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Systematic Review of the Information and Communication Technology Features of Web- and Mobile-Based Psychoeducational Interventions for Depression

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Abstract

Objective: To examine the information and communication technology (ICT) features of psychoeducational interventions for depression delivered via the Internet or via mobile technology.

Methods: Web- and mobile-based psychoeducational intervention studies published from 2004 to 2014 were selected and reviewed by two independent coders.

Results: A total of 55 unique studies satisfied the selection criteria. The review revealed a diverse range of ICTs used to support the psychoeducational programs. Most interventions used websites as their main mode of delivery and reported greater use of communication tools compared to effective approaches like tailoring or interactive technologies games, videos, and self-monitoring tools. Many of the studies relied on medium levels of clinician involvement and only a few were entirely self-guided.

Conclusion: Programs that reported higher levels of clinician involvement also reported using more communication tools, and reported greater compliance to treatment. Future experimental studies may help unpack the effects of technology features and reveal new ways to automate aspects of clinician input.

Practical implications: There is a need to further examine ways ICTs can be optimized to reduce the burden on clinicians whilst enhancing the delivery of proven effective therapeutic approaches.

1. Introduction

Major depressive disorder is one of the leading causes of disability and substantially contributes to the global burden of disease [1, 2]. It is also one of the strongest risk factors for suicide [3]. Despite a high prevalence in adult populations, a majority of individuals with a diagnosable mental disorder (~60%) never seek treatment due to low perceived need and other barriers such as cost and limited access to mental health services [1, 4, 5]. Fear of stigma and unwillingness to disclose problems are also barriers to treatment seeking [6]. Access to effective psychological treatments like cognitive behavior therapy (CBT) is further limited due to a shortage of therapists trained in psychotherapy and time-intensive consultations [5, 7]. This dire backdrop underscores the need for innovative solutions and alternative modes of delivery to increase access to life-saving and proven therapeutic treatments.

In recent years, the delivery of mental health services via web and mobile technologies has gained popularity. Evidence-based psychotherapies such as CBT have been successfully adapted for web- or mobile-based delivery [8]. Compared to clinic-based interventions, technology-based interventions can provide: wider and timely access to mental health education and services, a more private setting for sharing sensitive information (in some cases anonymously), and wider access to social support [9-11]. Several systematic reviews and meta-analyses have indicated efficacy rates for technology-assisted psychotherapies that are comparable to the gold standard of face-to-face therapies [8, 12-16].

Additionally, various studies have suggested that the use of ICTs (e.g., online coaching, tailoring, discussion forums, self-monitoring tools, social media technologies, etc.) and increased levels of interactivity can help improve participant engagement and retention, and encourage help seeking [17-20]. However, web- and mobile-based psychoeducational interventions vary

widely in their modes of delivery, therapeutic approaches, and level of therapist involvement [21]. This makes it difficult to unpack how ICTs assist the treatment process, which in turn, makes it hard to determine ways to optimize the design of these types of psychoeducational interventions.

This systematic review examines how ICTs support the goals of psychoeducational interventions. Specifically, we intend to explore levels of automation, levels of clinician involvement, patterns between the use of ICTs and adherence (or compliance), and how ICTs support therapeutic goals. To the authors' knowledge, this is the first systematic review that examines technology features of web- and mobile-based psychoeducational interventions in great detail. Past reviews and meta-analyses have focused on different aspects of technology-based interventions. For example, Richard and Richardson (2012) described communication tools used in computer-based depression interventions (not just web-based) targeting university students. Davies, Morriss, and Glazebrook (2014) reviewed treatment outcomes, clinical design and participant characteristics of interventions targeting college students with very limited discussion of ICT features. Boydell et al. (2014) reviewed technology-assisted interventions for children and adolescents and focused their analysis on existing delivery modes and user satisfaction and preferences. Cowpertwait & Clarke's (2013) meta-analysis was similar in terms of general focus and search strategy, but our analysis unpacks in more detail the specific technology components used in web-and mobile-based psychoeducational interventions.

2. Methods

2.1. Identification of studies

We conducted a comprehensive search of efficacy studies of web- and mobile-based psychoeducational interventions published in English-language peer-reviewed journals from

2004 to 2014. This study was guided by the Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 [22] which provides the most up-to-date guidance on the standards and rigorous methods for systematic reviews on the effects of healthcare interventions.

Search strategy

Due to the interdisciplinary nature of this research, we conducted a comprehensive search of various databases including CINAHL, Cochrane Library of Systematic Reviews, EBSCO, Essential Evidence Plus, Evidence-Based Medicine Reviews, Health Reference Center, PsychInfo and PubMed. Keywords used included various combinations of MeSH terms and keywords often used to describe research in depression and eHealth (see Table 1). These keywords were used to search titles or abstracts of potentially eligible articles published from 2004 to 2014. We also examined reference lists of existing reviews and meta-analyses to identify other potentially eligible studies. The initial search yielded 1041 potentially eligible citations including a few systematic reviews and meta-analyses that led to an additional 28 citations.

2.2. Screening process and Inclusion/Exclusion criteria

Studies were screened in several stages using explicit inclusion and exclusion criteria (see Figure 1). We reviewed abstracts and earmarked for further screening studies that met the following criteria: (1) randomized controlled trials or experiments with meaningful comparison groups, (2) English-language peer-reviewed articles reporting efficacy studies of web or mobile-based interventions for depression targeting patient or at-risk populations, (3) interventions delivered or accessed via web and mobile technologies where at least 50% of interactions are technology-mediated, (4) it was psychoeducational in nature, and (5) measured as one of its main outcomes at least one of the following depression-related items: health behaviors, psychosocial functioning, coping, and other clinical depression measures. Two coders examined full texts of

the remaining 206 potentially eligible articles based on pre-defined inclusion and exclusion criteria. We excluded articles that did not adhere to the above-mentioned inclusion criteria; that were primarily usability studies, proposals, protocols or feasibility studies, or qualitative studies that did not report any quantitative measures for health behavior or clinical outcomes; focused exclusively on anxiety disorders and more severe mental health conditions (e.g., bipolar, psychosis, etc.); focused primarily on clinician-training; focused mainly on computer-assisted screening or therapy for clinician use (e.g., computer-automated depression screening, computer-based cognitive behavioral therapy); and were mainly telephone-based or stand-alone computer-based educational programs (e.g., CD-ROM). Fig. 1 illustrates the study selection process using PRISMA (**P**referred **R**eporting **I**tems for **S**ystematic reviews and **M**eta-**A**nalyses) guidelines. PRISMA focuses on methods that ensure transparency and completeness in reporting systematic reviews and meta-analyses and is highly recommended by Cochrane Review Groups [23].

Table 2 summarizes the characteristics of studies included in the systematic review.

———Insert Figure 1 and Table 2 here———

2.3. Coding

Two researchers evaluated the 55 remaining eligible studies independently on a number of variables including: study design, intervention focus, study population, treatment approach, and ICT features. Operational definitions were summarized in a codebook to ensure that categorization was consistently and accurately applied throughout the coding process. Any disparities in judgment that emerged during the coding process were resolved through discussion. Satisfactory inter-coder reliability was established with an average percent agreement across all categories of 85%. Features of the web- or mobile-based interventions were coded based on what was reported in the articles. Related (e.g., follow-up) articles were examined when

author(s) explicitly stated that more details about the treatment program or intervention were reported elsewhere. Except for the "Others" technological feature category that reports the names of less common design features, all technological features were dummy coded with the value 0 and 1 respectively indicating absence and presence of a particular technological feature.

2.4 Operational definition of main variables of interest

One of the relative advantages of adopting ICTs in the delivery of psychoeducational interventions is the possibility of reducing amount of clinician involvement without necessarily impacting the quality of treatment. We categorized clinician involvement into four distinct levels: interventions involving *no clinician or coach involvement* were categorized as completely *self-help*; studies where clinician or coach contacts were conducted solely for the purpose of providing reminders, links to modules, encouragement and answering logistical questions were categorized as having *low clinician or coach involvement*; *medium clinician or coach involvement* referred to provision of feedback on homework for mastering strategies that were not therapeutic in nature; and *high level of clinician involvement* referred to provision of individualized counseling or consults that were mainly therapeutic in intent (Table 2).

———Insert Table 2 here———

For the purposes of this descriptive analysis, treatment outcomes are described in detail in Table 2 and are summarized in Table 3 to enable limited observation regarding the effectiveness of technology-assisted psychotherapies.

We were also interested in examining compliance (or adherence) to the intervention. However, due to the variation in how adherence was measured and calculated across the 55 studies, we had to put all different ways of calculation into consideration and set cut-off points for each method in consultation with an existing review of adherence in web-based interventions

[24]. For studies that defined adherence as the percentage of participants who completed more than 60% of all modules or sessions [25, 26], a trial was considered to have met the compliance criterion when adherence rate was 40% or higher. For studies that referred to adherence as the percentage of participants who completed all modules or sessions [27, 28], a study met the criterion if adherence rate of 30% or higher was reported. For those that considered the percentage of participants who completed 50% of all modules or sessions as compliance to treatment [29, 30], 50% or higher adherence met the criterion. Overall, we assessed the compliance to treatment in all subgroups where an ICT-based psychotherapy was offered. When there was more than one treatment group in the study, the compliance for the main ICT-based psychotherapy group of the researchers' interest was scored (Table 3).

———Insert Table 3 here———

3. Results

3.1. Characteristics of studies

A total of 66 peer-reviewed articles (reporting on 55 unique studies; including follow-up reports for original RCTs) met all eligibility criteria (Table 2). The variation in the interventions made direct comparison between studies difficult to carry out. A complete list of the ICT components of the web- and mobile-based psychoeducational interventions is presented in Table 3.

Overall, the names of 26 unique internet- or mobile-application-based psychoeducational programs for depression were reported in 46 studies (see Table 2). MoodGym was the most popular interactive web-based program adopted in 10 of the intervention studies.

All but two of the studies were web-based – one was mobile-based while another used a combination of web-and mobile-based delivery.

ICT features were categorized primarily into: (1) communication tools that support peer-to-peer and/or clinician-patient communication (e.g., email, discussion boards, chat); or (2) other interactive instructional technologies (e.g., tailored content, video, animation, games) or self-monitoring tools. The following section describes the most commonly included ICT features.

3.1.1 Communication tools

We identified five categories of communication tools reported in the trials: online feedback, instant messaging or virtual chat room, discussion forum, phone calls, and text reminders. These all required some level of therapist involvement or staff assistance regardless of whether the communication was therapeutic in nature.

3.1.1.1 Online Feedback

In 23 trials, staff provided feedback to participants. Feedback was usually communicated through regular email, encrypted e-mail or secure private messages. One study used an online workbook system to provide feedback [31]. Most feedback was provided asynchronously by a therapist, a coach, a psychologist, or a Master's level psychology student under supervision of a licensed psychologist. This usually came in the form of: comments on homework assignments (or exercises, quizzes), answers to participants' questions, reinforcement or clarification of key concepts in the psychoeducational material without any therapeutic advice [28, 32-35], recognition of the work that participants completed, general encouragement and reminders to continue the program or to complete homework activities [36-39].

3.1.1.2 Instant messaging and chat rooms

Instant messaging [40, 41] and secure online chat rooms [42] used to provide feedback synchronously were less frequently mentioned. For example, in one study facilitators posted course materials using text or images in online chat rooms, and participants were allowed to post

comments, use emoticons, share experiences and ask questions [42]. Transcripts of these interactions were made available for review to both participants and facilitators. Chat rooms were typically small (up to 6 participants) and were facilitated by 1-2 therapists. Instant messaging, on the other hand, facilitated one-on-one communication between participants and clinicians [40, 41]. This feature was used quite extensively in one study to provide guided CBT wherein therapists were encouraged to spend 20-50 minutes responding to patient messages [41].

3.1.1.3 Discussion forum

Discussion boards used primarily for peer support were often moderated or monitored by a coach or a therapist [26, 43-46]. Participants used these forums primarily to share their experiences and provide social support [44, 45]. In some cases, discussion forums were used mainly to support instruction. Patients discussed contents of the treatment material, or posted homework and questions for the clinician or therapist [28, 47, 48]. In many cases, participants could use pseudonyms or were offered different privacy setting options to maintain anonymity.

3. 1. 1. 4 Phone calls and text messages from therapists

In the majority of the 16 trials that provided telephonic support, phone calls were used to remind participants to complete modules [28, 37, 38, 43, 49] or were used by facilitators to elaborate on course materials [32, 45, 46, 50, 51]. In some cases, telephone was used to provide technical support (e.g., to help users log onto the website) [34]. Finally, text messaging was used in two trials to remind patients to complete modules when e-mail and phone contact did not work [34, 42].

3.1.2 Other program ICT approaches and features

A number of interactive features were mainly used to support instructional purposes (e.g., automated emails, tailored content, video, animation) and to facilitate self-monitoring of

symptoms. A few studies reported less frequently mentioned features like games, thought helper, e-Journals, ask-an-expert, and Frontline.

3.1.2.1 Tailored content

Tailoring refers to the use of computer algorithms to adapt health messages to a particular individual's treatment needs [32, 52, 53]. Tailored content was reported in five trials. In four of the studies tailored content was in the form of simulated conversation, in which subsequent content was adaptive to users' responses [40, 54-56]. In the "myCompass" program [57] participants received individualized module recommendations and self-monitoring procedures based on their responses to a tailoring questionnaire.

3.1.2.2 Automated emails

Automated e-mail was a standard feature in 13 web-based treatment programs and was reported in 15 studies. These were generally used to update participants on course content (e.g., notifications about new course content) and reinforce continued engagement (e.g., reminders to log into program portal or to complete course assignments, and confirmation or congratulation messages on completion of modules) [58]. Proudfoot et al. [57] provided users the option to receive scheduled automated e-mail reminders for self-monitoring or to receive mental healthcare advice and motivational texts.

3.1.2.3 Self-monitoring tools

Self-monitoring tools were incorporated in six trials. Four studies provided tools for monitoring depressive moods [39, 40, 42, 59]. Proudfoot et al. [57] used a self-monitoring feature in myCompass program that enabled users to select three symptoms they wanted to self-monitor from a list of 20 symptoms. Users were also given the option to schedule and receive text or email reminders for self-monitoring [57].

3.1.2.4 Video, audio-visual aids and animation

Video instruction was a standard feature of five treatment programs and was specifically reported in seven studies (see Table 3). Van Bastelaar et al. [39] incorporated short videos of patients explaining how they used skills learned in the course to solve their problems. Warmerdam et al. [27] reported using audio-visual aids showing patients applying the principles of CBT. Animation was incorporated in four treatment programs and was reported in six studies. Narrated animations were included in instructional modules of the web-based behavioral activation program, *Depressionshja ̈lpen* [47]. Animated demos of CBT techniques were also incorporated in instructional modules of the MoodGYM program specifically adapted for adolescents [60].

3.1.2.5 Other ICT features

A few interactive features (e.g., games, thought-helper, eJournal, ask-an-expert) were reported less frequently in the intervention studies. Clarke et al. [40, 52] incorporated a thought-helper in their entirely self-help online CBT program, ODIN (Overcoming Depression on the InterNet) to help participants practice cognitive restructuring. With this feature, users type a negative or irrational thought into a text box, these are then matched with an existing list of common negative thoughts. Users were then presented with a list of possible realistic counter-thoughts [40, 52]. ODIN also provided users with an opportunity to record their thoughts in a private online journal or diary with the option to make their entries public [40]. Sheeber et al. [45] included an Ask-an-Expert forum that was monitored daily by a coach or clinical supervisor. One intervention study provided participants access to a public forum, *Stories from the Frontline*, which includes a large collection of forum posts written by participants in previous

iCBT programs [46]. Lastly, an interactive game was reported by one of the studies using the treatment program MoodGYM [61].

3.1.3 Mobile delivery

Only two studies used a native mobile application to deliver psychoeducation for depression [51, 57]. Watts *et al.* [51] did not find significant differences in clinical outcomes between mobile delivery and computer-based delivery of the same treatment program. Proudfoot *et al.* [57] used a combination of a mobile app and a website to deliver CBT and found that the combined platforms significantly reduced depression symptoms, and was associated with high program satisfaction (87%). These findings provide results in favor of the delivery of standard psychotherapies such as CBT via mobile platforms.

3.2 General trends on compliance, levels of clinician involvement and outcomes

Studies that reported greater compliance with adherence measures were generally observed to indicate greater levels of clinician involvement. Similarly, greater use of communication tools and interactive features helped facilitate clinician involvement and also generally indicated greater compliance to treatment. Moreover, trials that reported using more ICT features indicated either comparable or greater symptom reduction compared to a treatment-as-usual group or significantly higher symptom reduction compared to a waitlist group.

4. Discussion and conclusion

4.1. Discussion

A total of 55 studies were included in this systematic review of ICT features of web- and mobile-based psychoeducational interventions. Results showed that most of the web- or mobile-based psychoeducational interventions demonstrated either comparable or improved outcomes compared to treatment as usual or waitlist control groups. The current review provides additional

evidence that highly structured and effective therapeutic techniques like CBT can be easily adapted for web or mobile delivery. Many of these techniques, however, typically require greater levels of clinician-patient contacts to be effective, thus the gold standard is still face-to-face delivery. Advances in computing technologies make it possible to create and provide access to sophisticated systems that can simulate therapist-client interactions. Many aspects of these proven treatments can now be automated through information and communication technologies. Moreover, widespread access to high speed connections and the potential for mobile delivery make these treatments more accessible to at-risk and hard-to-reach individuals. Thus it was the goal of this review to examine the ICT features of web- and mobile-based psychoeducational interventions to determine the extent to which the relative advantages of technological features are being optimized.

In spite of the increasing popularity of mobile-based health interventions, it was interesting to note that only two studies explored the use of mobile delivery for psychoeducation. These two studies, do however, point to the potential of successfully adapting therapies like CBT for mobile platforms.

While advances in computing can potentially automate many aspects of these interventions and make them largely self-guided, 25 of the studies reviewed still reported high or medium levels of human (or therapist) support. Granted that previous meta-analyses have revealed larger effect sizes for human-supported web-based psychoeducational interventions compared to unsupported interventions, this can be interpreted as a limiting factor in that one of the intentions of web-based delivery is to reduce the burden on therapists and provide wider access [16, 62]. Many of the interventions reviewed included substantive feedback systems whereby clinicians used tools such as email, encrypted email or secure messaging, discussion

forums, instant messaging or text messaging to provide extensive feedback and counseling. In one study, therapists were encouraged to spend 20-50 min each to respond to patient texts [41].

It is interesting to note that there was limited reporting overall of the use of multi-media features like videos and animations or interactive features like games, quizzes, etc. These features were more apparent in popular therapeutic programs like MoodGYM but were less prevalent in majority of the intervention studies reviewed. In fact, the most common ICT features shared among majority of the studies, was the use of an educational website and a feedback system (e.g., email, online messaging, etc.). Features that could potentially improve the interactivity and engagement in these interventions and that are easily automated (e.g., tailored content, thought helper, e-journaling, self-monitoring tools, etc.) were less frequently reported. Tailoring has been proven to be an effective health communication strategy that employs sophisticated computer algorithms to deliver individualized feedback [63]. Effective strategies such as motivational interviewing can easily be automated to create tailored feedback [64] that in turn can enhance the CBT approach. However, tailoring was reported in only five of the studies eligible for this review. Interestingly, only six studies reported using any kind of self-monitoring or tracking tools. This points to the limited interactivity of these web-based psychoeducational interventions.

4.2 Limitations of the study

Observations were based only on program features explicitly reported by the authors. It is entirely possible that some details were missed due to the general paucity in descriptions of the technological components of the interventions examined. Moreover, due to the idiosyncratic nature of the outcome measures used across the studies, we could only generate limited

observations about efficacy. Future experimental studies can investigate the effects of using a particular set of ICTs on compliance and treatment outcomes.

4.3 Conclusions

To the authors' knowledge, the current study is one of the most comprehensive systematic reviews focusing on the ICT features of web- or mobile-based psychoeducational interventions. While a great majority of the studies were overall effective in reducing depressive symptoms, there was variance in the way ICTs were used. Despite the potential to deliver psychoeducational instruction using a wider variety of modalities and interactive features, most of the interventions employed basic modalities like websites and common communication tools (e.g. email, messaging, discussion forums). Many still depended on medium to high levels of clinician support and limited automation. Studies reporting higher levels of clinician involvement and greater use of communication tools also reported greater levels of compliance. Clearly, this points to the need to further explore how we can use technologies to reduce the burden on clinicians and to simulate therapist-client interactions that are critical for improving outcomes and compliance. Although the goal of web- or mobile-based delivery is not to replace face-to-face therapy, there are ways that ICTs can be optimized to create comparable approaches that enable wider reach. This review reveals promising progress in this area but the potential of web- and mobile-based delivery has yet to be fully realized. Moreover, there is a need for more controlled experimental studies and meta-analyses to help unpack the combined effects of specific technology features and reveal ways we can automate more aspects of clinician input.

4.4 Practice implications

This review aims to improve understanding about how ICTs are being used in web or mobile-based psychoeducational interventions and to identify patterns regarding the application

of these features vis-a-vis therapist involvement and compliance to treatment. Findings suggest that these types of interventions have yet to fully optimize the use of ICTs to reduce the burden on mental healthcare providers. Intervention program designers may want to explore the use of proven effective approaches like computer tailoring to supplement the delivery of individualized feedback. Moreover, there are a number of interactive features (i.e., thought helper, electronic journaling, simulations, interactive activities, text messaging, etc.) that can potentially supplement psychoeducation, self-tracking and monitoring, and skills building that, in turn, can reduce the burden on clinicians without negatively affecting treatment outcomes. In order for us to better understand the effectiveness of ICTs within these types of interventions, future clinical studies need to describe the technological features used in more detail and also evaluate users' perceptions about these components.

Conflict of interest

None.

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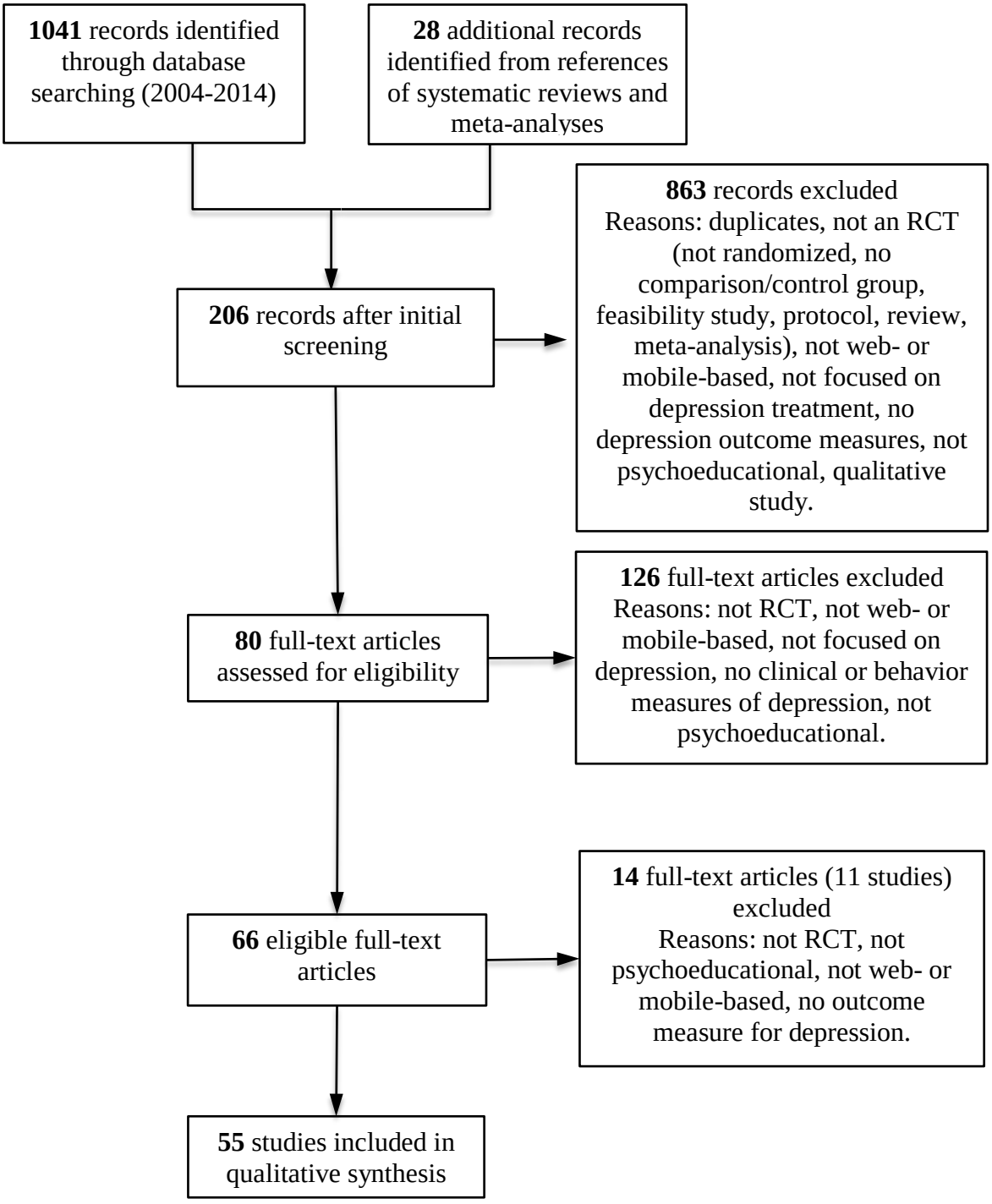

Fig. 1. PRISMA Study Selection Process Flow Diagram

Table 1

Academic databases searched and key words used.

Databases	Key Words
CINAHL	depression AND intervention, depression intervention AND computer-assisted/cellular phone, depression AND psychotherapy/psychoeducation
Cochrane Library of Systematic Reviews	computer-assisted depressive* disorder intervention, internet depressive* disorder intervention, and major depressive disorder intervention
EBSCO	Internet-based intervention AND depressive disorder, depression intervention AND cell phone
Essential Evidence Plus	Internet depression intervention
Evidence-Based Medicine Reviews	computer-assisted depressive* disorder intervention, internet depressive* disorder intervention, and major depressive disorder intervention
Health Reference Center	depression intervention AND computer/internet*/technology*/cellphone*/mobile application
PsychINFO	Internet-based intervention AND depressive disorder , depression intervention AND phone / text message/computer / internet-based, internet / phone / mobile phone / computer AND cognitive behavior therapy AND depression
PubMed	depression/prevention and control [MeSH] OR depression/therapy [MeSH] AND internet OR wireless technology/utilization [MeSH], tailor* AND intervention AND Internet AND depression, depression* AND internet/cellular phone AND intervention, internet AND depression AND cognitive behavior therapy*

Table 2

Summaries of the Internet-based psychoeducational studies reviewed.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
1. Anderson et al., 2005 [65]	Depression; adults at risk of depressive disorder		BA+CBT	The study examined the effectiveness of an internet-based therapy program for depression with minimal therapist contact. Over the course of ten weeks, the treatment group (n=57) was given access to an HTML-based website that included 89 pages of text divided into five modules. It also involved weekly quizzes that were automatically sent to therapists. Therapists provided e-mail feedback and access to the next treatment. The treatment group and waitlist control group (n=60) also participated in separate, monitored discussion boards online. Participants in the treatment group showed a significant improvement of depressive symptoms compared to the control group. These improvements were maintained at a 6-month follow-up.
2. Berger et al., 2011 [54]	Adults with depression	Deprexis	Contemporary CBT	The study compared the effectiveness of a guided versus unguided internet-based treatment intervention for depression. Over the course of ten weeks, the unguided self-help group (n=25) received the same treatment as the guided group (n=25) except for weekly therapist support provided through an e-mail system. Both groups were given access to the online website that contained mostly text but some interactive features including videos and dialogue that was tailored to individual responses. A waitlist control group (n=26) was also included for comparisons. There was no significant difference in symptom reduction between guided and unguided treatment groups, however both treatment groups improved more symptoms than the control group. These improved were maintained at a 6-month follow-up.

	RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
3.	Bolier et al., 2013 [66]	Mild to moderately depressed adults	Psyfit ("mental fitness online")	CBT+PP+PST+ Mindfulness	The study examined the effectiveness of an automated, self-help intervention delivered online. Over the course of 6 weeks, the treatment group (n=143) received weekly psychoeducation lessons and, automated e-mails reminding them when the next lesson was available and access to self-monitoring instruments. A waitlist control group (n=141) was included for comparisons. In the treatment group, depressive, anxiety and well-being all improved post intervention. These improvements were maintained at a 2-month and a 6-month follow-up.
4.	Calear, Christensen, Mackinnon, Griffiths, & O'Kearney, 2009 [60] and Calear, Christensen, Mackinnon, & Griffiths, 2013 [67]	Depression; adolescent students of ages 12-17	MoodGYM	CBT	The study examined the effectiveness of self-help, internet-based therapy intervention for the prevention and reduction of anxiety and depression symptoms in adolescents. Participants were children attending 30 different schools across Australia. Over the course of 5 weeks, the treatment group (n=593) was given access to MoodGYM during school and was monitored in person by a teacher. A waitlist control group (n=914) was included for comparisons. Adherence to the program was positively related to treatment outcomes. Only male participants in the treatment group showed an improvement in depressive symptoms post intervention and at a 6-month follow-up. All participants in the treatment group showed an improvement in anxiety symptoms post intervention and at a 6-month follow-up.

	RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
5.	Carlbring et al., 2013 [47]	Adults with Depression	Depressionshjälpen	BA+ACT	The study examined the effectiveness of self-help internet-delivered therapy intervention for depression. Over the course of eight weeks, the treatment group (n=40) was given access to an interactive website that included texts, videos and narrated animation. The treatment group also had access to a therapist through e-mail and received a workbook (in paper) and CD-ROM with mindfulness and acceptance exercises. A waitlist control group (n=40) was included for comparisons. Participants in the treatment group showed a significant improvement in depressive symptoms compared to participants in the control group. 25% of participants in the treatment group reached remission (BDI score<11). These improvements maintained at a 3-month follow-up.
6.	Christensen, Griffiths, Korten, Brittliffe, & Groves, 2004 [61]	Depression	MoodGYM	CBT	The study compared treatment outcomes for public registrants (n=19607) who visited an online, self-help website versus treatment outcomes for participants (n=182) of a random controlled trial who used the same website. The website contained several interactive features including a game and workbook. Participants in the controlled trial and public registrants did not differ in treatment outcomes for depression. Both showed improvements.
7.	Christensen, Griffiths, Mackinnon, & Brittliffe, 2006 [68]	Depression; adults	MoodGYM	CBT	The study compared the effectiveness of a brief iCBT with extended versions with and without stress management and behavior therapy add-ons. A total of 2794 participants were randomly assigned to 6 conditions (n >=463 for each condition) each with a different combination of the iCBT modules. Module 1 contained an interactive online workbook and Module 4 provided downloadable relaxation tapes. The extended additions of iCBT, but not the single module, effectively reduced symptoms of depression. However, longer interventions did result in higher dropout rates.

	RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
8.	Christensen, Leach, et al., 2006 [69]	Adults of ages 18-52 at risk of depression	BluePages vs. MoodGYM	CBT /Psychoeducation	The study compared the effectiveness of iCBT for depression (n=182) with an information website (n =165). Participants in the online therapy group were give access to a website which provided downloadable summary pages, individualized symptom scores and homework completion outcomes. A waitlist control group (n=157) was included for comparisons. Both group received weekly telephone calls. Participants in the online therapy group and information website group showed a significant improvement in depressive symptoms compared to participants in the control group. The use of internet therapy was associated with higher help seeking for iCBT, massage and exercise while the use of the information website was associated with decreased support seeking from friends and family.
9.	Christensen, Griffiths, & Jorm, 2004 [50] and Mackinnon, Griffiths, & Christensen, 2008 [70]	Adults with depression	BluePages vs. MoodGYM	CBT/Psychoeducation	The study compared the effectiveness of a psychoeducation website (n=166) with an iCBT for depression (n=182). An attention-placebo control group (n=178) was also included for comparisons. The treatment intervention included interactive exercises stored in personalized workbooks. Individualized feedback was available to print for each module. Participants in the iCBT and psychoeducation website groups showed significant improvements in depressive symptoms compared to participants in the control group. iCBT was slightly more effective in improving depressive symptoms than the psychoeducation website. These improvement were sustained for the iCBT group but not for the psychoeducation website group at a 6-month follow-up. Both treatments were significantly superior than the control group at a 12-month follow-up.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
10. Clarke et al., 2005 [52]	Depression	ODIN (Overcoming Depression on the InterNet)	CT	The study examined the effectiveness of a web-based self-help intervention (ODIN) that provides training for cognitive restructuring for depression. There were two treatment groups: one that provided telephone reminders (n=80) and one that provided postcard reminders (n=75). Both groups had access ODIN that included interactive features such as "Thought Helper" – a search engine for users to input negative thoughts and find several counter-thoughts. A TAU control group (n=100), without access to ODIN, was included for comparisons. Participants in the treatment groups showed a significant improvement in depressive symptoms compared to participants in the control group. There were not differences found between groups with different types of reminders. There were stronger treatment effects for more severely depressed participants.
11. Clarke et al., 2009 [40]	Depression; young adults of ages 18-24		CBT	The study examined the effectiveness of a pure self-help, internet-based cognitive behavioral skills training program targeting young adults with depression symptoms. The treatment group (n=83) was given access to an interactive website that provided users with personalized feedback to simulate how therapy is delivered in conventional, face-to-face sessions. The website also included a private e-journal, thought helper, daily mood and pleasant activity level tracking. A TAU control group (n=77) was included for comparisons. The treatment group showed significant improvement in depressive symptoms compared to TAU group. Overall, there was a small effect on depressive symptom reduction for the sample and a moderate effect among female participants.
12. Day, McGrath, & Wojtowicz, 2013 [32]	Depression; university students of ages 18-45		CBT	The study examined the effectiveness of a guided self-help iCBT for university students with moderate anxiety, depression, and/or stress. Over the course of 6 weeks, the treatment group (n=33) was given access to an online program organized in multimedia workbooks that included videos, audio files, pictures and activities. Trained coaches also provided support and encouragement to participants via e-mail or brief weekly phone calls. A delayed-treatment control group (n=30) was included for comparisons. Participants in the treatment group showed a significant improvement in depressive symptoms compared to participants in the control group. These improvements maintained at a 6-month follow-up.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
13. de Graaf et al., 2011[53] and de Graaf et al., 2009 [33]	Adults of ages 18-65 with depression	Colour Your Life	CBT	The study compared the effectiveness of an iCBT intervention for depression (Colour Your Life, n=100) with the same intervention combined with TAU (TAU, n=100). A just TAU group was also included for comparisons (n=103). The combined online program and TAU group received support from a general practitioner and e-mail reminders. There were no significant differences in treatment effects between all three groups at posttest or at a 12-month follow-up. Overall effects were modest in all three interventions.
14. Dear et al., 2013 [36]	Adults of ages 20-91 with chronic pain and depressive disorder or anxiety disorder	The Pain Course	CBT	The study examined the effectiveness of a clinician-guided iCBT intervention for reducing disability, anxiety, and depression in relation to chronic pain. Over the course of eight weeks, the treatment groups received either regular contact (n=143), optional contact (n=141) or no contact (n=131) with a clinical psychologist. A psychologist provided content summaries, answers to participants' questions, encouragement and progress reinforcement through a secure e-mail messaging system and weekly phone calls. Automated e-mails, comprised of 2 to 3 paragraphs, were also sent to participants in all treatment groups. A waitlist control group (n=75) was included for comparisons. Participants in all treatment groups showed improvements in anxiety, depression and average pain compared to participants in the control group. There were no significant differences in clinical outcomes between treatment groups.
15. Donker et al., 2013 [71]	Adults with depression	IPT component of E-couch; MoodGYM	IPT/CBT	The study compared the effectiveness of IPT(n=620) versus CBT (n=613) components of an internet-based program for depression. Another internet-based program (n=613) was included for comparisons. All programs were self-guided and lasted for 4 weeks. Each week, automated e-mails were sent to advice participants of the availability of a new module. All three interventions significantly improved depressive symptoms, however, there were no significant differences between the three interventions at posttest or at a 3-month follow-up.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
16. Drozd et al., 2014 [72]	Adult patients with chronic HIV infection	AVANTI	PP + metacognitive therapy	The study examined the effectiveness of an internet-based intervention for treating depression and improving subjective well-being of patients with chronic HIV infection. Over the course of 5 weeks, the treatment group (n=36) received an e-mail that directed them to a predetermined sequence of websites that were unique for a particular session. A control group was included for comparisons (n=31). Participants in the treatment group showed significant improvements in subjective well-being and affect balance at a 3-month follow-up. Participants in the treatment group did not show significant improvements in depressive symptoms.
17. Farrer, Christensen, Griffiths, & Mackinnon, 2011 [73]	Adults with depression	BluePages + MoodGYM	CBT	The study compared the effectiveness of an iCBT intervention for depression with and without phone tracking over the course of 6 weeks. Participants in the tracking group received 10-min phone calls from a counselor each week. The calls addressed issues related to the program itself and did not include any therapeutic advice. A TAU control group (n = 35) and a phone-tracking-only group (n = 37) were included for comparisons. Participants in the iCBT conditions (with and without phone tracking) showed significant improvements in depressive symptoms at posttest and at a 6-month follow-up. There were no differences in symptom improvement between the iCBT groups.
18. Geraedts et al., 2014 [58]	Adult employees with depression	Happy@Work	CT + PST	The study examined the effectiveness of a web-based, guided self-help intervention for employees with depressive symptoms. The treatment condition (n=116) received feedback on their assignments through the website. This allowed users to then continue on to the next lesson. Automatic reminders were sent to participants via email when deadlines were not met. A TAU control group (n=115) was included for comparisons. Participants in both groups showed significant improvements in depressive symptoms at posttest and these were maintained at a 6 and 12-month follow-up. There were no significant differences in improvement of depressive symptoms between the two conditions.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
19. Glozier et al., 2013) [34] and (Donkin et al., 2013 [74]	Adults of ages 45-75 with mild to moderate depression and high cardiovascular disease risks	E-couch vs. HealthWatch	CBT+IPT+AR +PA (for E-couch)	The study examined the effectiveness of an internet-delivered cognitive behavioral therapy for depressive symptom reduction in adults with mild to moderate depression and high cardiovascular disease risks. Over the course of 12 weeks, the treatment intervention (n=280) was given access to a sequential version of E-couch. Users received e-mails when a new module opened and a reminder email, phone call or text message if the module had not yet been completed. An attention-control group (n=282) was given access to health information website for 12 weeks. Participants in the treatment condition showed a small, but robust improvement of depressive symptoms in comparison to the participants in the attention-control group.
20. Griffiths et al., 2012 [43]	Adults of ages 18-65 with depressive disorder	E-couch; WellBeing Board	CBT+IPT+AR +PA (for E-couch)	The study examined the effectiveness of internet support group (ISG) provided through an online, closed and moderated bulletin board over the course of 12 weeks. One treatment group (n=76) received access to both an internet-based program (E-couch) for depression as well as to the ISG. Moderators added one or two new forums or topics to the bulletin board each week. Two other treatment groups either received access to just the bulletin board (n=80) or just the internet-based program (n=76). Participants in all treatment group received automated emails when each new module was available as well as telephone reminders. A delayed treatment control group (n=77) was also included for comparisons. The ISG only group had significant reduction in depressive symptoms at 3-month follow-up. However, both ISG and ISG combined with E-couch had greater treatment effects at a 6- and 12-month follow-up. The treatment effects of E-couch alone dissipated at 6-month follow-up.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
21. Haemmerli et al., 2010 [44]	Adults of ages 22-45 with primary or secondary infertility	Child Wish Online Coaching	CBT	The study examined the effectiveness and patient acceptance of an internet-based treatment for depression, anxiety, and infertility-specific distress. Over the course of 8 weeks, the treatment group (n=124) received access to an interactive self-help program that included regular text-based contact with a therapist, continuous monitoring and feedback system and monitored forums for participants to share their experiences with others. Therapists were instructed to write weekly brief motivational notes to participants. A waitlist control group (n=64) was included for comparisons. Participants in the treatment condition showed significant improvement in depressive symptoms compared to the participants in the control group. Eighty percent of the participants rated the treatment positively. There was no improvement in pregnancy rate.
22. Hoek, Schuurmans, Koot, & Cuijpers, 2012 [75]	Adolescents with depression and anxiety		PST	The study examined the effectiveness of an Internet-based guided self-help preventative PST for adolescents (n=22) with mild to moderate symptoms of depression and/or anxiety. The intervention also included a weekly-automated email explaining contents and exercises for the coming week. Mental health professionals provided the feedback on participants' completed homework exercises. A waitlist control group (n=23) was included for comparisons. Reduction of depression and anxiety symptoms were found in both groups. The internet-based PST did not outperform the waiting-list control group.
23. Hoifodt et al., 2013 [76]	Adults of ages 18-65 with depression	MoodGYM (Norwegian version, 5 modules+a personal workbook)	CBT	The study examined the effectiveness of a guided iCBT (n=52) for mild and moderate depression. Weekly face-to-face therapist support and tailored emails were incorporated into the treatment to reinforce the treatment program. A delayed-treatment control group (n=54) was included for comparisons. More participants in the treatment group experienced reduction of depression and anxiety symptoms than in the control group. This effect was mostly sustained at 6-month follow-up. Improvements in life satisfaction were partially maintained. Adherence rates were moderate.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
24. Hollandare et al., 2011 [77] and Holländare et al., 2013 [78]	Adults with depressive disorder		CBT	The study examined the effectiveness of a 10-week iCBT intervention as relapse prevention for people with residual major depression symptoms after previous treatment (n=42). A therapist was in contact with participants in the treatment group through e-mail. The contact was unrestricted and contained support, answers to specific questions, prompts and reinforcement after completed homework. A TAU control group (n=42) was included for comparisons. Fewer participants in the treatment group experienced relapse than in the control group. A larger reduction in residual symptoms was also found in the treatment group than in the control. Two years after the intervention, a significantly larger proportion of the treatment group experienced remission than the control group.
25. Johansson, Ekbladh, et al., 2012 [79]	Adults of ages 21-73 with depression	SUBGAP	PDT	The study examined the effectiveness of a 10-week guided self-help PDT intervention for depression. Therapists in the PDT group (n=46) offered continuous online support via secure online messaging. An active control group (n=46) was included for comparisons and received only psychoeducation and online support. Participants in the treatment group showed significantly more improvements in depression symptoms than the control group. These improvements were sustained at a 10-month follow-up.
26. Johansson, Sjöberg, et al., 2012 [80]	Adults of ages 20-75 with depression		CBT	This randomized controlled trial compared the effectiveness of a 10-week guided self-help iCBT for depression that was either tailored (n=39) or untailored (n=40). Both tailored and untailored versions included delivery of text chapters and e-mail support from a therapist through a secured online environment. Both groups also received regular feedback from therapists on homework assignments. An active control group (n=42) was included for comparisons. The control group had access to an online discussion forum with topics related to depression. Both iCBT treatment groups showed significant improvements on depression, anxiety, and quality of life. This treatment effect was maintained at a 6-month follow-up. Individually tailored treatment was more effective in reducing depression symptoms and improving recovery rate than the untailored treatment among patients with more severe depressive symptoms and more comorbidity.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
27. Kersting, Kroker, Schlicht, Baust, & Wagner, 2011 [81]	Adults with depression; Mothers after pregnacy loss		CBT	The study examined the effectiveness of an iCBT for mothers after pregnancy loss. The treatment group (n=45) received 5 weeks of an online intervention that adapted several cognitive behavioral components to the needs of mothers after loss of child during pregnancy. Participants completed 10 assignments on the website, for which therapists provided individual feedback through the website. The control group (n= 33) was assigned to a waiting list. The iCBT showed significant reductions in posttraumatic stress, grief, depression and overall mental health compared to the control condition. There were no significant reductions in anxiety or somatization between the conditions. Effect sizes were medium to large and were consistent at a 3-month follow-up.
28. Kessler et al., 2009 [82]	Adults with depression		CBT	The study examined the effectiveness of an iCBT for treating depression delivered in real time by a therapist. The experimental group (n=149) received 10 sessions of CBT for 8 weeks. Participants were given one-to-one access via instant messaging with a trained therapist for an average of 55 min. Therapists worked for the organization *PsychologyOnline* and had previous experience providing psychotherapy in this setting. The control group (n=148) was assigned to a waiting list. The internet-based intervention led to a significantly higher recovery rate compared to the waitlist condition. Effect sizes were larger than similar interventions offered in primary care. These results were consistent at an 8 month follow-up
29. Langrial, Oinas-Kukkonen, Lappalainen, & Lappalainen, 2014 [37]	Depression; Confidence	Good Life Compass	ACT	The study examined the effectiveness of a web-based intervention for depression that included persuasive reminders. The first treatment group (n=19) received 6 weeks of a Behavior Change Support System, which included virtual rehearsals, a software feature that enhances mindfulness, acceptance skills and commitment toward value based actions and persuasive reminders. Participants completed one module every week and were reminded by 2 weekly e-mails from therapists. The second treatment group (n=20) received the same treatment after the main intervention and did not receive the e-mail reminders. The first treatment group showed a significant reduction in depressive symptoms and a significant increase in self-confidence. Comparisons to the rehearsal-only (second) group showed that reminders had little effect on this change in symptoms.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
30. Lintvedt et al., 2013 [35]	Adults at risk of depression	MoodGYM, BluePages (Norwegian version)	CBT + IPT	The study examined the effectiveness of and user satisfaction with an unguided, internet-based intervention for depression. The treatment group (n=81) received access to MoodGYM, a web-based program based on cognitive behavioral and interpersonal therapies, and BluePages, a website containing evidence-based information about depression, for 8 weeks. The control group (n=82) was assigned to waiting list. The web-based intervention led to significant reduction in depressive symptoms and negative thoughts compared to the waitlist condition.
31. Meyer et al., 2009 [55]	Adults with depression	Deprexis	Contemporary CBT	The study examined the effectiveness of a web-based intervention for depression. The treatment group (n=320) received access to Deprexis, an online, self-help program for 9 weeks in addition to TAU. The program incorporated several psychotherapeutic approaches into 10 modules with content tailored to the user's responses. The program explained and illustrated relevant concepts and techniques and provided several exercises. The control group (n=76) was offered delayed access to the program following TAU. A more significant reduction in depressive symptoms and higher rate of recovery was found in the web-based intervention condition. These results were sustained at a 6-month follow-up.
32. Moritz, Schilling, Hauschildt, Schroder, & Treszl, 2012 [56]	Adults with depression	Deprexis	Contemporary CBT	The study examined the effectiveness of an online self-help intervention for depression. The treatment group (n=105) received Deprexis, an internet-based, self-help program for 8 weeks. The program incorporates cognitive behavioral and other psychotherapeutic approaches into 10 content modules. The content is tailored to the users' responses and explains and illustrates relevant concepts and techniques to the user. The program also provides exercises, drawings and animation throughout. The control group (n=105) was assigned to a wait list. The internet-based intervention led to a significant reduction in depressive symptoms compared to the waitlist condition. Symptom decline was more evident among participants with moderate symptoms at baseline and among those who were not currently consulting a therapist.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
33. O'Kearney et al., 2006 [25]	Depression; Ages = 15-16; Males	MoodGYM	CBT	The study examined the effectiveness of an internet-based intervention for depression in treating depression and depression-vulnerable status in male youths. The treatment group (n= 40) received access to MoodGYM, a self-help web-based program that uses cognitive-behavioral therapy to help people identify and overcome problems with depression, for 5 weeks. Participants were assigned to tutor groups (15-20 students) and had weekly access to a computer laboratory at their school. The control group (n=38) was assigned to a waiting list. There were no significant differences between the two conditions in depressive symptoms, attributional style or self-esteem. Participants who completed 3 or more modules in MoodGYM showed small reduction in risk of being classified as depression. These reductions were not sustained at the 1-month follow-up.
34. Perini et al., 2009 [28]	Adults with depression	Sadness Programme	CBT	The study examined the effectiveness of an internet-based program for depression with assistance from a clinician. The treatment group (n=29) received 8 weeks of the Sadness Programme, a web-based program based on CBT principles and techniques and contained 4 major components: 6 online lessons, homework assignments, participation in an online discussion forum and regular e-mail (or phone) contact with a therapist. A therapist was an active responder to both the discussion post and homework lessons. A total of 215 e-mails were sent to the treatment group participants. The control group (n=19) was assigned to a waiting list. The online intervention group had a significant reduction in depressive symptoms compared to the waitlist.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
35. Pittaway et al., 2009 [83]	Depression, Anxiety	Livinglifetotheful; Beating the Blues	CBT	The study compared the effectiveness of three self-help CBT treatments for depression and anxiety. The treatment group (n=19) received access to Livinglifetothefull, a tailored, self-help website consisting of 13 CBT modules that lasted 45-60 min as well as 2 support phone calls during week 2 and week 4 of the intervention. Participants also attended an introductory appointment with the researcher coordinator. A comparison group (n=16) received Beating the Blues, a computerized, self-help intervention consisting of eight 50-min sessions as well as 1 support phone call at week 4. Another comparison group (n=15) received printable workbooks on overcoming depression and anxiety. All sessions lasted 8 weeks. All three interventions improved depression symptoms. No significant difference was found in clinical scores between the three interventions.
36. Powell et al., 2013 [84]	Mental Well-being	MoodGYM	CBT	The study examined the effectiveness of an internet-based intervention for mental well-being and depression in the general population. The treatment group (n=1534) had access to MoodGYM, a web-based, self-help program that teaches cognitive behavioral skills for 8 weeks. The course is supported by animation, written and spoken information and homework assignments. Coaches provided one-time feedback for all weekly homework assignments and also sent e-mail reminders in the first two weeks of treatment. The control group (n=1536) was assigned to a waiting list. The internet-based intervention significantly increased mental well-being and decreased self-reported scores of depression and anxiety, but did not influence quality of life or health service use. These results were consistent at a 3-month follow-up.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
37. Proudfoot et al., 2013 [57]	Depression	myCompass	CBT+IPT+PP+ PST	The study examined the effectiveness of a mobile phone and internet-based program for depression. The treatment group (n=242) received 7-weeks of myCompass, an online, self-help program delivered over the mobile phone and internet. The program contains several lessons where users follow the story of a comic character that has depression, along homework activities for each lesson, real-time self-monitoring of symptoms, and motivation/reminder automated e-mails or text messages. Both a waitlist group (n=230) and attention control group (n=248) were used as control groups. The attention control group received mental health program that matched the main intervention on duration and mode of delivery. Both the main intervention group and the attention control group showed significant reductions in depressive symptoms compared to the waitlist condition. The internet-based program showed a significantly greater reduction in symptoms than the attention control condition, but these results were not sustained at the 12-week follow-up.
38. Ruwaard et al., 2009 [59]	Depression		CBT	The study examined the effectiveness of an iCBT for depression guided by therapists. The treatment group (n=36) received 8 sessions over 11 weeks of a web-based form of CBT. Participants completed 8 homework assignments in the form of a personal interactive webpage. Trained therapists provided personalized feedback to each participant based on their progress and further instructions for upcoming sessions. The control group (n=18) was assigned to a waiting list. The web-based intervention significantly reduced depressive symptoms compared to the waitlist condition. These results were consistent at the 18-month follow-up.
39. Sethi, Campbell, & Ellis, 2010 [85]	Depression; Anxiety Low to Moderate Levels of Depression and Anxiety	MoodGYM	CBT	The study compared the effectiveness of 3 versions of CBT for depression against a waitlist group (n=10): one delivered online (n=9), one delivered face-to-face (n=10), and one delivered both face-to-face and online (n=9). Over the course of 3 weeks, the experimental group received MoodGYM, a web-based program with limited guidance from a therapist. The combined face-to-face and online treatment was significantly more effective in reducing both depressive and anxiety symptoms than the strictly online or strictly face-to-face versions of the therapy.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
40. Sheeber et al., 2012 [45]	Maternal Depression; Mothers suffering from depression	Mom-Net	CBT	The study examined the effectiveness of an iCBT for mothers suffering from depression. Over the 14 weeks, the treatment group (n=35) received Mom-Net, an internet-based program adapted from the Coping with Depression course and featuring content tailored toward mothers with depression. Participants had access to an online "bulletin board" where participants could share their experiences with the program. Coaches monitored the discussion board and responded to an "Ask an Expert" link. They also had 15-20 minutes phone conversations with each participant every week and monitored participant's understanding and progress through the main website. The control group (n=35) was assigned to a waiting list. Mom-net significantly reduced depressive symptoms compared to the waitlist condition. The internet-based program also showed low attrition rates and high levels of feasibility.
41. Spek et al., 2007 [38] and Spek, Nyklíček, Cuijpers, & Pop, 2008 [86]	Subthreshold Depression; Age = 50+	Coping with Depression (Dutch version)	CBT	The study compared the effectiveness of a CBT for depression in people over 50 years old, one delivered over the internet and the other delivered face-to-face as group-based. A secondary objective of the study was to determine the characteristics that predicted treatment outcome for both groups. One treatment group (n=102) received a web-based self-help version of Coping with Depression, an 8-week program that contains text, exercises, videos and figures utilizing CBT protocols. Another group (n=99) received a group-based version of Coping with Depression, which covered the same topics as the internet version. The control group (n=100) was assigned to a waiting list. Both intervention groups showed a significant reduction in depressive symptoms compared to the waitlist group. There were not significant differences between the internet-based and group-based interventions, with education of participant being a major characteristic that determined the effectiveness of both interventions. These results were consistent at a 1-year follow-up. In a follow-study, the authors found that outcome of cognitive behavior was positively associated with participant’s scores in altruism and group therapy outcome was negatively associated with participant’s scores in neuroticism.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
42. Thompson et al., 2010 [26]	Depression, Epilepsy	Project UPLIFT	MBCT	The study compared the effectiveness of a distance-delivered MBCT for depression in a population diagnosed with epilepsy: one delivered over the internet and the other delivered over the phone. One treatment group (n=12) received Project UPLIFT, an 8 week, internet-based program that incorporates mindfulness activities. Participants were provided access to a discussion board through a Blackboard website, as well as optional contact with a therapist through e-mail or phone, The other treatment group (n=13) received the same treatment as the experimental group except that it was delivered through eight phone conferences. The control group (n=27) was assigned to a waiting list. Both treatment groups showed a significant reduction in depressive symptoms compared to the control group. There were no significant differences in treatment outcome between the phone and internet-based deliveries of the therapy. These results were consistent at an 8-week follow-up.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
43. Titov et al., 2010 [48]	Depression	Sadness Program	CBT	The study compared the effectiveness of clinician-assisted versus technician-assisted iCBT for depression. Both clinician and technician assisted groups received the Sadness Program for 8 weeks. Participants in both treatment groups received automatic emails that informed them of upcoming lessons or reminded them to complete ongoing lessons. The clinician group (n=45) received weekly e-mail and phone contact with a clinician, and had access to a discussion forum where they could post therapy-related questions to a clinician. Other participants in this group could view the questions and responses. The technician-assisted group (n=31) had weekly e-mail or phone contact with a technician, who offered encouragement and support but no clinical advice. These groups were compared to a delayed treatment control group (n=40). Both clinician and technician-assisted groups significantly reduced symptoms of depression compared to the control group. Participants in the technician group had significantly lower scores in depression than participants in the clinician group at a 4-month follow-up.
44. Titov et al., 2013 [87]	Depression, Anxiety, Panic, Social Phobia	The Wellbeing Course	CBT+IPT	The study compared the effectiveness of two transdiagnositc interventions for depression and anxiety disorders, delivered online: one with automated e-mails and one without. One treatment group (n=100) received The Wellbeing Course, which included five lessons over 8 weeks incorporating principles of CBT and IPT. A typical lesson contained 60 slides with both texts and pictures. This group also received at least 2 automated e-mails related to the course every week, which served as reminders, motivation and recaps of past lessons. The other treatment group (n=106) received the exact same treatment but without the automated e-mails. The control group (n=51) was assigned to a waiting list. Both treatment groups showed significant reduction in depressive symptoms compared to the waitlist group. There were no significant differences in symptoms between the two treatment groups, however the group that received automated e-mails showed significantly higher adherence rates than the treatment group that did not received the automated e-mails.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
45. Titov et al., 2011 [46]	Depression, Anxiety, Panic, Social Phobia	Wellbeing Program	CBT	The study examined the effectiveness of a transdiagnostic treatment, delivered online, for people who suffer from major depression and anxiety disorders. The treatment group (n=39) received the Wellbeing Program, which included 5 online lessons over 8 weeks incorporating principles of CBT. Participants completed online homework assignments and had access to an online discussion form moderated by a therapist. They also had e-mail and instant message contact with a clinician. E-mail was also used to send reminders to participants of each session. The control group (n=38) was assigned to a waiting list. The transdiagnostic intervention significantly reduced symptoms related to depression and anxiety disorders.
46. Unlu Ince et al., 2013 [88]	Depression	Alles Onder Controle (Turkish version)	PST	The study examined the effectiveness of an internet-based intervention for depression targeted to Turkish people living in the Netherlands. The treatment group (n=49) received Alles Onder Controle, a 5-week guided self-help, online intervention that incorporates principles of PST. Participants in the treatment intervention completed weekly homework assignments and were provided feedback on them by researchers via e-mail. The control group (n=47) was assigned to a waiting list. There were no significant differences between the online intervention and waitlist groups in depressive symptoms. However, the experimental group showed significant improvement in depressive symptoms at a completers-only follow-up analysis.
47. van Bastelaar et al., 2011 [39]	Depression; Type 1 and 2 Diabetes	Coping with Depression	CBT	The study examined the effectiveness of a web-based intervention for depression in adults diagnosed with type 1 or type-2 diabetes. The experimental group (n =125) received Coping with Depression, a CBT-based program, for 8 weeks. The program included 8 lessons that incorporated written texts, homework and videos that were specific to diabetes. Participants also had access to a moderated forum where they could share experiences, provide support and discuss issues related to depression and diabetes. Certified health psychologists provided feedback on homework assignments and had e-mail contact with participants. The control group (n=130) was assigned to a waitlist group. The web-based intervention significantly reduced depressive and diabetes-specific emotional distress symptoms, but did not affect glycemic control.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
48. van der Zanden et al., 2012 [42]	Depression, Ages = 16-25	Master Your Mood	CBT	The study examined the effectiveness of a guided web-based intervention aimed at reducing depression symptoms in young people (16-25). One group (n=121) received Master Your Mood, an online intervention structured around CBT. Throughout the 6 sessions over 12 weeks, course material was delivered to users through a chat room, utilizing both texts and images. Participants could share their own experiences and ask questions to other users and two trained professionals. Text message reminders were also sent to participants on their mobile phone a half hour before each session. The other group (n=123) was assigned to a waiting list control condition. At posttest and a 3-month follow-up, depressive symptoms for individuals who completed the online intervention improved significantly compared to the waitlist group.
49. van Straten et al., 2008 [30]	Depression, Anxiety, Stress		PST	The study examined the effectiveness of a web-based self-help intervention aimed reducing depression, anxiety and work-related stress. One group (n=107) received online PST. Participants were given access to a website, where they could complete exercises and readings for 4 weeks. Trained psychology students provided non-therapeutic feedback on the exercises to participants. Automated email was sent to participants each week to explain contents and exercises. The control group (n=106) was assigned to a waiting list. The web-based intervention significantly reduced symptoms of depression and anxiety, but did not significantly reduce symptoms of work-related stress.
50. Van Voorhees et al., 2009 [89] and Hoek et al., 2011 [90] and Saulsberry et al., 2013 [91]	Adolescents of ages 14-21 who are at risk of depressive disorder	CATCH-IT	CBT+IPT+BA	The study compared brief advice (n=40) with motivational interview (MI, n=43) in enhancing participation outcomes when used with an Internet-based depression prevention program (CATCH-IT). No information about technological features in intervention was provided except the motivation interview group received reminders via phone. In both groups, significant depressive symptom reductions were found at 6-week posttest, this treatment effect was sustained at a 6-month follow-up. However, the MI group experienced fewer depressive episodes and less feelings of hopelessness than the brief advice group.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
51. Vernmark et al., 2010 [49] and Andersson, Hesser, Hummerdal, Bergman-Nordgren, & Carlbring, 2013 [92]	Depression		CBT	The study compared the effectiveness of an e-mail therapy for depression with a guided, self-help intervention for depression. One group (n=30) received therapy through e-mails for 8 weeks. The content of the e-mails were individualized with emphasis on certain components of CBT that were important for the participant. Another group (n=29) received the standard iCBT with minimal therapist assistance. Participants received only positive reinforcement by therapists and e-mail reminders. A control group (n=29) was assigned to a waiting list. Both the e-mail and iCBT interventions led to significant reductions in depressive symptoms. However, the overall differences between the e-mail and internet-based interventions were not significant. These results were consistent at the 3.5-year follow-up.
52. Wagner et al., 2014 [41]	Depression		CBT	The study compared the effectiveness of a CBT for depression delivered over the internet with the same treatment delivered face-to-face. Both versions of the treatment had the same time frame (8 weeks), chronology and treatment modules. The online treatment group (n=32) received individual written feedback from a therapist on writing assignments and contact from a therapist through mobile texts. The face-to-face treatment group (n=30) had the same level of interaction with the therapist. Both groups had a significant reduction in depressive symptoms. At the 3-month follow-up, depressive symptoms for individuals in the face-to-face intervention worsened, whereas symptoms for individuals in the online intervention remained stable.
53. Warmerdam et al., 2008 [27] and Warmerdam, Smit, van Straten, Riper, & Cuijpers, 2010 [93]	Depression/18 + with depression symptoms CES-D >=16	Coping with Depression	PST/CBT	The study compared the effectiveness of CBT (n = 88) and PST (n = 88) for depression, both delivered over the internet for 8 weeks. The PST intervention included information, exercises, and a built-in feedback system and the CBT intervention included information, exercises, and audio-visual aids. Participants in both groups also received e-mails from a life coach. A waitlist control group (n = 87) was included for comparisons. Both internet-based CBT and PST interventions led to a significant reduction in depressive symptoms when compared to the waiting list control group. And, these results were consistent after the 12-week follow-up. However, no significant differences were found between the two different types of therapies.

RCT	Health focus/Target population	Program	Therapeutic approach	Description and effects
54. Watts et al., 2013 [51]	Depression	The Get Happy Program (verision of Sadness Program)	CBT	The study compared the effectiveness of a mobile and computer version of treatment for depression, Get Happy Program, a CBT-based program that delivers lessons on how to deal with depression using an interactive comic book, for 8 weeks. The program was delivered through a mobile application for 22 of the participants and through a computer application for 30 of the participants. Both groups received e-mails or phone calls from a clinician until they completed the second lesson of the program. Overall, both versions led to significant decreases in depressive symptoms, with within-group effect size (>.8), and these results were consistent after a 3-month follow-up. However, there were no significant differences between the mobile and the computer versions of the treatment.
55. Williams, Blackwell, Mackenzie, Holmes, & Andrews, 2013 [94]	Depression	Sadness Program + CBM	CBT and CBM	The study examined the effectiveness of an internet-based intervention using a combination of computerized CBM protocols and iCBT against a waiting list control group. Participants received one week of imagery-focused CBM delivered through audio recordings from their personal computer, and then accessed the 10-week Sadness Program as the iCBT component. The entire intervention was delivered without any therapist involvement. Overall, the treatment of iCBT and CBM was effective in reducing outcome measures of depression, whereas the waitlist group was not.

Note. ACT, acceptance and commitment therapy; AR, applied relaxation; BA, behavioral activation; CBM, cognitive-bias modification; CBT, cognitive behavior therapy; CT, cognitive therapy; IPT, interpersonal psychotherapy; MBCT, mindfulness-based cognitive therapy; PA, Physical activity; PDT, psychodynamic psychotherapy; PP, positive psychology; PST, problem-solving therapy; TAU, treatment as usual.

Table 3

Features and technological components of the intervention programs used in studies reviewed.

	RCT	MAIN MODE OF DELIVERY			COMMUNICATION TOOLS					OTHER ICT FEATURES									
		Web-based	Mobile-based	Combination	Online Feedback	Instant messaging/ Chat	Discussion Forum	Phone Calls	Text Reminders	Tailored Content	Automated Emails	Video	Animation	Self-Monitoring Tools	Others	NO. OF ICT FEATURES	LEVEL OF CLINICIAN INVOLVEMENT	TREATMENT OUTCOMES	COMPLIANCE CRITERION MET
1.	Anderson et al., 2005 [65]	x			x		x									**3**	Medium	ICT>TAU	**Yes**
2.	Berger et al., 2011 [54]	x			x					x		x				4	Medium	ICT>TAU	Yes
3.	Bolier et al., 2013 [66]	x			x[a]						x			x		3	No	ICT>WLC	No
4.	Calear, Christensen, Mackinnon, Griffiths, & O'Kearney, 2009 [60] and Calear, Christensen, Mackinnon, & Griffiths, 2013 [67]	x											x			2	No	ICT>WLC_m	Yes
5.	Carlbring et al., 2013 [47]	x			x[a]							x	x			4	Low	ICT>WLC	Yes
6.	Christensen, Griffiths, Korten, Brittliffe, & Groves, 2004 [61]	x											x		Game	3	No	ICT=TAU	No
7.	Christensen, Griffiths, Mackinnon, & Brittliffe, 2006 [68]	x														1	No	ICT>TAU	No
8.	Christensen, Leach, et al., 2006 [69]	x														1	No	ICT=TAU	No
9.	Christensen, Griffiths, & Jorm, 2004 [50] and Mackinnon, Griffiths, & Christensen, 2008 [70]	x						x								2	No	ICT>WLC	Yes

RCT	MAIN MODE OF DELIVERY			COMMUNICATION TOOLS					OTHER ICT FEATURES					NO. OF ICT FEATURES	LEVEL OF CLINICIAN INVOLVEMENT	TREATMENT OUTCOMES	COMPLIANCE CRITERION MET
	Web-based	Mobile-based	Combination	Online Feedback	Instant messaging/ Chat	Discussion Forum	Phone Calls	Text Reminders	Tailored Content Automated Emails	Video	Animation	Self-Monitoring Tools	Others				
10. Clarke et al., 2005 [52]	x						x						Thought Helper	3	No	ICT>TAU	No
11. Clarke et al., 2009 [40]	x								x		x	x	Thought Helper; e-Journal	6	No	ICT>TAU	Yes
12. Day, McGrath, & Wojtowicz, 2013 [32]	x			x			x			x				4	Low	ICT>WLC	Yes
13. de Graaf et al., 2011[53] and de Graaf et al., 2009 [33]	x								x					2	No	ICT=TAU	Yes
14. Dear et al., 2013 [36]	x			x[a]			x		x					4	Medium	ICT>WLC	Yes
15. Donker et al., 2013 [71]	x								x					2	No	ICT=TAU	No
16. Drozd et al., 2014 [72]	x								x					2	No	ICT=WLC	No
17. Farrer, Christensen, Griffiths, & Mackinnon, 2011 [73]	x						x				x			3	Medium	ICT=TAU	No
18. Geraedts et al., 2014 [58]	x			x					x					3	Medium	ICT=TAU	Yes
19. Glozier et al., 2013) [34] and (Donkin et al., 2013 [74]	x						x	x	x					4	Low	ICT=ACG	Yes
20. Griffiths et al., 2012 [43]	x					x	x		x					4	Low	ICT>WLC	Yes
21. Haemmerli et al., 2010 [44]	x			x[a]		x								3	Medium	ICT>WLC	Yes
22. Hoek, Schuurmans, Koot, & Cuijpers, 2012 [75]	x			x					x					3	Medium	ICT=WLC	Yes
23. Hoifodt et al., 2013 [76]	x			x										2	Medium	ICT>WLC	Yes

RCT	MAIN MODE OF DELIVERY			COMMUNICATION TOOLS					OTHER ICT FEATURES						NO. OF ICT FEATURES	LEVEL OF CLINICIAN INVOLVEMENT	TREATMENT OUTCOMES	COMPLIANCE CRITERION MET
	Web-based	Mobile-based	Combination	Online Feedback	Instant messaging/ Chat	Discussion Forum	Phone Calls	Text Reminders	Tailored Content	Automated Emails	Video	Animation	Self-Monitoring Tools	Others				
24. Hollandare et al., 2011 [77] and Holländare et al., 2013 [78]	x			x											2	Medium	ICT>WLC	No
25. Johansson, Ekbladh, et al., 2012 [79]	x			x[a]											2	Medium	ICT>ACG	Yes
26. Johansson, Sjöberg, et al., 2012 [80]	x			x[a]		x									3	Medium	ICT>ACG	Yes
27. Kersting, Kroker, Schlicht, Baust, & Wagner, 2011 [81]	x														1	Medium	ICT>WLC	No
28. Kessler et al., 2009 [82]	x				x										2	High	ICT>WLC	Yes
29. Langrial, Oinas-Kukkonen, Lappalainen, & Lappalainen, 2014 [37]	x			x			x								3	Low	ICT>WLC	No
30. Lintvedt et al., 2013 [35]	x														1	No	ICT>WLC	No
31. Meyer et al., 2009 [55]	x								x			x			3	No	ICT>TAU	No
32. Moritz, Schilling, Hauschildt, Schroder, & Treszl, 2012 [56]	x								x			x			3	No	ICT>WLC	Yes
33. O'Kearney et al., 2006 [25]	x														1	No	ICT=WLC	Yes
34. Perini et al., 2009 [28]	x			x		x	x								4	Medium	ICT>WLC	Yes
35. Pittaway et al., 2009 [83]	x						x								2	Low	ICT=TAU	No
36. Powell et al., 2013 [84]	x									x					2	Medium	ICT>WLC	No
37. Proudfoot et al., 2013 [57]			x						x	x			x		4	No	ICT>TAU+WLC	No

RCT	MAIN MODE OF DELIVERY			COMMUNICATION TOOLS					OTHER ICT FEATURES					NO. OF ICT FEATURES	LEVEL OF CLINICIAN INVOLVEMENT	TREATMENT OUTCOMES	COMPLIANCE CRITERION MET
	Web-based	Mobile-based	Combination	Online Feedback	Instant messaging/ Chat	Discussion Forum	Phone Calls	Text Reminders	Tailored Content Automated Emails	Video	Animation	Self-Monitoring Tools	Others				
38. Ruwaard et al., 2009 [59]	x			x[a]								x		3	Medium	ICT>WLC	No
39. Sethi, Campbell, & Ellis, 2010 [85]	x													1	Low	ICT=TAU	No
40. Sheeber et al., 2012 [45]	x					x	x						“Ask an Expert”	4	Medium	ICT>WLC	Yes
41. Spek et al., 2007 [38] and Spek, Nyklíček, Cuijpers, & Pop, 2008 [86]	x			x			x			x				4	Low	ICT>WLC	Yes
42. Thompson et al., 2010 [26]	x					x				x				3	Low	ICT>WLC	No
43. Titov et al., 2010 [48]	x			x		x	x		x					5	Medium	ICT>WLC	Yes
44. Titov et al., 2013 [87]	x								x					2	No	ICT>WLC	Yes
45. Titov et al., 2011 [46]	x				x	x	x		x				Frontline	6	Medium	ICT>WLC	Yes
46. Unlu Ince et al., 2013 [88]	x			x										2	Medium	ICT=WLC	No
47. van Bastelaar et al., 2011 [39]	x			x		x			x	x		x		5	Medium	ICT>WLC	Yes
48. van der Zanden et al., 2012 [42]	x				x			x				x		4	High	ICT>WLC	Yes
49. van Straten et al., 2008 [30]	x								x					2	Low	ICT>WLC	Yes
50. Van Voorhees et al., 2009 [89] and Hoek et al., 2011 [90] and Saulsberry et al., 2013 [91]	x													1	No	ICT_1=ICT_2	No
51. Vernmark et al., 2010 [49] and Andersson, Hesser, Hummerdal, Bergman-	x			x			x							3	Medium	ICT>WLC	Yes

	RCT	MAIN MODE OF DELIVERY			COMMUNICATION TOOLS					OTHER ICT FEATURES				NO. OF ICT FEATURES	LEVEL OF CLINICIAN INVOLVEMENT	TREATMENT OUTCOMES	COMPLIANCE CRITERION MET
		Web-based	Mobile-based	Combination	Online Feedback	Instant messaging/ Chat	Discussion Forum	Phone Calls	Text Reminders	Tailored Content Automated Emails	Video	Animation	Self-Monitoring Tools	Others				
	Nordgren, & Carlbring, 2013 [92]																	
52.	Wagner et al., 2014 [41]	x			x										2	Medium	ICT=TAU	Yes
53.	Warmerdam et al., 2008 [27] and Warmerdam, Smit, van Straten, Riper, & Cuijpers, 2010 [93]	x			x						x				3	Low	ICT>WLC	Yes
54.	Watts et al., 2013 [51]		x		x			x							3	Medium	ICT=MG	Yes
55.	Williams, Blackwell, Mackenzie, Holmes, & Andrews, 2013 [94]	x													1	No	ICT>WLC	Yes

- a = secured messaging (encrypted)
- ICT = information communication technology; TAU = treatment-as-usual; WLC = waitlist control group; MG = mobile phone group; m = only for male participants
- Ask An Expert: A link embedded in the discussion forum site to a public Q&A forum where a coach or clinician provided information; e-Journal: a private online journal or diary with the user option to publish online after review; Frontline: a large collection of forum posts written by participants in previous iCBT programs; Thought Helper: a three-step interactive search engine for negative thoughts and counter-thoughts that matches user text input and choice with pre-defined thoughts. It also allows text input of personalized counterthoughts for storage and later retrieval; Online feedback: web-based asynchronous messaging or e-mail platform.