different between the booster and control groups at the 7- and 12-month assessments, with an estimated risk reduction for relapse of 87% (95% CI 1% to 98%) and 79% (95% CI 3% to 95%), respectively; however, the groups were not statistically different at 24 months. Secondary measures, including the Global Assessment of Functioning and the Obsessive-Compulsive Inventory — Revised, favoured the booster group, with significant interaction effects retained through 24 months. Because the largest difference in the primary measure was seen at the 7-month assessment, the booster’s efficacy may be limited; however, retention of effects for the secondary measures indicates that the booster holds promise, if the treatment protocol can be refined.

Box 3: Special populations: children and older adults

Children

- In several RCTs, juvenile patients with anxiety (aged 8 to 18 years) were responsive to conventional CBT, and the interventions had long-term effectiveness (reviewed by Compton and associates²¹).
- A few studies have examined the efficacy of Internet-delivered CBT in children and adolescents. For example, BRAVE-ONLINE and MoodGYM were used in primary care and school-based settings, respectively, for children with anxiety. Both programs were associated with significant improvement in anxiety symptoms (reviewed by Caelear and Christensen²²). Another study²⁰ looked at incorporation of MoodGYM into the curriculum in 30 Australian schools. The five-week program was presented by teachers in their own classrooms, and the data were compared with a wait-listed control group who attended unrelated classes. The authors observed significantly greater improvement in anxiety symptoms among participants with high adherence relative to wait-listed controls, both immediately after treatment (effect size 0.34, 95% CI 0.11 to 0.57) and at six-month follow-up (effect size 0.39, 95% CI 0.16 to 0.62).²⁰
- Another trial compared the Internet-delivered CBT program Camp Cope-A-Lot with individual CBT and computer-linked education, support and attention controls over a 12-week period.²³ Both individual CBT and Internet-delivered CBT produced significant improvements relative to controls: 70% and 81% of participants, respectively, no longer met their primary diagnostic criteria, compared with 19% in the control group. There was greater adherence by therapists with the Internet-delivered CBT protocol than with individual CBT, and the patients showed substantially higher satisfaction with Internet-delivered CBT and individual CBT relative to controls.

Older adults

- It is generally assumed that older adults are reluctant to use new technology and therefore that they would not embrace Internet-delivered CBT. However, several studies evaluating this form of therapy for anxiety have shown that older adults in a primary care setting do well with this intervention.^{24,25}
- One open trial determined adherence rates, treatment gains and enrolment patterns for older versus younger adults.²⁴ The study used an unguided, six-lesson Internet-delivered CBT program targeting anxiety that was accessible for 90 days. Older patients did not enrol in the Internet-delivered program more frequently than younger adults; however, once enrolled, older patients were substantially more likely to complete the program. There were no significant differences in gains between older adults and younger patients, with one exception. The Mini-Social Phobia Inventory showed greater symptom reduction among older patients than younger patients. The results of this study indicate that Internet-delivered CBT is effective in older populations, but they do not seek it out. Increasing the awareness of available programs could allow use of Internet-delivered CBT to help populations of older adults.

Note: CBT = cognitive behavioural therapy, CI = confidence interval, RCT = randomized controlled trial.

What resources are available for Internet-delivered CBT?

Numerous websites and apps are currently available (Table 1).^{16–18,24,28–40} In Box 3, we have highlighted several programs. An additional program, OCFighter, is described in detail in Box 4.^{32,33,41} In addition, Box 5 outlines the successful rollout by the Australian government of a nationwide Internet-delivered CBT program.^{24,42}

Table 1: Resources for Internet-delivered cognitive behavioural therapy (CBT) in the literature and the real world

Program name	Description	Geographic availability
In research trials		
Cancer Coping Online	Available to patients with cancer to help them in coping with distress. The program has 6 modules and takes 6 weeks to complete. High patient satisfaction and relatively good adherence (due to weekly email reminders) was reported. In a pilot trial, 10 of 12 participants completed the full program, and patients stated that the program was easy to use. Patients reported reduction in negative affect, hopelessness and anxiety following completion. ¹⁷ A full clinical trial has recently been completed. ¹⁸	NA
A-CHESS	Developed by the Addiction–Comprehensive Health Enhancement Support System as an application (app) that provides support, monitoring and information to patients with alcohol dependence. A-CHESS is part of a behavioural approach for treating this addiction. The app allows patients to stay in contact with counsellors to help maintain sobriety. In an unmasked RCT, use of the app was associated with significant reductions in heavy alcohol consumption over an 8-month period and for 4 months of follow-up. ³⁴	NA
Currently available*		
THIS WAY UP clinic† (https://thiswayup.org.au/clinic/)	Offered to patients with depression and generalized anxiety disorder. Patients must be referred by a physician. The program has been the subject of numerous RCTs. A trajectory study showed significant reductions in psychological distress, measured by the Kessler Psychological Distress Scale (K10), and disability, measured by the World Health Organization Disability Assessment Schedule (WHODAS-II); older adults experienced the most benefit. ^{24,28,30,35}	Australia
Diabetergestemd.nl (www.diabetergestemd.nl/)	Modified version of the Colour Your Life program. Designed to treat depression in patients with type 1 or type 2 diabetes mellitus. An RCT involving 255 adult patients showed reduced emotional distress with no change in glycemic control. ^{16,31}	Netherlands
Spider Phobia Free† and Stress Free (http://virtually-free.com/)	Advocated by the NHS and AnxietyUK and designed to provide meditation, relaxation, self-hypnosis and breathing techniques to treat fear, anxiety and stress. An app version of each program is available to Canadians. The UK-based website claims more than 19 000 users of the apps.	INT
Moodkitt† (www.thriveport.com/products/moodkitt/)	Designed to provide more than 200 mood-improving activities and thought modulation strategies. <i>Discover</i> magazine called Moodkit “the happiness app.”	INT
Beating the Blues† (www.beatingtheblues.co.uk/)	Recommended by the UK NICE and available in Canada for a fee. The program is for patients with depression or anxiety and consists of eight weekly sessions of 50 minutes each, during which patients are taught to identify symptoms and set goals. Data indicate that statistically significant improvements in key measures of anxiety and depression are achieved. ³⁶	INT
FearFighter† (www.fearfighter.com/)	Designed to treat patients with panic and phobia. This program is available in Canada for a fee; it is covered for NHS patients in the UK. The program consists of nine interactive steps with downloadable content, videos and homework exercises. An RCT for anxiety and depression showed improvement on a number of measures. ³⁷ Patients and referring health care providers reported a high level of satisfaction and ease with using this program. ³⁸	INT
CBT-i Coach (available on iTunes)	Developed by the US Department of Veterans Affairs and designed to help patients with insomnia to improve their sleeping habits and to educate patients on how negative thoughts may affect sleep. In contrast to sleeping medications, Internet-delivered CBT for insomnia focuses on underlying reasons (thoughts) that disrupt or prevent healthy sleep patterns.	INT
MoodGYM (https://moodgym.anu.edu.au/welcome)	Developed in Australia and geared toward patients with anxiety and depression. There are at least 600 000 registered users, with translation to Finnish, Dutch, Norwegian and Chinese. The program consists of five interactive modules, quizzes and homework. In an RCT, post-intervention evaluation showed a significantly higher reduction in symptoms among patients who completed the program than among wait-listed controls. ²⁹ A majority of users found this program as acceptable as in-person CBT, stating that they were more likely to continue using MoodGYM over time. ²⁹	INT
Online Therapy USER (www.onlinetherapyuser.ca/wac/welcome-to-the-wellbeing-after-cancer-course/)	Intended for patients who have recently completed cancer therapy and are experiencing depression or anxiety. The program has five parts and is completed in eight weeks, with weekly email interactions with a therapist. According to the website, 101 patients started the course, and 66 fully completed it; 94% of those who completed the program felt it was worth their time.	Saskatchewan
PTSD Coach Canada (www.veterans.gc.ca/eng/stay-connected/mobile-app/ptsd-coach-canada)	Developed by Veterans Affairs Canada for patients with post-traumatic stress disorder. Focuses on education as well as CBT techniques. The international version of this app (PTSD Coach) is estimated to have been downloaded more than 130 000 times in at least 78 countries. In a preliminary evaluation, patients reported satisfaction, improved symptom control and better sleep. ³⁹	INT
OCFighter† (www.ocfighter.com/)	Developed in the UK for patients with OCD, it is available in Canada and the United States for a fee. The program leads to improvement in OCD symptoms. Two RCTs showed good adherence rates with therapist support for as little as 16 minutes per week. ^{32,33}	INT
Pain Squad (www.sickkids.ca/Research/I-OUCH/Pain-Squad-App/index.html)	Developed by the Hospital for Sick Children (Toronto, Ontario), this app helps in management of pain for children with cancer. A usability and feasibility study showed high compliance rates and overall satisfaction. ⁴⁰	INT
<p>Note: INT = internationally available, NA = not applicable, NHS = National Health Service (UK), NICE = National Institute for Health and Care Excellence (UK), OCD = obsessive–compulsive disorder, RCT = randomized controlled trial, UK = United Kingdom.</p> <p>*Additional resources are available, some of which may be found at www.getselfhelp.co.uk/links2.htm.</p> <p>†Fees are applicable for access to these programs.</p>		

What are the advantages of Internet-delivered CBT over face-to-face treatment?

Internet-delivered CBT has two principle advantages: patient empowerment and increased clinical efficiency.

Patient empowerment has many aspects. With Internet-delivered CBT, patients can schedule their care and receive their therapy from any location with Internet access.^{7,11} This geographic independence benefits patients in rural areas with limited services. For example, one independent study on anxiety evaluated rural populations in Scotland.⁴³ Patients participated in FearFighter, a nine-module program, and were assessed before and after treatment and at a follow-up appointment (mean follow-up time 4.5 months, range 1 to 8 months). Among the 35 participants with pretreatment data, 26 (74%) completed treatment. There were moderate to large effect sizes for most anxiety measures, including social anxiety (pre- to post-treatment effect size 0.97; post-treatment to follow-up effect size 0.53), depression (pre- to post-treatment effect size 0.99; post-treatment to follow-up effect size 0.03) and agoraphobia (pre- to post-treatment effect

size 0.95; post-treatment to follow-up effect size 0.29) ($p < 0.001$ for all comparisons). Thus, Internet-delivered CBT could provide care for patients who might not seek treatment because of physical or psychiatric conditions or social stigma. Several recent clinical trials implemented self-referral as a recruitment option.^{20,28,43,44} In addition, the privacy and anonymity of Internet-delivered CBT may help patients who are introverted or depressed to be more open and receptive to treatment.⁷

From a clinical efficiency perspective, Internet-delivered CBT offers substantial benefits. It allows clinicians to treat more patients effectively in less time. Even with intermittent therapist support, it is less time-consuming and requires fewer resources overall than traditional CBT. For example, a 2014 editorial about guided Internet-delivered CBT noted that therapists spent about 10 minutes per patient per week,⁴⁵ and in one RCT investigating Internet-delivered CBT for irritable bowel syndrome, six therapists treated 195 patients simultaneously.⁴⁶ In addition, a 2009 review of what makes Internet-delivered CBT effective stated that asynchronous therapist communications are advantageous because they minimize the need for immediate availability.⁷ A 2014 review discussing the advantages and limitations of Internet-delivered CBT noted that the incorporation of questionnaires, homework and self-assessments allowed the patient's progress and outcome to be easily monitored.³

Box 4: Featured program — OCFighter

One example of a well-studied, successful program is OCFighter, an Internet-delivered CBT website for patients with obsessive-compulsive disorder, endorsed by the United Kingdom's National Institute for Health and Care Excellence. This nine-step course features videos of therapists explaining core concepts (such as exposure) and patients discussing their experiences with the illness and their recovery. It is available in Canada and the United States for a fee and includes online therapist support via Skype.

One RCT compared scheduled versus requested therapist support.⁴¹ Patients had unlimited access to the program for 17 weeks. Those in the scheduled therapist support group completed nine scheduled calls with the therapist, whereas those in the requested therapist support group had access to a help line. Patients were evaluated before and after treatment. The adherence rates for this program were high. Of the scheduled therapist support group ($n = 20$), 95% completed step 7 and 55% completed the entire program, compared with 57% and 50%, respectively, for the requested therapist support group ($n = 16$). The scheduled therapist support group showed significant improvements relative to the requested therapist support group, according to scores on the Yale-Brown Obsessive Compulsive Scale (effect size 1.2 v. 0.3).

Another RCT compared wait-listed controls with patients receiving OCFighter before face-to-face CBT treatment.³² Patients were assessed before and after treatment and also after completing clinician-guided care. The authors observed that the exposure and ritual prevention understanding scores for the OCFighter group were similar to those obtained with in-person CBT (mean score for both 13.1).

A third RCT compared OCFighter with in-person CBT and relaxation controls.³³ The program was 10 weeks long, and patients were assessed before and after treatment. The results indicated that OCFighter was as effective as in-person CBT if at least one self-exposure session had been completed before initiating Internet-delivered CBT, based on the percentage of responders on the Clinical Global Impressions scale (60% for in-person CBT v. 65% for one self-exposure session plus Internet-based CBT).

Note: CBT = cognitive behavioural therapy, RCT = randomized controlled trial.

Is Internet-delivered CBT cost-effective?

Several studies have investigated the cost-effectiveness of Internet-delivered CBT from both societal and provider perspectives. In a 2012 systematic review of this modality and its applications, efficacy and cost-effectiveness, the authors calculated that the probability of Internet-delivered CBT being a cost-effective treatment was 57% (range 38% to 96%) relative to wait-listed controls.⁶ One RCT compared in-person group CBT with Internet-delivered CBT for social anxiety.⁴⁷ Patients were treated through a 15-module Internet-delivered program or 14 weekly group meetings and were assessed before treatment, immediately after treatment and six months after treatment. The authors determined that the probability of Internet-delivered CBT being efficacious at a lower cost was 79.5% at a willingness-to-pay of US\$0. Two studies compared a 10-module Internet-delivered CBT program with a stress-management strategy⁴⁶ or an Internet chat forum⁴⁸ for irritable bowel syndrome. The authors calculated a societal cost reduction of about US\$16 000 and US\$39 000 per patient compared with forum and stress-manage-

ment controls, respectively, at a willingness-to-pay of US\$0. Another RCT compared a four-month, 10-module Internet-delivered CBT program with treatment as usual for depression.⁴⁹ Using data from this RCT, a systematic review calculated a probability of about 70% that Internet-delivered CBT was cost-effective at a willingness-to-pay of US\$50 000.⁵⁰ Two RCTs surveyed guided Internet-delivered CBT for depression⁵¹ and anxiety⁵² in older adults. Both programs were five-lesson, eight-week courses, and data were compared with data for wait-listed control groups. The authors showed that both programs had a greater than 95% chance of being cost-effective at the standard Australian willingness-to-pay threshold of A\$50 000.

All of these studies calculated the cost-effectiveness of pre-existing, successful programs, but developing a new program requires substantial time and money. Of course, it is less expensive to translate an existing program to a new language. To assess the cost-effectiveness of translation, researchers translated the Internet-delivered CBT programs BluePages and MoodGYM from English into Norwegian and conducted an RCT comparing the participants in the translated programs with wait-listed controls.⁵³ The cost of translation was about one-fourth the cost of a new program, and program implementation would produce a 21-fold return on investment based on the quality-adjusted life-years gained. These data support the translation of existing programs, rather than investment in the development of new programs.

What are the disadvantages of Internet-delivered CBT?

There are some disadvantages to Internet delivery of CBT. The first is lack of direct patient monitoring, which can be problematic for two reasons: lack of a human relationship (i.e., therapeutic alliance) and difficulty in adjusting therapy according to the patient's progress. A few studies, including one systematic review, have evaluated therapeutic alliance in guided Internet-delivered CBT for several conditions, mainly compared with wait-listed controls or email-based therapist interaction.^{54–59} These studies consistently showed high therapeutic alliance for guided Internet-delivered CBT. Only one RCT directly compared guided with face-to-face Internet-delivered CBT.⁶⁰ The study enrolled 86 patients with panic disorder, divided into two groups: the Internet-delivered CBT group received the six-module Panic Online program, and the face-to-face group received weekly one-hour sessions for 12 weeks. The authors observed no difference in outcomes or therapeutic alliance scores between the two groups. However, patients in the face-to-

face group reported greater enjoyment communicating with their therapist.⁶⁰ The difficulty of adjusting a patient's therapy can be mitigated somewhat by using guided Internet-delivered CBT, whereby a therapist assesses the patient's progress and adapts treatment accordingly.³

The second disadvantage is low adherence. Several studies indicate that this issue may be mitigated by some level of therapist support. For example, in an RCT comparing the effectiveness of the MoodGYM program with wait-listed controls,²⁹ 73% of unguided MoodGYM users did not complete the full program. In contrast, therapist-guided MoodGYM users had completion rates equal to those for traditional CBT.²⁹ Another RCT evaluated various levels of therapist support with the Panic Online program.⁶¹ The patients were assigned to groups with frequent or infrequent therapist contact, defined as receiving at least three or just one email message per week, respectively. The researchers observed no differences between the two groups in efficacy, therapeutic alliance, treatment credibility, treatment satisfaction or treatment adherence.⁶¹ In addition, a series of studies using the Internet-delivered Worry program to treat anxiety showed that therapy guided by primary care physicians achieved 40% to 60% adherence, and therapy guided by clinical psychologists had rates as high as 90%.^{28,30,62} In contrast, one RCT directly compared unguided, minimally guided and flexibly guided Internet-delivered CBT for social phobias using a five-lesson program administered over 10 weeks.⁶³ The three treatments were equally effective, with no statistical difference in adherence. Further studies are needed to reconcile these conflicting results.

Box 5: Example of government rollout — Australia

Several clinical Internet-delivered CBT programs have already been rolled out successfully. Governments are embracing websites and apps, including the United Kingdom (England and Wales), Sweden, Australia and Canada (Saskatchewan). One example is Australia's THIS WAY UP Clinic. This e-clinic, the result of a university–state government partnership, offers a number of courses: Worry (for generalized anxiety disorder), Worry and Sadness (for mixed depression and anxiety), Shyness (for social phobias), Obsessions and Compulsions (for obsessive–compulsive disorder) and Panic (for panic and agoraphobia). The THIS WAY UP Clinic makes good use of the Internet: patients can set up an online calendar to generate email reminders, progress reports are provided to referring clinicians by email, patients have access to “patient recovery stories,” and the website is graphically pleasing and uses comic book–style lessons to explain key concepts in story form.

The courses are available by referral through clinic-registered clinicians, including family doctors but also mental health nurses and psychologists. The program charges a fee (A\$55). The e-clinic also features free self-help courses. A recent progress update by the e-Mental Health Alliance reported that the THIS WAY UP Clinic was logging an average of 1000 unique visitors and 80 patients registering per month.⁴² Newby and associates²⁴ reported that more than 3600 clinicians were registered with THIS WAY UP as of May 2013. The self-help program alone had over 6000 registrations since its inception and about 275 registrations per month.

Note: CBT = cognitive behavioural therapy.

The third disadvantage of Internet-delivered CBT relates to technology accessibility. As much as 30% of the Western population may not have home Internet access or own a computer.⁷ In addition, the programs may have hardware or bandwidth requirements that limit their availability to patients. For example, for RCTs of Internet-delivered CBT in rural Scotland and China, computers had to be provided or computer centres created to allow patients to complete the program.^{43,64} In addition, patients who are not technologically savvy may resist replacing clinical visits with computerized treatments.

The fourth disadvantage is the possibility of improper treatment. Internet-delivered CBT occasionally uses online diagnostic tools based on self-reporting, which could lead to misdiagnosis and improper treatment. One study compared an Internet-administered Composite International Diagnostic Interview with an in-person Structured Clinical Interview for DSM-IV [Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition] axis I disorders.⁶⁵ Among 53 patients who performed an online diagnostic interview two days before a formal in-person interview, there was low agreement between the two evaluation methods for all but panic disorder. In contrast, a recent study comparing automated pretreatment assessments ($n = 173$) with clinician diagnoses ($n = 135$) for assignment to an Internet-delivered CBT program⁶⁶ showed similar results in the two groups.

There are also potential concerns regarding service providers and their products, such as poor program quality or fake services. So far, no one has investigated these concerns. However, users can apply some common sense precautions in selecting a program. Legitimate programs often have government endorsements, are affiliated with a hospital or academic institution, or feature relevant peer-reviewed literature. For programs with therapist guidance, the therapists' biographies are frequently available, and the patient can check their credentials. These features can help in distinguishing legitimate programs from scams. However, a patient who feels that a service has

not delivered what was advertised has limited options for redress. If a well-researched, government-supported program was used, a complaint can be filed with the organization's customer service department. Some commercial apps have customer service departments as well. In either case, the best outcome is likely to be a refund. Government programs are more likely to be responsive to complaints, in an effort to maintain their funding. Although suppliers of commercial apps may be less likely to respond to complaints, most of these apps cost less than US\$5, so the monetary loss will be minimal.

Who should not pursue Internet-delivered CBT?

Internet-delivered CBT is not recommended for severely ill patients. In fact, most studies have excluded severely ill patients, on the assumption that this form of therapy is better suited for patients with early-stage disease and sufficient social support.⁶⁷ However, a secondary analysis of data from the diabetes RCT, described above,¹⁶ showed that symptom severity was not a significant effect modifier for success.³¹ As part of a quality assurance study, researchers followed the outcomes for 359 patients for whom the Australian Sadness program had been prescribed⁶⁸ and observed large post-treatment effect sizes in patients with severe symptoms or suicidal tendencies (Patient Health Questionnaire Nine Item: effect size 1.49, 95% CI 1.01 to 1.96; Patient Health Questionnaire Nine Item – Suicide Item: effect size 1.12, 95% CI 0.64 to 1.59). Further studies are needed to assess the effectiveness of Internet-delivered CBT for severe illness, but substantial ethical concerns related to trial design make such studies challenging.

What are the future directions, challenges and obstacles for integration into clinical practice?

Although a growing body of research favours Internet-delivered CBT, some important questions must be addressed (Box 6). First, what types of patients will benefit from this form of therapy? Currently, there is no clear picture of the ideal demographic.³ The applicability and benefits of Internet-delivered CBT for specific populations, including economically disadvantaged and poorly educated people, as well as those living in rural areas, need further investigation.⁶⁸ Second, is Internet-delivered CBT truly as effective as in-person CBT? Given the limited number of studies directly comparing in-person and Internet-delivered CBT,⁹ future trials should involve head-to-head comparisons.

Box 6: Questions for future research

- What types of patients would benefit from Internet-delivered cognitive behavioural therapy (CBT)?
- Is Internet-delivered CBT truly as effective as in-person CBT?
- How should Internet-delivered CBT be blended with other therapies, such as pharmacotherapy or in-person support?
- How can Internet-delivered CBT be implemented in the clinic?
- How can Internet-delivered CBT be scaled up to reach those who need it most?

The implementation of Internet-delivered CBT also poses several clinical challenges. The first is that of blending this form of CBT with other therapies, such as pharmacotherapy or in-person support. Further studies are needed to identify the most effective combination of Internet-delivered CBT and other treatments. The second challenge relates to clinical implementation. The number of physicians available for guided Internet-delivered CBT is limited. However, a recent RCT on generalized anxiety disorder compared the efficacy of guidance by clinicians and nonpsychologist technicians.⁶⁹ Patients were divided into three groups: clinician-guided Internet-delivered CBT, technician-guided Internet-delivered CBT and wait-listed controls. The two Internet-delivered CBT groups had access to the Worry program (six modules, 10 weeks) and were evaluated before and immediately after treatment and at three-month follow-up. The technician-guided and clinician-guided Internet-delivered CBT groups were similar in terms of adherence (80% v. 74%) and outcomes (Penn State Worry Questionnaire pre-treatment to follow-up effect size 0.97 v. 1.42; Generalized Anxiety Disorder Seven-Item effect size 1.61 v. 1.48). These data showed that a modestly trained individual with no prior counselling qualifications could guide Internet-delivered CBT, with adherence and outcomes similar to those achieved with clinician guidance, indicating that well-trained assistants may be used to supplement clinicians. The third challenge is scale-up. Several large-scale government rollouts have supported Internet-delivered CBT as a feasible national health care option. The e-Mental Health Alliance in Australia has outlined its own challenges for scaling up Internet-delivered CBT, specifically increasing awareness of available services and optimizing the programs to increase adherence and maximize outcomes.⁴² These factors should be considered in future large-scale investigations.

Conclusion

Overall, there are compelling data to support the integration of Internet-delivered CBT into clinical psychiatric care. These data indicate that this form of CBT offers numerous benefits to both the patient and the practitioner. It allows treatment of patients with many different psychiatric conditions, at lower cost than traditional CBT. Patient adherence can be improved with some therapist involvement, and the evidence suggests that this approach yields better outcomes. Additionally, governments are likely to find this treatment modality attractive in terms of cost and efficacy. In the age of Google, this psychological intervention is empowering, clinically efficient and consis-

tent with the way that, increasingly, patients interact with health care.

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