



EUROPE

Review of computerised cognitive behavioural therapies

Products and outcomes for people
with mental health needs

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Preface

This study builds on RAND Europe's previous research in the area of improving service provision and outcomes for people with mental health needs. In this report we provide an overview and explore the potential of tools which aim to combine the principles of talking therapies with recent developments in information and communication technologies. In conclusion we discuss implications and key considerations for those who are considering improving existing or creating new online platforms and mobile applications that draw on cognitive behavioural therapy interventions to alleviate depression, anxiety and other common mental health disorders.

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Summary

Context: Common mental health problems, such as depression, anxiety, and other disorders, affect many people and incur increasing costs to individuals, employers, and government. Yet, access to mental health services is still limited. A previous study by RAND Europe suggested that providing access to online mental health assessment and support, as well as building on computerised cognitive behavioural therapy (cCBT) interventions, could help reach out to the general population and, in particular, those less likely to seek help elsewhere (see van Stolk et al. 2014).¹ The current study explores online platforms and mobile applications that offer cognitive behavioural therapy (CBT) for people with mental health needs.

Method: We used a snowballing approach starting from van Stolk et al. (2014) to identify the most recent academic literature available on the subject. We reviewed, coded and analysed 44 studies related to mental health treatments and cognitive behavioural therapy platforms. This report summarises the results of our work and provides an overview of the tools discussed in the literature, characteristics of the participants who tested these tools, and available evidence on the mental health and employment outcomes.

Products: Overall, this review shows that a variety of cCBT products exist which differ both in terms of the conditions that the products aim to address and the ways in which platforms are designed. The tools offer support through a varying number of modules (or lessons) clustered around specific issues that need to be addressed. The number of modules offered by the tools differs slightly by condition: platforms for anxiety disorders and insomnia are on average lengthier, with a median number of modules of 9 and 8 respectively, compared with those for depression, in which the median is 6.5. The majority of tools use a linear structure and offer at least some additional guidance, although the intensity of this extra support is typically low.

Mental health outcomes: The mental health outcomes – such as reductions of social anxiety or depression symptoms – are measured on various scales, such as the Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI) and Insomnia Severity Index (ISI), among others. This review shows that the cCBT tools appear to have a positive effect on mental health outcomes, although this varies depending on the nature of participants and the outcomes being measured. The mean effect sizes varied from large to moderate:

¹ The study was commissioned by the Department for Work and Pensions and the Department of Health through the Cabinet Office's Contestable Policy Fund. See van Stolk et al. (2014).

- Improvements measured on BDI-II for the tools for depression show within-group effect size of 1.23.
- Improvements measured on BAI for the tools for anxiety disorders show between-group effect size of 0.79.
- Improvements measured on ISI for the tools for insomnia show within-group effect size of 1.40.

Work-related outcomes: Only a few studies examined work-related outcomes of the cCBT tools. Those that did showed a small mean between-group effect size of 0.35 on the Work and Social Adjustment Scale (WSAS). Three of the examined tools showed positive significant work-related outcomes as well as mental health improvements.

Participants: Computerised CBT products target a wide range of potential users, but some participant characteristics, such as gender and educational background, are likely to affect the uptake of – or the extent of engagement with – cCBT tools. The data did not point to a relationship between the level of employment or education of the treated individuals and the effectiveness of platforms, although there was a relationship between effectiveness and the age and gender of participants: tools appeared to be more effective in older participants and in women. There is therefore a risk that such platforms will fail to reach out to those who need help most; that this type of treatment is simply not well suited for these groups; or that a more effective method of increasing their participation and adherence to treatment needs to be found. However, the limited number of articles does not allow us to make a firm link between these factors or to inform us about the direction of the relationship between participant characteristics and effectiveness. Similarly, we cannot exclude the fact that there was a selection effect, in that the examined studies included participants who were more likely to take part in cCBT research or to benefit from treatment, and that therefore the effects of the tools have been overstated.

Conclusions: The diversity of existing tools reflects the fact that cCBT interventions (supported by technology developments) lend themselves well to – and offer space for – experimentation in terms of their design and delivery mechanisms. There are no evident patterns that would suggest that certain types of tools (or certain elements of their design) determined the level of their effectiveness. While there is no ‘silver bullet’ for future designs of cCBT, one can expect that mobile applications will increase in number and that most cCBT platforms will provide at least a basic level of additional support.

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This report represents the views of the authors. Any remaining inaccuracies are our own.

Abbreviations and acronyms

| | |
|---------|--|
| BAI | Beck Anxiety Inventory |
| BDI-II | Beck Depression Inventory |
| CBT | cognitive behavioural therapy |
| cCBT | computerised cognitive behavioural therapy |
| CORE OM | Clinical Outcomes in Routine Evaluation Outcome Measure |
| DASS | Depression Anxiety Stress Scales |
| DSM | <i>Diagnostic and Statistical Manual of Mental Disorders</i> |
| GAD | Generalised Anxiety Disorder |
| GAD-7 | Generalised Anxiety Disorder 7-Item Scale |
| iCBT | Internet-based cognitive behavioural therapy |
| IES-R | Impact of Event Scale – Revised |
| ISI | Insomnia Severity Index |
| K6 | Kessler Psychological Distress Scale (6-item) |
| K-10 | Kessler Psychological Distress Scale (10-item) |
| LSAS | Liebowitz Social Anxiety Scale |
| LSAS | Liebowitz Social Anxiety Scale Self-Report |
| MADRS-S | Montgomery–Åsberg Depression Rating Scale |
| MFI-20 | Multidimensional Fatigue Inventory |
| NHS | National Health Service [UK] |
| NWAK | number of awakenings |
| OCS | Obsessive Compulsive Disorder |
| PDSS | Postpartum Depression Screening Scale |
| PHQ-9 | Patient Health Questionnaire for Depression Scoring |
| PSQI | Pittsburgh Sleep Quality Index |
| PTSD | Post-traumatic Stress Disorder |
| QOLI | Quality of Life Inventory |

| | |
|--------|---|
| SAD | Social Anxiety Disorder |
| SDS | Sheehan Disability Scale |
| SE | sleep efficiency |
| SIAS | Social Interaction Anxiety Scale |
| SOL | Sleep-onset Latency |
| SPIN | Social Phobia Inventory |
| SPS | Social Phobia Scale |
| SQ | sleep quality |
| TST | total sleep time |
| UWES | Utrecht Work Engagement Scale |
| WASO | wake after sleep onset |
| WHODAS | World Health Organisation Disability Assessment Scale |
| WOS | Workplace Outcome Suite |
| WLQ | Work Limitations Questionnaire |
| WRRQ | work-related affective rumination |
| WSAS | Work and Social Adjustment Scale |

1. Introduction

Mental health problems affect many people and can bear high costs for individuals, employers and the economy at large.

Common mental health problems cover a wide range of disorders, such as depression, anxiety, phobias, panic attacks, obsessive compulsive disorder and post-traumatic stress. The recent Health Survey for England 2014 showed that 26% of all adults reported having ever been diagnosed with at least one mental illness and that a further 18% of adults reported having experienced a mental illness without a formal diagnosis. The prevalence of common mental health problems was the largest, with 24% of all adults reported having ever been diagnosed with at least one of these conditions (Bridges 2016).² While these conditions differ in severity, there is growing awareness that mental health issues have the potential to seriously affect various aspects of people's daily functioning and quality of life and that they should be given sufficient attention, alongside physical health problems, as a cause of ill-health in the population.

Mental health problems come at a high price. In addition to causing human suffering, mental health problems cause those humans to experience difficulties with maintaining and finding employment. In a recent report, Hafner et al. (2015) investigated how the health and wellbeing of employees relate to productivity. Their results show that mental health problems and a lack of sleep are significant causes for productivity loss at work, especially through 'presenteeism'. The costs of ill-health also include increased spending on healthcare provision. Finally, higher levels of absence due to sickness absence and reduced productivity at work translate into costs to employers and the economy more broadly (Black and Frost 2011). In 2010, the Centre for Mental Health (2010) estimated that, overall, mental health problems cost the UK economy about £105b each year. More recently, the Mental Health Task Force (2016) valued the current costs of mental health support and services across government departments in England at £34b a year, a number seen by the task force as being insufficient to meet the current demand.

There are pockets of improving mental health service provision and outcomes in the UK.

Some estimates show that only 25% of people needing mental health services have access to them (LSE 2012). Despite continuous investments in improving access to mental health services (estimated by NHS (National Health Service) England at £11.7b in 2014/2015), meeting the access and waiting times standards for mental health treatment continues to pose challenges (National Audit Office 2016).

² Smaller proportions reported having been diagnosed with a serious mental illness (such as bipolar disorder, eating disorder, personality disorder, nervous breakdown, psychosis or schizophrenia) or other type of condition or disorder.

A recent study by Chisholm et al. (2016) estimated that scaling up effective treatment of depression and anxiety would bring substantial returns on investment and would help save some of the estimated 50 million years of work lost across 36 countries as a consequence of depression and anxiety each year. However, the evidence base for the extent to which different interventions are effective in supporting people with mental health needs to gain employment is still limited (van Stolk et al. 2014).

Several challenges have been identified in the provision of public services for people with common mental health problems (van Stolk et al. 2014; OECD 2014, 2015). The range of policy options for the government to consider – presented by van Stolk et al. (2014) – included interventions that provide early access to specialist services and that address both employment and mental health needs.

Computerised Cognitive Behavioural Therapy (cCBT) has been proposed as a potential solution to reach out to the general population at a relatively low cost.

Van Stolk et al. (2014) recommended four policy options to be tested to build an evidence base in improving mental health and employment outcomes for people with mental health needs (see Figure 1). One of these options is to provide access to online mental health and work assessments and support, building on CBT interventions.³

It was argued that such tools could reach out to people less likely to seek help by talking to a GP or therapist and that the support could be provided at an early stage, thereby reducing the risks of and costs associated with the patient developing more significant problems. While an initial mapping of platforms and mobile applications that provide CBT or offer interactive tools to address a specific mental health need was carried out, the evidence on the effectiveness of such tools was only starting to emerge at the time (van Stolk et al. 2014).

This study sought to review and bring up to date the evidence behind online mental health tools based on CBT, in order to inform future interventions in this area.

Over the last three years new applications and tools have been developed. We expected to find that the evidence base behind the effectiveness of both new and old platforms had grown since 2013. However, only a limited number of recent meta- and systematic reviews of Internet-based interventions for people with mental health needs is available (for example, Beatty and Binnion 2016; Renton et al. 2014; Bergman Nordgren 2013; Grist and Cavanagh 2013).

On the other hand, there is a growing number of studies that investigate individual platforms and applications. This new evidence could facilitate more substantial comparisons between the design of interventions and outcomes achieved by different cCBT platforms, and possibly between cCBT platforms and other models of support.

³ CBT is an evidence-based form of psychotherapy. It is based on collaboration between a client and a therapist, who work together to identify and solve problems by teaching the patient: (1) to monitor their negative, automatic thoughts (cognitions); (2) to recognise the connections among cognitions, distress and behaviour; (3) to examine the evidence for and against their cognitions; (4) to substitute more accurate interpretations for these cognitions; and (5) to learn to identify and change the beliefs which predispose them to distort experiences (Beck 1979). CBT has been tested and proved to be effective for many different mental health disorders and problems, although recent studies have questioned some of such claims (Baardseth et al. 2013; Johnsen and Friborg 2015).

Figure 1. RAND Europe recommended four interventions for piloting.



embed vocational support into primary care settings



enhance support to those out of work, using group work to build resilience against setbacks faced when job-seeking



provide access to online mental health and work assessments and support – for example building on computerised cognitive behavioural therapy interventions



offer telephone assessments and support to people with common mental health problems who are out of work

SOURCE: van Stolk et al. (2014)

This study used a targeted literature review to explore online platforms and mobile applications that offer cognitive behavioural therapy for people with mental health needs. We provide more detailed information on the methods in Chapter 2. Chapter 3 presents the results of the review, organised around the features of the tools (section 3.1), characteristics of the users (section 3.2), and available evidence on the mental health and employment outcomes as evidenced in the reviewed articles (section 3.3). Chapter 4 concludes the report, with key considerations that need to be taken into account when developing and implementing online assessments and support for people with mental health problems.

2. Approach and methodology

2.1. Articles were identified through a snowball sampling approach and subsequently screened and reviewed

To initiate the collection of articles, eight studies which were cited in the *Psychological Wellbeing and Work* report (van Stolck et al. 2014) were used as the starting point. Through a snowball sampling approach, articles which cited these studies were identified using Google Scholar, and only those published since 2013 were taken into consideration. Table 1 shows the number of articles initially identified.

Table 1. Number of articles citing original since 2013 (after initial sampling).

| Original article | Number of articles citing original since 2013 |
|---------------------------|--|
| So et al. 2013 | 40 |
| Childress 1998 | 8 |
| Espie et al. 2012 | 112 |
| Krusche et al. 2012 | 33 |
| Sarasohn-Kahn et al. 2012 | 7 |
| Kaltenthaler et al. 2006 | 19 |
| Spek et al. 2007 | 447 |
| McRone et al. 2004 | 85 |
| Total | 751 |

Given the automated method used for their collection, a thorough screening was required to ensure that only relevant articles were included. The studies' titles and abstracts were reviewed to decide their relevance. Articles were discarded when:

- They did not relate to health-related treatments or online tools
- They were not related to working adults but focused on children, students and the elderly
- They were related to or about substance abuse, eating disorders, post-natal depression, or gambling
- They were not written in English

This yielded a list of 150 articles. To further narrow down the selection, we undertook a final screening. Articles which were not specifically evaluating a cCBT tool were discarded. This meant that master's

theses, study designs, studies not pursuing a quantitative methodology, and studies focusing on problem solving and activation cognitive therapy were discarded.

In addition, we carried out a tool-specific search for articles evaluating previously identified tools (see van Stolk et al. 2014) and the tools indicated by the client (Table 2). Studies released after 2013 assessing the tools Beating the Blues, Buddy, Big White Wall, Fear Fighter, Ieso Digital Health, Kooth, Living Life to the Full, MoodGYM, SilverCloud and Sleepio were searched. This yielded two new articles – for FearFighter and SilverCloud – which met the selection criteria (published from 2013 onwards). Valid articles for MoodGYM were also found, but these had already been identified and listed previously. All new articles identified through this additional search were then incorporated in the review.

Table 2. Number of articles by tool.

| Tool | Number of articles |
|-------------------------|---------------------------|
| Beating the Blues | 0 |
| Buddy | 0 |
| Big White Wall | 0 |
| FearFighter | 1 |
| Ieso digital health | 0 |
| Kooth | 0 |
| Living Life to the Full | 0 |
| MoodGYM | 3* |
| SilverCloud | 1 |
| Sleepio | 0† |

* These are articles which were already identified in the initial search: Gilbody et al. (2015), Twomey et al. (2014) and Donker et al. (2013).

† The authors identified RCT as being underway, but not yet complete.

After these selection procedures, the final list contained 47 articles for coding. A further three articles were removed during the coding process after a final consistency check to ensure that all entered studies complied with the selection criteria.⁴ Therefore 44 articles entered the analysis stage (Table 3).

Table 3. Number of articles by selection stage.

| Selection stage | Number of articles |
|--|---------------------------|
| Initial snowball sampling | 751 |
| Review of titles and abstracts | 150 |
| Elimination of any non-cCBT tool study | 47 |
| Post-coding | 44 |

⁴ In some cases, the review of abstracts alone was not sufficient to determine which articles were not relevant.

2.2. The quality of the identified articles was assessed

As part of the review process of the articles, their quality was assessed. The source of the article, the study design and whether or not it used the CONSORT protocol,⁵ as well as the study limitations, were taken into consideration as part of the articles' quality assessment.

From the 44 analysed articles, the vast majority (42) were peer-reviewed journal articles. Of the two remaining articles, one was not peer reviewed and the other was still undergoing review at the moment of the analysis. In terms of the study design, the majority (33) used randomized control trials. Of these, 18 clearly stated the use of the CONSORT protocol for their study design. The remaining 15 did not specify whether the CONSORT protocol had been used; we categorized these as not using CONSORT.

The design of the RCTs varied across the studies (see Table 4). There were 12 articles which had a wait-list control group being compared with a group receiving cCBT; 9 studies in which the cCBT group was being compared with another cCBT group; and 19 in which a cCBT group was compared with another type of comparison group (e.g. care as usual, CBT, or bibliotherapy-administered CBT, among others). Some of the studies included a three-arm RCT that combined a treatment and two comparison groups. There were 9 studies which did not have any comparison group, and which instead used other research methods (e.g. Delphi, longitudinal study).

Table 4. Number of articles by types of comparison groups.

| Comparison groups | Number of articles |
|--|--------------------|
| Wait-list control vs cCBT | 12 |
| cCBT vs another cCBT | 9 |
| cCBT vs other form of support | 19 |
| No comparison group | 9 |
| Total (includes three-arm RCTs) | 49 |

Finally, when reviewing the limitations of the studies, we not only noted those limitations explicitly stated by the authors, but we also considered additional information to identify any other limitations which might have not been acknowledged by the authors. For example, we assessed whether there was a risk of bias because of authors' association with the product, or whether the sample sizes allowed for a meaningful analysis and drawing of conclusions. The robustness of the study design was also carefully considered. All identified limitations were taken into account during our coding and analysis of the mental health and employment outcomes. The low-quality articles were included in the analysis, but their results were considered as 'unclear' – see section 2.3 below.

⁵ CONSORT (Consolidated Standards of Reporting Trials) includes a range of initiatives to improve reporting of randomized controlled trials. CONSORT Statement 'offers a standard way for authors to prepare reports of trial findings, facilitating their complete and transparent reporting, and aiding their critical appraisal and interpretation. The CONSORT Statement comprises a 25-item checklist and a flow diagram'. Consort (homepage). (2016). As of 04 August 2016: <http://www.consort-statement.org/>

2.3. A coding protocol was used to extract and record information from each article

The coding protocol was developed with the intention to extract relevant information from the selected articles on the characteristics of online CBT tools, the individuals using them, the intervention characteristics and how these parameters related to mental health and employment outcomes. The extraction of the information was divided into two main areas. The first focused on recording information on the tools' characteristics (e.g. product details, mode of delivery, tool content and duration), and the second focussed on details of the intervention in which the cCBT tool was used, with whom and to what effects (participant characteristics, intervention design, overall results, effect sizes, etc.). In addition, coders noted any potential risks of bias and entered any additional comments.

Due to the variety of the reviewed articles (varying conditions considered, comparison groups, and outcome measures used), direct comparisons of tools' effectiveness was not feasible within the scope of this targeted review. To enable comparisons, the team established the following scoring system for work-related and mental health improvements:

- Green was scored if the article showed clear benefits of treatment in that the outcome measures showed improvements (e.g. statistically significant reductions on depression or anxiety scales within or between groups) and the study was not subject to major limitations (such as lack of control groups, small sample sizes, etc.).
- Amber was scored if the results of the study were unclear (for example, mental health outcomes showed improvements but the study lacked control groups to attribute these effects to the intervention), or if the results were subject to important limitations (for instance, small sample sizes of treatment and control groups).
- Red was scored if, despite sufficient sample sizes, the article showed that treatment had no effect compared with the chosen control groups (i.e. wait-list or care-as-usual controls).

Once the relevant fields for information extraction had been determined, the coding protocol went through a process of trial and adaptation. It was first reviewed internally by the team members and then by a continuous quality assurance reviewer, after which minor changes were made. In order to ensure the consistency of the extraction process and the use of the protocol, a randomly selected article was tested by three coders, who discussed the results and implemented further alterations to the protocol. After the trial, each remaining article was coded by one reviewer only, and any ambiguous cases or discrepancies in the coding were discussed among the coding team, following which adaptations were made to the final coding protocol and the extraction sheet. For the final version of the protocol, please refer to Appendix A.

2.4. Analysis method

In this report we examine the association between the cCBT treatment and mental health and work-related outcomes. The method chosen (targeted literature review) and the diversity of studies did not allow for the use of statistical methods to explore differences between studies and combine their effects (i.e. meta-analysis). Instead, we summarised the findings in a narrative, taking into account limitations of

the chosen method, risk of publication bias and the quality of the reviewed articles. However, where possible, data were synthesised and the characteristics of the reviewed articles were presented in a tabulated form.

3. Findings

In this chapter, we present the results of the review organised around the features of the tools (section 3.1), characteristics of the users (section 3.2), and available evidence on the mental health and employment outcomes as evidenced in the reviewed articles (section 3.3).

3.1. Platforms and applications

In this section, we present information on online platforms and mobile applications which were identified through the literature review and which employed cognitive behavioural therapy to provide support for people with mental health needs. We discuss the products, countries where they are available, cost implications, conditions that these tools aim to address and mechanisms through which the support is provided.

Given the approach adopted in this study (i.e. literature review) and the timeframe (2013–2016), the results presented below cannot be considered as an exhaustive mapping of all available platforms and applications. For example, tools that have not yet been evaluated in the literature (or that were evaluated prior to 2013) are not included. We looked to address this limitation by drawing on previous work and available meta- and systematic reviews, where possible. In order to set the scene for cCBT provision in the UK, we also present a list of cCBT platforms offered by the NHS, in Appendix B.

3.1.1. Different products were available across many countries, but information on costs is limited

The majority of the reviewed articles (33 out of 44) present tools which were developed as online platforms. Only 9 were available both through a website and an application for tablets or mobile phones. In 2 of the reviewed articles this information could not be established (see Table 9, Table 10 and Table 11).

The articles varied in terms of geographical coverage where the tools were tested. Most of the articles evaluated the tools available in Australia (7), in Sweden (6), in the Netherlands (5) and in the United Kingdom (4). Individual articles additionally examined platforms trialled in the United States, Japan, Denmark, Ireland and Spain.

The fact that the tools are online makes many of them available anywhere in the world – although this access is dependent on Internet access, language and computer skills of potential users, acceptability of

this type of support and other considerations. MoodGYM is a good example: it is available online in five languages (including English and Chinese). However, for the purpose of this review it is important to keep in mind the geographical diversity of the tools: there may be differences between countries in cultural characteristics and traditions, (mental) healthcare settings, and issues surrounding mental health (such as stigma), to name a few. We come back to this point in a discussion on mental health and employment outcomes in section 3.3.

Nine of the reviewed articles included information about a price at which the tool was available. Some of the articles evaluated the same tool (e.g. two studies focused on Mixed Depression and Anxiety Course and another two analysed SilverCloud).⁶ The cost of access to the tools varied from £30 (Mixed Depression and Anxiety Course), to £60 (BeMindful), to £80 (Beating the Blues), through to £229 (the most advanced version of FearFighter).⁷ These cost findings are in line with the results of a recent review of web-based intervention programmes for depression, which identified eight platforms where a fee was required (Renton et al. 2014). The authors reported that the fee ranged from £28 (This Way Up, Clinic Course) for five or six lessons to £277 for eight sessions (The National Stress Clinic), but that most interventions offered a free trial period, allowing users to interact with the platform prior to paying the fee.

3.1.2. The platforms aimed to address a variety of mental health conditions

The online tools aimed to support people with a variety of mental health conditions. A number of the platforms recognised that comorbidity of mental health problems is common and offered support for those with more than one condition. Of the 44 articles, about half referred to the tools for depression (21) and anxiety disorders (19). Tools for insomnia were considered by six articles, and some other conditions were addressed by only a couple of the selected studies (see Table 5). This diversity of mental health conditions among the reviewed articles makes comparisons between them more difficult. We highlight condition-specific issues related to the analysed tools in the remainder of this report, where relevant and possible.

⁶ It is not clear whether the remaining studies reviewed tools that were available for free or whether the information about their price was simply not included.

⁷ For ease of comparison, all prices were rounded up, and those available in foreign currencies were converted to British pounds.

Table 5. Number of articles by mental health condition targeted.

| Targeted condition | Number of articles |
|--------------------------------|--------------------|
| Depression | 21 |
| Anxiety disorders* | 19 |
| Insomnia | 6 |
| Obsessive compulsive disorder | 2 |
| Recovery from work issues | 2 |
| Post-traumatic stress disorder | 2 |
| Panic disorder | 1 |
| Total | 53† |

* This category includes all articles that refer to 'anxiety', 'social anxiety' or 'social anxiety disorder'.

† The total exceeds the sum of the number of articles reviewed because some tools were aimed at people with comorbidities.

3.1.3. *Delivery mechanisms included up to several modules and usually offered some additional guidance to participants*

The number of modules offered differed slightly by condition, and the content usually followed a linear protocol

The analysis of the articles showed that the tools offer support through a varying number of modules (or lessons)⁸: from three (e-Couch for people with depression, Donker et al. 2013) through to 16 (a tool for people with anxiety disorders – name unknown, Bergman Nordgren et al. 2014). Because of this wide range, we looked if there were any differences in the average number of modules among the tools that aimed to address different mental health condition. Given the diversity of conditions (see Table 5), our analysis was limited to the top three: depression, anxiety disorders and insomnia. Table 6 shows that platforms for anxiety disorders and insomnia had more modules (the median was 9 and 8, respectively) than those for depression (where the median was 6.5).

Table 6. Number of modules by condition targeted.

| Condition | Number of modules (median) [†] |
|--------------------------------|---|
| Anxiety disorders [†] | 9 |
| Insomnia | 8 |
| Depression | 6.5 |
| All conditions | 8 |

* Includes only those articles for which information on the number of modules was available; duplicates were removed.

† This category includes all articles that refer to 'anxiety', 'social anxiety' or 'social anxiety disorder'.

⁸ Most articles referred to modules, some to lessons. These modules/lessons were clustered around specific issues, and one module (or lesson) can either be taken during one session or spread across a number of sessions.

Traditional CBTs have developed a number of disorder-specific protocols to address various mental health problems. Although these treatment protocols share the same core model and general approach to treatment, they show considerable differences in some of the specific treatment techniques (Hofmann et al. 2012). Traditional CBT also allows for different levels of compliance with the sequence and content of the treatment, and the adherence to the treatment protocols vary among CBT therapists.

These differences are also reflected in the design of the cCBT platforms. On the one hand, they may follow a well-defined linear treatment (with a set number of sessions followed in a given frequency and order, and with fixed phases of each session). On the other hand, they may provide a menu of treatment module choices, which (along with frequency and order in which they are followed) are driven by the client. In either case, the variance in traditional CBT treatment introduced by therapists is replaced with the level of adherence to and treatment choices made by the participant.

In particular, we examined the structure of the cCBT tools in the reviewed articles. We found that most of the tools (21) were based on linear treatment protocols, 7 allowed for some degree of flexibility in the treatment modules or sessions and their sequence, and 6 tools provided content entirely flexible to participants' choices. For the remaining 6 the information was not provided (see Table 7).

We also noted that among the linear tools, a relatively large number was dedicated to people with anxiety disorders (10). In contrast, the tools for people with depression allowed for more or full flexibility; only five of these tools designed the content based on linear protocols.

Table 7. Number of articles by structure of the tool(s).

| Structure | Number of articles |
|----------------------------|---------------------------|
| Linear | 21 |
| Some degree of flexibility | 7 |
| Fully flexible | 6 |
| N/A | 6 |
| Total | 40 |

NOTE: Duplicates were removed.

Guided support was offered more frequently than self-administered tools

The analysed articles evaluated a variety of tools, some of which used cCBT on its own or in combination with some additional guidance. For the purposes of this analysis, guidance was defined as any support provided by, or contact with, a therapist, psychologist, psychiatrist or support group, which was received in parallel to the completion of the online CBT course. We also looked at how this contact or support was enacted: via email, eChat platform, face-to-face contact, telephone, video, online tailored (homework/educational material) feedback, or any combination thereof.

Of the 40 tools, 27 included some form of additional guidance, while 10 were found to be unguided. There were 3 tools for which information was not available (Table 8). While the proportions of guided cCBT tools for depression and anxiety disorders were similar (10 each), among the unguided tools, more were dedicated to people with depression (8) than to people with anxiety disorder (1).

Table 8. Number of articles by content of the tool.

| Content | Number of articles |
|----------------|---------------------------|
| Guided | 27 |
| Unguided | 10 |
| N/A | 3 |
| Total | 40 |

The most common type of guidance was that provided via email. In 12 of the cases this was email contact/support only, while in 4 cases email was provided alongside eChat (2), telephone (1) or tailored educational material⁹ (1) support. The second most common form of support was through telephone (4), followed by online/tailored homework feedback (2). Interventions using video or face-to-face support were also identified, but only in one instance each.

Intensity of additional guidance was typically low

A further element analysed was the level of support characterizing these tools. We were interested to know whether the cCBT tool was accompanied by a minimal additional guidance (e.g. short telephone calls or brief email feedback) or whether that guidance was (much) more intensive, in that it matched or exceeded the time envisaged for engaging with the online tool (e.g. whether it was accompanied by a series of sessions with therapists).

Of the 27 guided cCBT tools, 17 tools envisaged a minimal level of support. In 4 studies, the participants used cCBT tools that were accompanied with an equal or similar level of guidance as the prescribed level of intensity to use the tool. None of the tools provided cCBT as a minor element additional to another, more intensive, form of support. The articles examining the remaining 6 tools did not provide such information.

Below, we present an overview of the tools that aimed to address the top three most prevalent conditions: depression (Table 9), anxiety disorders (Table 10) and insomnia (Table 11).

⁹ Here, aside from email contact with a therapist, the cCBT tool content was tailored to the needs of the individual patient.

Table 9. Platforms for people with depression.

| Reference | Name | Delivery | Content | Additional guidance | Intensity of guidance | Structure | Number of modules |
|-----------------------------|--|-----------------|----------|---|-----------------------|-----------|-------------------|
| Linder et al. (2014) | Depressionshjälpen | Website | Guided | Email and telephone | Minimal | Linear | 7 |
| Månsson et al. (2013) | Stödsystem | Website and app | Guided | Face to face | N/A | N/A | N/A |
| Newby et al. (2014a) | Mixed Depression and Anxiety Course | Website and app | Guided | N/A | N/A | Flexible | 6 |
| Newby et al. (2014b) | Mixed Depression and Anxiety Course | Website and app | Guided | N/A | N/A | Flexible | N/A |
| Richards et al. (2015) | SilverCloud | Website and app | Guided | Email | Minimal | Flexible | 7 |
| Sharry et al. (2013) | Mind Balance (renamed: SilverCloud) | Website | Guided | Email | Minimal | Flexible | 7 |
| Gilbody et al. (2015) | <ul style="list-style-type: none"> • MoodGYM • Beating the Blues | Website | Guided | Telephone | Minimal | Linear | 15 |
| Geraedts et al. (2014) | Happy@Work | Website | Guided | Online homework feedback | Minimal | Linear | 6 |
| Imamura et al. (2015a) | Useful mental health solutions series for business series | Website | Guided | Email | Minimal | Linear | 6 |
| Imamura et al. (2014) | Useful mental health solutions series for business series | Website | Unguided | N/A | N/A | Linear | N/A |
| van der Vaart et al. (2014) | Name unknown | N/A | N/A | N/A | N/A | N/A | N/A |
| Twomey et al. (2014) | MoodGYM | Website | Unguided | N/A | N/A | Linear | 5 |
| Whitton et al. (2015) | myCompass | Website and app | Unguided | N/A | N/A | Mixed | 12 |
| Andrews et al. (2016) | various | N/A | N/A | N/A | N/A | N/A | N/A |
| Proudfoot et al. (2013) | myCompass | Website and app | Unguided | N/A | N/A | Mixed | N/A |
| Watts et al. (2013) | The Sadness Program | Website and app | Unguided | N/A | N/A | Linear | 6 |
| Blom et al. (2015) | Name unknown | Website | Guided | Email and tailored educational material | Minimal | Linear | 8 |
| Birney et al. (2016) | MoodHacker | Website and app | Guided | Email | N/A | Flexible | N/A |
| Botella et al. (2016) | Smiling Is Fun | Website and app | Unguided | N/A | N/A | Linear | 8 |
| Berman et al. (2014) | ePST | Website | Unguided | N/A | N/A | Mixed | 6 |
| Donker et al. (2013) | <ul style="list-style-type: none"> • Internet-delivered interpersonal psychotherapy e-couch • MoodGYM cCBT e-couch | Website | Unguided | N/A | N/A | Flexible | 3 |

Table 10. Platforms for people with anxiety disorders.

| Reference | Name | Delivery | Content | Additional guidance | Intensity of guidance | Structure | Number of modules |
|--------------------------------|-------------------------------------|-----------------|----------|---------------------|-----------------------|-----------|-------------------|
| Gershkovich et al. (2015) | Name unknown | Website | Guided | Video | Minimal | Linear | 8 |
| Månsson et al. (2013) | Stödsystem | Website and app | Guided | Face to face | N/A | N/A | N/A |
| Mathiasen et al. (2016) | FearFighter | Website | Guided | Telephone | Minimal | Linear | 9 |
| Newby et al. (2014a) | Mixed Depression and Anxiety Course | Website and app | Guided | N/A | N/A | Flexible | 6 |
| Newby et al. (2014b) | Mixed Depression and Anxiety Course | Website and app | Guided | N/A | N/A | Flexible | N/A |
| El Alaoui et al. (2015a) | Name unknown | Website | Guided | eChat | Equal share | Linear | 8 |
| Twomey et al. (2014) | MoodGYM | Website | Unguided | N/A | N/A | Linear | 5 |
| Whitton et al. (2015) | myCompass | Website and app | Unguided | N/A | N/A | Mixed | 12 |
| Andrews et al. (2016) | Various | N/A | N/A | N/A | N/A | N/A | N/A |
| Proudfoot et al. (2013) | myCompass | Website and app | Unguided | N/A | N/A | Mixed | N/A |
| Berger et al. (2014) | Name unknown | Website | Guided | eChat and email | Equal share | Mixed | 8 |
| Nordgren et al. (2014) | Name unknown | Website | Guided | Email | Minimal | Linear | 10 |
| Boettcher et al. (2014a) | Name unknown | Website | Unguided | N/A | N/A | Linear | 8 |
| Boettcher et al. (2014b) | Name unknown | Website | Guided | Email | Minimal | Linear | 9 |
| Bergman Nordgren et al. (2013) | Name unknown | Website | Guided | Email | Minimal | Linear | 16 |
| El Alaoui et al. (2015b) | Name unknown | Website | Guided | eChat and email | Equal share | Linear | 11 |
| El Alaoui et al. (2015c) | Name unknown | Website | Guided | Email | Minimal | Linear | 12 |
| Hedman et al. (2014) | Name unknown | Website | Guided | Email | Minimal | Linear | 15 |

Table 11. Platforms for people with insomnia.

| Reference | Name | Delivery | Content | Additional guidance | Intensity of guidance | Structure | Number of modules |
|---------------------------|--------------|----------|----------|---|-----------------------|-----------|-------------------|
| Kaldo et al. (2015) | Name unknown | Website | Guided | Online homework feedback | Minimal | Mixed | 8 |
| Lancee et al. (2013) | Name unknown | Website | Guided | Email | Minimal | Flexible | 8 |
| van Straten et al. (2014) | Name unknown | Website | Unguided | N/A | N/A | Linear | 6 |
| Blom et al. (2015) | Name unknown | Website | Guided | Email and tailored educational material | Minimal | Linear | 8 |
| Holmqvist et al. (2014) | Name unknown | Website | Unguided | N/A | N/A | Linear | 6 |

3.2. Participant characteristics

This section provides a general overview of the participant characteristics within the samples examined in the reviewed articles, separated by condition and mode of tool delivery. The average age, gender distribution, share of people in full-time employment and educational background of participants are presented. In cases where information was available for both the intervention and control groups, the coded values correspond to those of the intervention groups.¹⁰ In cases of three-arm trials, the values of the group using the cCBT tool were noted, and in cases in which two of the groups were using a cCBT tool but with a different form of support, an average between the two sample values was computed.

3.2.1. *An average cCBT participant was a female in her late thirties with a university degree and in full-time employment*

The median age of participants in the articles sampled was 38 years.¹¹ The study samples were composed, on average, of more female participants (62%, range: 0–85%) than males.¹² In general, the majority of participants were in full-time employment (60%, range: 0–95%) and were highly educated (59%, range: 21–87%, had a university degree). These characteristics are presented in Table 12.

When we looked at the characteristics of the participants using the examined tools, we observed some variation regarding the age of the participants and the conditions which affect them. The tools can be divided into three age groups. First, there are tools which were tested with participants in their early to mid-thirties; these tools aimed to treat anxiety disorders (trials with groups of individuals with a median age of 35), Obsessive Compulsive Disorder (OCD) (median age 35) and panic disorder (median age 34). Second, there were cCBT tools tested with participants in their late thirties, and which aimed to treat depression and recovery from work issues (the samples' median age being 39 for both conditions). Finally, in the case of tools to treat patients affected by Post-traumatic Stress Disorder (PTSD) and insomnia, these were tested on groups of participants who were in their mid- to late forties (with a median age of 45 and 47.5, respectively), and thus represent the oldest group of participants.

¹⁰ It should be noted that the reviewed studies followed different methods of recruiting participants. Some were open for people to self-select, whereas others relied on a referral from a psychologist. However, most of the studies randomized participants to the intervention and control groups after taking a baseline measurement and making sure there were no significant differences between the treatment and control groups in terms of participant characteristics.

¹¹ Drawing on the data available for the UK only, we know that the prevalence of any mental health illness is highest between the ages of 25 and 74, peaking in the 55–64 year age group (see Bridges 2016).

¹² In the UK, women are more likely than men to report ever having been diagnosed with a mental illness (33% compared with 19%) (see Bridges 2016).

Table 12. Participant characteristics by condition and content of cCBT tool.

| | | Median age | Average % of female participants (range) | Average % in full-time employment (range) | Average % of participants with university degree (range) |
|-------------------------------------|--------------------------------|-------------------|---|--|---|
| Condition treated | Social Anxiety | 35 | 64(46–78) | 57 (24–85) | 53 (21–76) |
| | Depression | 39 | 64 (0–85) | 57 (0–85) | 63 (40–87) |
| | Insomnia | 47.5 | 74.5 (70–81) | 74 (70–80) | 72 (59–85) |
| | Obsessive Compulsive Disorder | 35 | 76 (N/A) | 53 (N/A) | 49 (N/A) |
| | Panic Disorder | 34 | 62 (N/A) | N/A | N/A |
| | Post-traumatic Stress Disorder | 45 | 62 (41–82) | 65 (57–73) | 41(25–57) |
| | Recovery from work issues* | 39 | 47 (15–80) | 83 (70–95) | 71(69–73) |
| | Content | Guided | 35.5 | 65 (15–85) | 54 (24–85) |
| | Unguided | 38.4 | 58 (0–80) | 68 (0–95) | 67 (25–87) |
| All articles' samples values | | 38 | 62 (0–85) | 60 (0–95) | 59 (21–87) |

* Recovery from work issues include work-related rumination, fatigue and poor sleep quality.

In regards to the percentage of female participants, while the vast majority of interventions tested the tools on a sample dominated by female participants (at least 60% females), the articles focusing on recovery from work issues are exceptions since in these, on average, fewer than half of the participants were female (47%, range: 15–80%). In contrast, the tools tested on samples with the highest proportion of females were those for treating OCD (76%).

In terms of the proportions of participants in full-time employment and those holding a university degree, tools treating insomnia and recovery from work issues had, on average, samples with the highest proportions of employed participants, namely, 74% (range: 70–80%) and 83% (range: 70–95%), respectively, and of participants holding a university degree, namely, 72% (range: 59–85%) for insomnia and 71% (range: 69–73%) for recovery from work issues. Furthermore, the sample used to test the tool to treat PTSD included the lowest proportion of participants holding a university degree: on average only 41% (range 25–57%). Regarding the other conditions, no major trend was observed other than that in all of them about half of the participants were in full-time employment and held a university degree.

When we differentiate the participants' characteristics by content of the tools, whether guided or unguided, little variation is observed. There are differences between the averages of the proportions of females (higher for guided tools) and in the proportion of employed and university educated participants (higher in both cases for unguided tools). There is also very small variation between the median ages of participants who used guided and unguided tools.

3.2.2. Tools for people with depression had on average more equal proportions of male and female participants

The tools which aimed at treating depression were trialled with people who had a median age of 39. These tools were also tested on samples with a predominant proportion of females (64%, range: 0–85%), which, compared with tools for other conditions, was among the second lowest percentages (the same average proportion for social anxiety). More than half (57%, range: 0–85%) of the participants using these tools were in full-time employment, and a relatively high proportion of participants held a university degree (63%, range: 40–87%).

A detailed overview of the characteristics of the participants using the tools for depression is presented in Table 13.

Table 13. Participant characteristics of studies of cCBT tools for people with depression.

| Reference | Mean age | Female (%) | Full-time employment (%) | With university degree (%) |
|---|-----------|------------|--------------------------|----------------------------|
| Lindner et al. (2014) | 30 | 85 | N/A | N/A |
| Månsson et al. (2013) | 43 | 67 | 60 | 47 |
| Newby et al. (2014a) | 40 | 67 | N/A | N/A |
| Newby et al. (2014b) | 44 | 78 | 36 | 59 |
| Richards et al. (2015) | 41 | 74 | 41 | N/A |
| Sharry et al. (2013) | 23 | 69 | N/A | N/A |
| Gilbody et al. (2015) | 40 | 67 | N/A | N/A |
| Geraedts et al. (2014) | N/A | 62 | >50 | 64 |
| Imamura et al. (2015a) | 38 | 15 | 70 | 73 |
| Imamura et al. (2014) | 38 | 15 | 70 | 73 |
| van der Vaart et al. (2014) | 37 | 33 | N/A | N/A |
| Twomey et al. (2014) | 35 | 74 | N/A | N/A |
| Whitton et al. (2015) | 39 | 69 | 85 | 58 |
| Andrews et al. (2016) | N/A | N/A | N/A | N/A |
| Proudfoot et al. (2013) | 39 | 70 | 84 | 54 |
| Watts et al. (2013) | 41 | 80 | N/A | N/A |
| Blom et al. (2015) | N/A | N/A | N/A | N/A |
| Birney et al. (2016) | 41 | 75 | 56 | 40 |
| Botella et al. (2016) | 32 | 0 | 0 | 58 |
| Berman et al. (2014) | 53 | 79 | 66 | 83 |
| Donker et al. (2013) | 27 | 72 | N/A | 87 |
| Median age and average percentage values | 39 | 64 | 57 | 63 |

3.2.3. Tools for people with anxiety disorders had somewhat younger and less well-educated participants

The tools which aimed at treating anxiety disorders were, on average, tested with a relatively young sample of participants (35 being the median age of participants) when compared with the tools aimed at

other conditions. Furthermore, these tools were tested on a predominantly female sample (64%, range: 46–78%). Similarly, on average, only 57% (range: 24–85%) of participants using anxiety-related tools were in full-time employment at the time of the treatment, this being the second lowest proportion among all other samples. With regard to the level of education of participants using these tools, on average 53% (range: 21–76%) held a university degree, the third lowest proportion when compared with all other samples by condition.

Table 14 presents an overview of the characteristics of the participants using tools for anxiety disorders.

Table 14. Participant characteristics of studies of cCBT tools for people with anxiety disorders.

| Reference | Mean age | Female (%) | Full-time employment (%) | With university degree (%) |
|---|-----------|------------|--------------------------|----------------------------|
| Gershkovich et al. (2015) | 33 | 70 | 70 | 54 |
| Månsson et al. (2013) | 43 | 67 | 60 | 47 |
| Mathiasen et al. (2016) | 32 | 63 | 39 | N/A |
| Newby et al. (2014a) | 40 | 67 | N/A | N/A |
| Newby et al. (2014b) | 44 | 78 | 36 | 59 |
| El Alaoui et al. (2015a) | 33 | 46 | 85 | Average 5.77* |
| Twomey et al. (2014) | 35 | 74 | N/A | N/A |
| Whitton et al. (2015) | 39 | 69 | 85 | 58 |
| Andrews et al. (2016) | N/A | N/A | N/A | N/A |
| Proudfoot et al. (2013) | 39 | 70 | 84 | 54 |
| Berger et al. (2014) | 35 | 56 | 38 | N/A |
| Bergman Nordgren et al. (2014) | 36 | 63 | 24 | 21 |
| Boettcher et al. (2014a) | 38 | 76 | N/A | 76 |
| Boettcher et al. (2014b) | 33 | 52 | N/A | 71 |
| Bergman Nordgren et al. (2013) | 39 | 67 | N/A | 44 |
| El Alaoui et al. (2015b) | 33 | 55 | 50 | 59 |
| El Alaoui et al. (2015c) | 33 | 55 | N/A | 43 |
| Hedman et al. (2014) | 35 | N/A | N/A | N/A |
| Median age and average percentage values | 35 | 64 | 57 | 53 |

* In this paper educational attainment was presented on a scale of 0–6, where 6 means a university degree.

3.2.4. Studies on tools for people with insomnia had older and mainly female participants

Tools which targeted individuals with insomnia were tested with the oldest samples of participants. Participants treated for insomnia had a median age of 47.5. With regard to the proportion of females, tools for insomnia were also tested on samples largely dominated by female participants (74.5%, range: 70–81%). Participants using insomnia-related tools were additionally better educated when compared with all other samples within this category (on average 72%, range: 59–85%, of participants held a university degree) and more likely to be in full-time employment (on average 74%, range: 70–80%). It is

worth noting that the ranges for all these characteristic averages represent the smallest variation compared with all other participant samples by condition.

Table 15 presents an overview of the characteristics of the participants using tools for insomnia.

Table 15. Participant characteristics of studies of cCBT tools for people with insomnia.

| Reference | Mean age | Female (%) | Full-time employment (%) | With university degree (%) |
|---|-------------|-------------|--------------------------|----------------------------|
| Kaldo et al. (2015) | 47 | 81 | 80 | N/A |
| Lancee et al. (2013)* | 48 | 75 | N/A | N/A |
| van Straten et al. (2014) | N/A | 70 | 70 | 59 |
| Blom et al. (2015) | N/A | N/A | N/A | N/A |
| Holmqvist et al. (2014) | N/A | 72 | 72 | 85 |
| Median age and average percentage values | 47.5 | 74.5 | 74 | 72 |

* Lancee et al. (2014) was excluded as the study was carried out on the same sample as Lancee et al. (2013).

3.3. Outcomes

This section discusses effectiveness of the platforms, taking into account first mental health and then work-related outcomes for people receiving treatment. We also draw on the existing literature looking into adherence to cCBT interventions – its predictors and implications for outcomes.

3.3.1. *Mental health outcomes were measured on various scales and showed large to moderate effect sizes*

Overview

Of the 44 articles included in the review, 39 examined outcomes relating to mental health improvements among cCBT users. Of these, 19 tools were meant for people with depression, 14 for people with anxiety disorders, 6 for people with insomnia, 2 for people with OCD, recovery from work issues and PTSD and 1 for those with panic disorder.¹³

The tools were made available in a number of countries: Australia, China, Denmark, Ireland, Japan, Norway, Spain, Sweden, the Netherlands, the United Kingdom, and the United States.

The measures¹⁴ used to track progress included various metrics spanning depression (such as Patient Health Questionnaire for Depression Scoring [PHQ-9], Beck Depression Inventory [BDI-II] or

¹³ Some tools were aimed at addressing more than one condition and some studies did not examine mental health outcomes – hence the differences in numbers compared with section 3.1.2.

¹⁴ Almost all tools used primary and secondary measures.

Montgomery-Åsberg Depression Rating Scale [MADRS-S]), anxiety disorders (e.g. Beck Anxiety Inventory [BAI], Generalised Anxiety Disorder 7-Item Scale [GAD-7] or Liebowitz Social Anxiety Scale [LSAS]), insomnia (including Insomnia Severity Index [ISI] and total sleep time [TST]) and more. The diversity of measures was larger among the articles that examined platforms dedicated to people with anxiety disorders than among those for people with depression or insomnia. At the same time there was some overlap in that there were six articles examining tools that aimed at addressing more than one condition (most often depression and anxiety disorder), which as a result used multiple measures to measure outcomes. Also, many articles examined the tool dedicated to a specific condition (such as anxiety disorder) by using a wide range of primary and secondary measures. These often included measures of other mental health issues (such as depression). For example, Månsson et al. (2013) studied a tool for social anxiety called STÖDSYSTEM (tr. support system). Among the measures used to track mental health improvements were PHQ-9, BAI and MADRS-S (for depression) and GAD-7 (for anxiety). This considerable overlap reflects the fact that people may have more than one mental health condition at a time.

A systematic review and meta-analysis of cCBTs carried out by Grist and Cavanagh (2013) showed an overall effect size of $g = 0.77$, 95% CI [0.59–0.95], in favour of cCBT interventions over inactive and active control groups. The review did not focus on a particular condition and included studies that focused on various anxiety disorders and depression. The authors established that, according to Cohen's (1988) criteria, the overall effect size was medium and that this was comparable to the average effect size of face-to-face CBT interventions for common mental health disorders.

As we have noted above, the method adopted in the current study, combined with the variety of cCBT platforms, diversity of contexts in which they were trialled, participants who tested these, as well as methods and measures of assessment used, made statistical analysis impossible. Any comparisons between the tools taking into account their levels of effectiveness were also difficult and could only be qualitative in character. To enable these comparisons, we used a simplified scoring of the results using Red (no effects of treatment), Amber (unclear results of treatment), Green (improvements in mental health outcomes) scores – see also section 2.3. Note that this categorisation needs to be interpreted with caution, and the results of comparisons should be viewed as indicative only.

Overall, the 39 articles showed a wide range of outcomes: from the most promising ones (17 coded as green), to those where emerging evidence was unclear (20 amber), and those that showed that the cCBT platform(s) had no effect on improving mental health of the treatment group (2 coded as red).

We analysed whether there are any patterns that would suggest that certain types of tools (or elements of their design) were more or less effective. For example, we looked at the effectiveness of the platforms by delivery mechanism, content, structure and offered functionalities to see if a particular design or feature was associated with better mental health outcomes. However, we observed no major trends in the data, and the numbers were too small to draw any firm conclusions (see Table 16).

In their systematic review, Grist and Cavanagh (2013) found no significant difference in effect sizes between guided and unguided platforms, but subgroup analysis showed a somewhat surprising trend for unguided programs to have higher effect sizes than unguided ones; $g = 0.95$, 95% CI [0.28–1.62] for unguided and $g = 0.67$, 95% CI [0.51–0.83] for guided tools. However, this is in contrast with earlier

studies that indicated that guided platforms are more effective than unguided, self-administered ones (Andersson and Cuijpers 2009; Gellatly et al. 2007; Spek et al. 2007).

Table 16. Effectiveness of cCBT tools by delivery mechanism.

| | | Number of articles | Tool effectiveness* | | | |
|----------------------|--|-----------------------|---------------------|----------|--------|---------|
| | | | Green | Amber | Red | N/A |
| Delivery | Website | 33 | 13 (39%) | 14 (42%) | 2 (6%) | 4 (12%) |
| | Website and app | 9 | 3 (33%) | 5 (56%) | 0 (0%) | 1 (11%) |
| Content | Guided | 28 | 10 (36%) | 14 (50%) | 1 (4%) | 3 (14%) |
| | Unguided | 14 | 6 (43%) | 5 (36%) | 1 (7%) | 2 (11%) |
| Structure | Linear | 26 | 8 (31%) | 12 (46%) | 2 (8%) | 4 (15%) |
| | Flexible | 7 | 4 (57%) | 3 (43%) | 0 (0%) | 0 (0%) |
| | Mix | 7 | 4 (57%) | 2 (29%) | 0 (0%) | 1 (14%) |
| Functionality | Static information | 30 | 10 (33%) | 14 (47%) | 2 (7%) | 4 (13%) |
| | Dynamic information (e.g. videos, forums) | 24 | 8 (33%) | 13 (54%) | 2 (8%) | 1 (4%) |
| | Tailored information based on assessment results | 8 | 3 (38%) | 3 (38%) | 0 (0%) | 2 (25%) |
| | Tailored information based on user's progress | 29 | 10 (34%) | 15 (52%) | 1 (3%) | 3 (10%) |

* As assessed by this review. Green – improvements in mental health outcomes; Amber – unclear results; Red – no effects of treatment.

We also looked at the effectiveness of the platforms by participant characteristics (age, gender, whether in full-time employment, and education level) to see whether platforms would be more or less effective for individuals with a particular characteristic. To discern any differentiation, the average value of the characteristic across all articles was used as the cut-off point to compare effectiveness (i.e. the mean percentage of females across all samples¹⁵ was 38). However, the samples median was used as the cut-off point for age. Table 17 shows the cut-off points used for each feature.

When we looked into their relation to effectiveness, no major trends were identified. Little to no variation is observed related to the level of employment or education of individuals, and the proportions of platforms that show clear positive effects on mental health outcomes (labelled as 'Green'). In terms of age, the platforms that were tested with participants aged above 35.5, appeared to be more promising than those tested with younger samples. However, after carrying out a Chi-square test, the results were not significant at a $p < 0.10$ level ($\chi^2 = 1.7$, p -value = 0.197). Furthermore, platforms trialled with samples composed of more than 62% women seemed to be more promising than those with a more balanced

¹⁵ These 'samples' refer to the samples used to test the platform within each article that was evaluated in this research.

gender distribution. However, in this case, too, after carrying a Chi-square test, we found that the results were insignificant at the $p < 0.10$ level ($\chi^2 = 0.7$, p -value = 0.385).

These observations need to be interpreted with caution, not only because of these statistically insignificant results, but also because the number of articles was limited and varied for each characteristic's cut-off point, in particular for gender (which had the greatest disparity in the number of articles per cut-off point group).

We also note that the systematic review by Grist and Cavanagh (2013) found an opposite effect of age, where age was negatively related to the effectiveness of cCBT; the authors suggested better technology skills among younger users as one possible explanation. The authors also concluded that other characteristics (including gender or the highest completed level of education) did not have a significant moderating influence on effect sizes.

Table 17. Effectiveness of tools by participant characteristics.

| | | Number of articles | Tool effectiveness* | | | |
|-------------------|---------------------------------------|--------------------|---------------------|----------|---------|---------|
| | | | Green | Amber | Red | N/A |
| Age | Aged the median age and below (35.5) | 16 | 4 (25%) | 10 (63%) | 0 (0%) | 2 (12%) |
| | Above median age (35.5) | 22 | 10 (46%) | 7 (32%) | 1 (5%) | 4 (18%) |
| Gender | 62% and below female participants | 12 | 3 (25%) | 4 (33%) | 1 (8%) | 4 (33%) |
| | More than 62% female participants | 28 | 11 (39%) | 14 (50%) | 1 (4%) | 2 (7%) |
| Employment | 60% and below in full-time employment | 12 | 4 (33%) | 7 (58%) | 1 (8%) | 0 (0%) |
| | More than 60% in full-time employment | 13 | 6 (46%) | 3 (23%) | 0 (0%) | 3 (23%) |
| Education | 59% and below with higher education | 15 | 5 (33%) | 7 (47%) | 1 (7%) | 2 (13%) |
| | More than 59% with higher education | 10 | 5 (50%) | 2 (20%) | 1 (10%) | 2 (20%) |

* As assessed by this review. Green – improvements in mental health outcomes; Amber – unclear results; Red – no effects of treatment.

We now look at these outcomes in more detail, focusing on the most common conditions: depression, anxiety disorders and insomnia. Please refer to Appendix C for the complete outcome matrix.

Tools for depression showed a large average within-group effect size

In their meta-analysis of cCBT for adult depression, So et al. (2013) showed that the pooled standardized mean difference (SMD) at post-treatment was -0.48 [95% CI -0.63 to -0.33], and they found no

significant clinical effect at long follow-up and no improvement of function. It is therefore useful to point to individual platforms that, according to recent articles, show promise in terms of long follow-up. Among such evidence-based tools for depression that demonstrated clear and sustainable¹⁶ improvements in mental health outcomes are:

- *SilverCloud*, which was tested in the UK and showed significant improvements on BDI-II and GAD-7 scores among the treatment group compared with the waiting list control at post-treatment and at 6-month follow-up (Richards et al. 2015).
- *Useful mental health solutions series for business*, which was tested in Japan both in the guided and unguided versions. According to Imamura et al. (2014, 2015a), the treatment group: 1) improved significantly on BDI-II at 3- and 6-month follow-up, and 2) had significantly lower incidence of major depression episodes (MDE) at 12-month follow-up compared with care-as-usual control.

Other promising tools which showed clear improvements in mental health outcomes at post-treatment included:

- *Mixed Depression and Anxiety Course*, which was tested in Australia and demonstrated that the treatment group improved significantly on GAD-7 and PHQ-9 compared with wait-list control (Newby et al. 2014b).
- *myCompass*, which was tested in Australia and found that the treatment group made significantly greater improvements on the Depression Anxiety Stress Scales (DASS) total compared with attention-control support and wait-list control group at post-treatment (Proudfoot et al. 2013).
- *cCBT e-Couch*, which was tested in Australia and showed that, although there were no significant differences between the groups on the CES-D scores at post-treatment, the cCBT e-couch group improved significantly from baseline to follow-up (Donker et al. 2013).

Summary statistics for five articles comparing cCBT for depression between the baseline and post-treatment are presented in Table 18. They show an overall mean within-group effect size of 1.23 in improvements on the Beck Depression Inventory (BDI-II) scale.

Table 18. Effect sizes of studies comparing mental health improvements on BDI-II.

| Reference | n | Within-group ES |
|---|-----|-----------------|
| Richards et al. (2015) | 262 | 1.29 |
| Imamura et al. (2014) | 762 | -0.16 |
| Lindner et al. (2014) – email-supported Internet-based CBT (iCBT) | 57 | 1.29 |
| Lindner et al. (2014) – telephone-supported iCBT | 57 | 1.03 |
| Sharry et al. (2013) | 80 | 1.17 |
| Watts et al. (2013) – cCBT mobile | 52 | 1.79 |
| Watts et al. (2013) – cCBT computer | 52 | 1.88 |
| Mean ES | | 1.23 |

¹⁶ By ‘sustainable’ we mean those outcomes that were maintained in the follow-up at different points in time.

The full list of depression-related tools and information on their significant outcomes is presented in Table 19.

Table 19. Mental health outcomes of platforms for people with depression.

| Reference | Comparison group(s) | Sample size(s) | Significant outcome(s)* | Mental health outcome† |
|-------------------------|--|---|--|------------------------|
| Newby et al. (2014b) | Wait-list control | Total = 99 Intervention = 46 Wait-list control = 53 | The treatment group improved significantly at post-treatment on PHQ-9 scores compared with control (BG ES [Hedge's g] = 1.00). The treatment group improved significantly at post-treatment on GAD-7 scores compared with control (BG ES [Hedge's g] = 0.85). The treatment group improved significantly at post-treatment on PHQ-9 scores compared with baseline (WG ES = 1.05). The treatment group improved significantly at post-treatment on GAD-7 scores compared with baseline (WG ES = 0.96). | G |
| Richards et al. (2015) | Wait-list control | Total = 262 Intervention = 133 Wait-list control = 129 | The cCBT treatment group improved significantly on BDI-II compared with waiting list control at post-treatment (BG ES = 0.50). The cCBT treatment group improved significantly on GAD-7 compared with waiting list control at post-treatment (BG ES = 0.32). The cCBT treatment group improved significantly on BDI-II from baseline at 6-month follow-up (WG ES = 1.29 ITT; 1.52 completers). The cCBT treatment group improved significantly on GAD-7 from baseline at 6-month follow-up (WG ES = 1.58 ITT; 0.98 completers). | G |
| Imamura et al. (2015a) | Other | Total = 762 Intervention = 381 care as usual = 381 | The iCBT group experienced significantly lower incidence of MDE at 12-month follow-up compared with care as usual control. | G |
| Imamura et al. (2014) | Other | Total = 762 Intervention = 381 Other form of support = 381 | The iCBT group improved significantly on BDI-II from baseline at 3-month follow-up (WG ES = -0.14) and 6-month follow-up (WG ES = -0.16). Effect sizes crossed 0; significance based on p-value. | G |
| Andrews et al. (2016) | Various, including wait-list controls | Various | Mean effect size of treatment over control groups across studies was ES = 0.86, although the measures used in the reviewed studies were not specified. | G ‡ |
| Proudfoot et al. (2013) | <ul style="list-style-type: none"> Wait-list control Other | Total = 720 Intervention = 242 Attention control = 248 Wait-list control = 230 | The myCompass treatment group made significantly greater improvements on the DASS total compared with the attention control (BG ES = 0.41) and waitlist control (BG ES = 0.55) groups at post-treatment. | G |
| Donker et al. (2013) | <ul style="list-style-type: none"> Another cCBT Other | Total = 1,929 Internet-delivered interpersonal psychotherapy = 620 CBT e-couch = 610 MoodGYM = 613 | There were no significant differences between groups on CES-D scores at post-test. The cCBT e-couch (WG ES = 1.44) and MoodGYM (ES = 1.04) groups improved significantly on CES-D scores from baseline to follow-up. (Effect sizes for ITT were 0.80 and 0.66, respectively; ES for adherent completers scores were 1.33 and 1.21, respectively.) | G |
| Lindner et al. (2014) | Another cCBT | Total = 57 Telephone-supported iCBT = 38 Email-supported iCBT = 19 | The email-supported iCBT treatment group improved significantly from pre-treatment to 3-month follow-up on Quality of Life Inventory (QOLI) (WG ES = 0.90), BDI-II (1.36), BAI (0.77) and MADRS-S (0.86). The telephone-supported iCBT treatment group improved significantly from pre-treatment to 3-month follow-up on QOLI (WG ES = 0.45), BDI-II (1.21), BAI (0.67) and MADRS-S (0.98). The email-supported iCBT treatment group improved significantly on BDI-II from baseline to post-treatment (WG ES = 1.29). The telephone-supported iCBT treatment group improved significantly on BDI-II from baseline to post-treatment (WG ES = 1.03). | A |
| Månsson et al. (2013) | No comparison group | 15 patients and 8 therapists | Participants improved significantly from baseline to 12-month follow-up on QOLI (WG ES = 1.29), BAI (1.09), PHQ-9 (1.31), GAD-7 (1.08) and MADRS-S (1.94). | A |
| Newby et al. | No comparison | Total = 707 | Sample improved significantly from pre- to post-treatment on GAD-7 (WG ES = 1.20), PHQ-9 (1.11), SPIN (0.69), Postpartum | A |

| Reference | Comparison group(s) | Sample size(s) | Significant outcome(s)* | Mental health outcome† |
|------------------------|---|---|--|------------------------|
| (2014a) | group | | Depression Screening Scale (PDSS) (0.51), K-10 (1.06) and World Health Organisation Disability Assessment Scale-II (WHODAS-II) (0.61). | |
| Sharry et al. (2013) | No comparison group | Total = 80 | Participants improved significantly on BDHI from baseline to post-intervention (WG ES = 1.17). | A |
| Gilbody et al. (2015) | <ul style="list-style-type: none"> Another cCBT Other | Total = 691 Beating the Blues = 210 MoodGYM = 242 care as usual = 239 | There was no significant difference in PHQ-9 scores between Beating the Blues and GP care as usual at any time point. There was limited evidence of an improvement in PHQ-9 scores in favour of MoodGYM over GP care as usual at 12 months only, and not at other follow-up time points. | A |
| Twomey et al. (2014) | Wait-list control | Total = 201 Intervention = 101 Wait-list control = 100 | MoodGYM was significantly more effective than the waiting list control condition for the reduction of symptoms of general psychological distress (BG ES = 0.14) and stress (BG ES = 0.15) at post-test. | A |
| Watts et al. (2013) | Another cCBT | Total = 52 cCBT mobile = 22 cCBT computer = 30 | The mCBT group improved from pre- to post-treatment on BDHI (ES = 1.79), PHQ-9 (ES = 1.41) and K-10 (ES = 1.05). The cCBT group improved from pre- to post-treatment on BDHI (ES = 1.88), PHQ-9 (ES = 0.92) and K-10 (ES = 1.22). | A |
| Birney et al. (2016) | Other | Total = 300 Intervention = 150 Other form of support = 150 | The treatment group with access to EAP support improved significantly on PHQ-9 scores from pre-test to 6-week follow-up ($\eta^2 = 0.093$).§ | A |
| Botella et al. (2016) | <ul style="list-style-type: none"> Wait-list control Another cCBT | Total = 60 Intervention = 22 Intervention with sensors = 19 Wait-list control = 19 | Results have large confidence intervals and outcomes are unclear. | A |
| Berman et al. (2014) | <ul style="list-style-type: none"> Another cCBT Other | Total = 29 | The treatment group improved significantly from baseline on PHQ-9 scores ($\eta^2 = 0.931$). When comparing ePST intervention to a previous RCT of Beating the Blues (Ormrod et al. 2010), ePST scored significantly higher on ARM subscales at week 10: Bond (BG ES = 1.57); Partnership (ES = 0.70); Confidence (ES = 1.36); Openness (ES = 1.38). | A |
| Blom et al. (2015) | The same cCBT with another group of participants | Total = 43 Insomnia cCBT = 22 Depression cCBT = 21 | The insomnia cCBT treatment group improved significantly more on ISI than the depression group at post-treatment. There was no significant difference on MADRS-S between the groups. The insomnia cCBT treatment group improved significantly from baseline on ISI (WG ES = 1.84) and MADRS-S (WG ES = 1.12) at 12-month follow-up. The depression cCBT treatment group improved significantly from baseline on ISI (WG ES = 0.95) and MADRS-S (WG ES = 0.94) at 12-month follow-up. | A |
| Geraedts et al. (2014) | Other | Total = 231 Intervention = 116 care as usual = 115 | The study showed no significant benefit of treatment over control. | R |

* Outcomes are displayed selectively; these were outcomes which showed a benefit of treatment over control or improvement in the treatment group from baseline, at the longest point from baseline at which these remained significant.

† As assessed by this review. Green (G) – improvements in mental health outcomes; Amber (A) – unclear results; Red (R) – no effects of treatment.

‡ The article provided an analysis of nine studies examining different cCBT platforms; therefore this article was not included in the discussion above.

§ Cohen (1988) sets rule-of-thumb guidelines for interpreting partial eta squared effect sizes: 0.01 = small; 0.06 = medium; 0.14 = large. Cohen's d effect sizes are usually interpreted as small (0.2), medium (0.5) and large (0.8). Outcomes are displayed selectively; these were outcomes which showed a benefit of treatment over control or improvement in the treatment group from baseline, at the longest point from baseline at which these remained significant.

Tools for anxiety disorders showed a moderate mean effect size

The tool for anxiety disorders that demonstrated sustainable improvements in mental health outcomes was:

- A tool for people with social anxiety disorder, name unknown, which was tested in Sweden and had been previously shown to be superior to wait-list controls in randomized trials. According to Hedman et al. (2014), the cCBT group improved significantly from baseline to 4-year follow-up on LSAS-SR, SIAS, SPS and BAI.

Other cCBT platforms that aimed to address anxiety disorders showed improvements in mental health outcomes at post-treatment but showed no significant outcomes at the follow-up (or had no follow-up). These platforms were:

- *Mixed Depression and Anxiety Course*, which was tested in Australia and demonstrated that the treatment group improved significantly on GAD-7 and PHQ-9 compared with wait-list control (Newby et al. 2014b).
- *myCompass*, which was tested in Australia and proved that the treatment group made significantly greater improvements on the DASS total compared with the attention-control support and wait-list control group at post-treatment (Proudfoot et al. 2013).
- A tool for people with social anxiety disorder, name unknown, which was tested in Sweden and showed that the treatment group made greater improvements at post-treatment on Clinical Outcomes in Routine Evaluation Outcome Measure (CORE OM), BAI, MADRS-S and QOLI scores compared with the control (Bergman Nordgren et al. 2014). The treatment group also improved significantly from baseline on all the above scores.
- An Internet-based mindfulness treatment, *Mindfulness grundkurs*, which was tested in Sweden and demonstrated that the mindfulness group improved significantly more on the BAI, BDI and ISI than the control at post-test (Boettcher et al. 2014a).

Two articles used the Beck Anxiety Inventory (BAI) to compare cCBT for anxiety disorders with wait-list control at post-treatment. Their summary statistics, which are presented in Table 20, show an overall mean effect size of 0.79 on BAI scores.

Table 20. Effect sizes of studies comparing mental health improvements on BAI.

| Reference | n | ES superiority (intervention) |
|--|-----|-------------------------------|
| Nordgren et al. (2014) | 100 | 0.58 |
| Berger et al. (2014) – standardised cCBT | 132 | 0.91 |
| Berger et al. (2014) – tailored cCBT | 132 | 0.87 |
| Mean ES | | 0.79 |

The full list of anxiety-related tools and information on their significant outcomes is presented in Table 21.

Table 21. Mental health outcomes of platforms for people with anxiety disorders.

| Reference | Comparison group(s) | Sample size(s) | Significant outcome(s)* | Mental health outcome† |
|--------------------------------|--|---|--|------------------------|
| Hedman et al. (2014) | Other | Total = 126 Intervention = 64 Group CBT = 62 | There were no significant differences between the cCBT and group-CBT groups at 4-year follow-up. The cCBT group improved significantly from baseline to 4-year follow-up on LSAS-SR (WG ES = 1.34), SIAS (ES = 1.18), SPS (ES = 1.09), MADRS-S (ES = 0.71), BAI (ES = 1.04). | G |
| Newby et al. (2014b) | Wait-list control | Total = 99 Intervention = 46 Wait-list control = 53 | The treatment group improved significantly at post-treatment on PHQ-9 scores compared with control (BG ES [Hedge's g] = 1.00). The treatment group improved significantly at post-treatment on GAD-7 scores compared with control (BG ES [Hedge's g] = 0.85). The treatment group improved significantly at post-treatment on PHQ-9 scores compared with baseline (WG ES = 1.05). The treatment group improved significantly at post-treatment on GAD-7 scores compared with baseline (WG ES = 0.96). | G |
| Proudfoot et al. (2013) | <ul style="list-style-type: none"> • Wait-list control • Other | Total = 720 Intervention = 242 Attention control = 248 Wait-list control = 230 | The myCompass treatment group made significantly greater improvements on the DASS total compared with the attention control (BG ES = 0.41) and waitlist control (BG ES = 0.55) groups at post-treatment. | G |
| Bergman Nordgren et al. (2014) | Other | Total = 100 Intervention = 50 Other form of support = 50 | The treatment group made greater improvements at post-treatment on CORE-OM scores compared with the control (BG ES = 0.86). The treatment group made greater improvements at post-treatment on BAI scores compared with the control (BG ES = 0.58). The treatment group made greater improvements at post-treatment on MADRS-S scores compared with the control (BG ES = 0.70). The treatment group made greater improvements at post-treatment on QOLI scores compared with the control (BG ES = 0.20). The treatment group improved significantly from baseline on CORE-OM scores at 1-year follow-up (0.75). The treatment group improved significantly from baseline on BAI scores (0.53). The treatment group improved significantly from baseline on MADRS-S scores (1.00). The treatment group improved significantly from baseline on QOLI scores (0.57). | G |
| Boettcher et al. (2014a) | Other | Total = 91 Intervention = 45 Other form of support = 46 | The mindfulness group improved significantly more on the BAI than the control at post-test (between-group ES = 0.99). The mindfulness group improved significantly more on the BDI than the control at post-test (between-group ES = 0.84). The mindfulness group improved significantly more on the ISI than the control at post-test (between-group ES = 0.36). There was a significant difference in the rate of recovery and improvement between groups at post-test favouring the mindfulness group. | G |
| Gershkovich et al. (2015) | No comparison group | Total = 13 | Significant change on SPAI from baseline to 3-month follow-up (ES = 1.39). Significant change on LSAS from baseline to 3-month follow-up (ES = 0.86). Significant change on BDI from baseline to post-treatment (ES = 1.11). Significant change on Sheehan Disability Scale (SDS)-total from baseline to 3-month follow-up (ES = 0.84). | A |
| Månsson et al. (2013) | No comparison group | 15 patients and 8 therapists | Participants improved significantly from baseline to 12-month follow-up on QOLI (WG ES = 1.29), BAI (1.09), PHQ-9 (1.31), GAD-7 (1.08) and MADRS-S (1.94). | A |
| Mathiasen et al. (2016) | Wait-list control | Total = 67 Intervention = 36 Wait-list control = 31 | Quality of life (EQ-vas) improved significantly more for the iCBT group at post-treatment compared with control (BG ES = 0.81). There were no significant between-group differences on the BDI-II nor BAI at post-treatment. The treatment group improved significantly on BDI-II from baseline to post-treatment. | A |
| Newby et al. (2014a) | No comparison group | Total = 707 | Sample improved significantly from pre- to post-treatment on GAD-7 (WG ES = 1.20), PHQ-9 (1.11), SPIN (0.69), PDSS (0.51), K-10 (1.06) and WHODAS-II (0.61). | A |

| Reference | Comparison group(s) | Sample size(s) | Significant outcome(s)* | Mental health outcome† |
|--------------------------|---|---|---|------------------------|
| Twomey et al. (2014) | Wait-list control | Total = 201 Intervention = 101 Wait-list control = 100 | MoodGYM was significantly more effective than the waiting list control condition for the reduction of symptoms of general psychological distress (BG ES = 0.14) and stress (BG ES = 0.15) at post-test. | A |
| Berger et al. (2014) | <ul style="list-style-type: none"> • Wait-list control • Another cCBT | Total = 132 Intervention = 44 Other cCBT = 44 Wait-list control = 44 | <p>The tailored cCBT group improved significantly relative to wait-list control on the BAI at post-treatment (BG ES = 0.87).</p> <p>The standardized cCBT group improved significantly relative to wait-list control on the BAI at post-treatment (BG ES = 0.91).</p> <p>The tailored cCBT group improved significantly relative to wait-list control on the BDI-II at post-treatment (BG ES = 0.83).</p> <p>The standardized cCBT group improved significantly relative to wait-list control on the BDI-II at post-treatment (BG ES = 0.88).</p> <p>The tailored cCBT group improved significantly relative to wait-list control on the SIAS at post-treatment (BG ES = 1.15).</p> <p>The standardized cCBT group improved significantly relative to wait-list control on the SIAS at post-treatment (BG ES = 1.12).</p> | A |
| Berman et al. (2014) | <ul style="list-style-type: none"> • Another cCBT • Other | Total = 29 | <p>The treatment group improved significantly from baseline on PHQ-9 scores ($\eta^2 = 0.931$).</p> <p>When comparing <i>ePST</i> intervention to a previous RCT of <i>Beating the Blues</i> (Ormrod et al. 2010), <i>ePST</i> scored significantly higher on ARM subscales at week 10: Bond (BG ES = 1.57); Partnership (ES = 0.70); Confidence (ES = 1.36); Openness (ES = 1.38).</p> | A |
| El Alaoui et al. (2015b) | No comparison group | Total = 654 | <p>Participant mean LSAS-SR scores improved significantly from screening to 6-month follow-up (ES = 1.15).</p> <p>Participant mean MADRS-S scores improved significantly from screening to 6-month follow-up (ES = 0.57).</p> | A |
| El Alaoui et al. (2015c) | No comparison group | Total = 446 | <p>The group improved on LSAS-SR scores from baseline to post-treatment (ES = 0.79) and 6-month follow-up (ES = 0.92).</p> <p>The group improved on MADRS-S scores from baseline to post-treatment (ES = 0.61) and 6-month follow-up (ES = 0.59).</p> <p>(Estimated parameters from growth curve analysis of continuous outcomes.)</p> | A |

* Outcomes are displayed selectively; these were outcomes which showed a benefit of treatment over control or improvement in the treatment group from baseline, at the longest point from baseline at which these remained significant.

† As assessed by this review. Green (G) – improvements in mental health outcomes; Amber (A) – unclear results; Red (R) – no effects of treatment. Outcomes are displayed selectively; these were outcomes which showed a benefit of treatment over control or improvement in the treatment group from baseline, at the longest point from baseline at which these remained significant. Cohen's *d* effect sizes are usually interpreted as small (0.2), medium (0.5) and large (0.8).

Tools for insomnia showed a large mean within-group effect size

The tools for insomnia that demonstrated improvements in mental health outcomes were:

- A tool for people experiencing insomnia, name unknown, which was piloted in the Netherlands and compared with a waiting-list control. Results showed that the treatment group improved significantly compared with control at post-test on Pittsburgh Sleep Quality Index (PSQI), total sleep time, sleep efficiency (SE), soundness of sleep, and quality of life scores (van Straten et al. 2014).
- A tool for people with insomnia, name unknown, which was piloted in the Netherlands. Both a group receiving additional therapist support and a group without such support improved significantly on the ISI from baseline to follow-up (Lancee et al. 2013).
- A tool for people experiencing insomnia, name unknown, which was piloted in Sweden. Both a group receiving additional therapist support and a group without such support improved significantly on the ISI from baseline to 12-month follow-up (Kaldo et al. 2015).

Four articles used the Insomnia Severity Index (ISI) to study the effectiveness of cCBT for insomnia disorders. Their summary statistics, which presented in Table 22, show a mean within-group effect size of 1.40.

Table 22. Effect sizes of studies comparing mental health improvements on ISI.

| Reference | n | Within-group ES |
|--|----------|------------------------|
| Lancee et al. (2013) – without support | 133 | 1.08 |
| Lancee et al. (2013) – with support | 129 | 1.55 |
| Kaldo et al. (2015) – without support | 74 | 1.09 |
| Kaldo et al. (2015) – with support | 73 | 2.07 |
| Holmqvist et al. (2014) | 39 | 1.56 |
| Blom et al. (2015) | 22 | 1.06 |
| Mean ES | | 1.40 |

The full list of insomnia-related tools and information on their significant outcomes is presented in Table 23.

Table 23. Mental health outcomes of platforms for people with insomnia.

| Reference | Comparison group | Sample size(s) | Significant outcome(s)* | Mental health outcome† |
|---------------------------|------------------------------------|--|--|------------------------|
| van Straten et al. (2014) | Wait-list control | Total = 118 Intervention = 59 Wait-list control = 59 | The cCBT treatment group improved significantly compared with control at post-test on PSQI (BG ES = 1.06), TST (BG ES = 0.57), SE (BG ES = 0.95), soundness of sleep (BG ES = 0.88) and quality of life (BG ES = 0.58) scores. | G |
| Kaldo et al. (2015) | Another cCBT | Total = 148 Intervention = 73 Other cCBT = 74 | Both the ICBT-with-therapist support (WG ES = 1.95) and ICBT-control (WG ES = 1.50) groups improved on ISI scores from baseline to 12-month follow-up. The ICBT-with-therapist support group experienced a significantly greater reduction in ISI scores relative to the ICBT-control at post-treatment (BG ES = 0.85) and 6-month follow-up (ES = 0.55). | G |
| Lancee et al. (2013) | Other | Total = 232 Intervention with support = 129 Intervention without support = 133 | The group who received cCBT and support improved significantly on the ISI from baseline to 6-month follow-up (WG ES = 1.76). The group who received cCBT improved significantly on the ISI from baseline to 6-month follow-up. (WG ES = 1.01). The group who received cCBT and support improved significantly on the ISI from baseline to post-treatment (WG ES = 1.55). The group who received cCBT improved significantly on the ISI from baseline to post-treatment (WG ES = 1.08). | G |
| Holmqvist et al. (2014) | Other | Total = 73 Intervention = 39 Other form of support = 34 | There were no significant differences between the cCBT group and the telehealth group at post-treatment except for sleep quality (SQ) scores (BG ES = -0.80). The cCBT group improved significantly from baseline to post-treatment on TST (WG ES = -0.48), Sleep-onset Latency (SOL) (ES = 0.68), Number of Night Awakenings (NWAK) (ES = 0.81), Wake after Sleep Onset (WASO) (ES = 0.59), SE (ES = -0.99), SQ (ES = -0.83), Multidimensional Fatigue Inventory (MFI-20) (ES = 0.91) and ISI (ES = 1.56). | A |
| Lancee et al. (2014) | Other | Total = 262 Intervention with support = 129 Intervention without support = 133 | Therapist support had a greater effect on SE, TST and SOL outcomes for participants with a high severity of depression at post-treatment (BG ES = -0.85, -0.41 and 0.52, respectively) and 6-month follow-up (BG ES = -0.67, 0.57 and -0.56, respectively) than for participants with a low severity of depression. | A |
| Blom et al. (2015) | Same cCBT with other participants‡ | Total = 43 Intervention insomnia = 22 Intervention depression = 21 | The insomnia-cCBT treatment group improved significantly more on ISI than the depression-cCBT group at post-treatment. There was no significant difference on MADRS-S between the groups. The insomnia-cCBT treatment group improved significantly from baseline on ISI (WG ES = 1.84) and MADRS-S (WG ES = 1.12) at 12-month follow-up. The depression-cCBT treatment group improved significantly from baseline on ISI (WG ES = 0.95) and MADRS-S (WG ES = 0.94) at 12-month follow-up. | A |

* Outcomes are displayed selectively; these were outcomes which showed a benefit of treatment over control or improvement in the treatment group from baseline, at the longest point from baseline at which these remained significant.

† As assessed by this review. Green (G) – improvements in mental health outcomes; Amber (A) – unclear results; Red (R) – no effects of treatment. Outcomes are displayed selectively; these were outcomes which showed a benefit of treatment over control or improvement in the treatment group from baseline, at the longest point from baseline at which these remained significant. Cohen's d effect sizes are usually interpreted as small (0.2), medium (0.5) and large (0.8).

‡ The study looked at adults with severe depression and insomnia, and compared the use of cCBT for insomnia with that for depression. There was no comparison with any other cCBT or non-cCBT treatment. Outcomes are displayed selectively; these were outcomes which showed a benefit of treatment over control or improvement in the treatment group from baseline, at the longest point from baseline at which these remained significant. Cohen's d effect sizes are usually interpreted as small (0.2), medium (0.5) and large (0.8).

Condition-specific tools showed concurrent improvement on comorbid conditions

Whereas tools are often designed with a specific condition in mind, overlap between symptoms of various mental health conditions may also have treatment implications; the large-scale U.S. National Comorbidity Study estimated that of the 46.4% of the population who would experience a *Diagnostic and Statistical Manual of Mental Disorders* (fourth edition) (DSM-IV) disorder over their lifetime, 27.7% would experience two or more disorders and 17.3% would experience three or more disorders (Kessler et al. 2005). Whereas some conditions may exhibit a high degree of symptom overlap and are often considered in tandem (for example, MoodGYM was designed to reduce the symptoms of both depression and anxiety), other symptoms may be considered secondary to another condition and are thus targeted primarily as a symptom rather than as a distinct condition (see discussion in Blom et al. 2015).

To explore this, we conducted a short analysis on a selection of studies which studied a tool targeted at a specific condition (e.g. social anxiety, insomnia) but which also measured comorbid conditions as a secondary outcome. As an exploratory analysis, it included tools designed to treat one specific recognised condition (although these may have included modules focusing on symptoms, such as sleep modules within a depression course), but excluded tools which were consciously designed for comorbid populations. The tools which fit these criteria and the outcomes for both primary and secondary conditions are listed in Table 24.

Of the 15 studies which fit this criteria:

- Three used a depression-specific tool, but also measured anxiety.
- Seven used an anxiety- or social anxiety-specific tool, but also measured depression or insomnia.
- Three used an insomnia-specific tool, but also measured depression and/or anxiety.
- Two used a PTSD-specific tool, but also measured depression and/or anxiety.
- One used an OCD-specific tool, but also measured depression.

In all cases with the exception of Wootton et al. (2013), improvements (or lack thereof) were shown to have occurred on the primary and secondary outcome measure in tandem:

- 12 studies showed improvement on both the primary and secondary outcome measures.¹⁷
- 1 study (Wootton et al. 2013) showed improvement on the primary outcome measure but not the secondary comorbid measure.
- 3 studies showed no significant differences between treatment and control groups.

This included the following named tool, which demonstrated improvements on both the primary and secondary outcome measures:

- *SilverCloud*, which is a cCBT programme targeted at adults with depressive symptoms. In addition to improving on the primary depression outcome measure (BDI-II), the treatment population also made significant improvements at post-treatment on the secondary anxiety measure (GAD-7) compared with waiting-list control (Richards et al. 2015).

¹⁷ Blom et al. (2015) is counted twice, as separate cCBT interventions targeted at different conditions.

Table 24. Tools measuring comorbid conditions.

| Reference | Primary outcome measure related to | Also examined | Outcome |
|---------------------------|------------------------------------|----------------------|--|
| Gershkovich et al. (2015) | Social anxiety | Depression | Treatment population improved significantly on both the primary anxiety and secondary depression outcome measures. |
| Blom et al. (2015) | Insomnia | Depression | Treatment population improved significantly on both the primary insomnia and secondary depression outcome measures. |
| Blom et al. (2015) | Depression | Insomnia | Treatment population improved significantly on both the primary depression and secondary insomnia outcome measures. |
| Lancee et al. (2013) | Insomnia | Depression, anxiety | Both the treatment group with and the one without therapist support improved significantly on both the primary insomnia and secondary depression outcome measures. |
| Richards et al. (2015) | Depression | Anxiety | Treatment population improved significantly on both the primary depression and secondary anxiety outcome measures. |
| van Straten et al. (2014) | Insomnia | Depression | Treatment population improved significantly at post-treatment on some primary insomnia measures and the secondary anxiety and depression outcome measures. |
| Berger et al. (2014) | Social anxiety | Depression | Both the tailored and standardised cCBT groups improved significantly on the primary anxiety outcome measures and secondary depression outcome measures. |
| Boettcher et al. (2014a) | Social anxiety | Insomnia, depression | Treatment population improved significantly on primary anxiety outcome measure and secondary depression and insomnia outcome measures. |
| Ivarsson et al. (2014) | PTSD | Depression | Treatment population improved significantly on primary anxiety outcome measure and secondary depression outcome measure. |
| El Alaoui et al. (2015b) | Social anxiety | Depression | Treatment population improved significantly on primary anxiety outcome measure and secondary depression outcome measure. |
| El Alaoui et al. (2015c) | Social anxiety | Depression | Treatment population improved on both the primary anxiety and secondary depression outcome measures. |
| Hedman et al. (2014) | Social anxiety | Depression | Treatment population improved significantly on primary anxiety outcome measure and secondary depression outcome measure. |
| Geraedts et al. (2014) | Depression | Anxiety | There were no significant differences between treatment and control on the primary depression measure or secondary anxiety outcome measures. |
| Mouthaan et al. (2013) | PTSD | Depression, anxiety | There were no significant differences between treatment and control on the primary PTSD measure or secondary anxiety and depression outcome measures. |
| Mathiasen et al. (2016) | Anxiety | Depression | There were no significant differences between treatment and control on the primary anxiety measure or secondary depression outcome measures. |
| Wootton et al. (2013) | OCD | Depression | The cCBT treatment group made significant improvements compared with control on the primary OCD measure, but not on the secondary depression outcome measures. |

Two further studies were notable in their examination of comorbid conditions:

- Blom et al. (2015) compared the effect of a 9-week guided cCBT programme for patients with comorbid insomnia and major depression. Patients received either a programme tailored for insomnia or a programme tailored for depression; both programmes involved homework assignments and therapist support. The groups made comparable improvements from baseline to post-treatment, 6-month and 12-month follow-up on the depression measure, with the insomnia support group also making significantly greater improvements on the insomnia measure. The authors conclude that this provides further evidence for the need to understand insomnia as a condition deserving of treatment in its own right, rather than as secondary to depression.
- Lancee et al. (2014) conducted a secondary data analysis on a previous multilevel trial (Lancee et al. 2013), which assessed the effect of a cCBT programme for people experiencing insomnia with low and high baseline depressive symptoms, respectively. Patients received a 6-week programme delivered with or without additional therapist support. While both the support and no-support groups improved significantly on insomnia, depression and anxiety measures at post-test (Lancee et al. 2013), results from the secondary analysis showed a significant interaction between group and support conditions for a number of insomnia measures (SE; total sleep time [TST]; Sleep Onset Latency [SOL]), indicating that participants with a high baseline level of depressive symptoms benefitted more from the accompanying therapist support than did those with a low baseline level of depressive symptoms.

It is important to note that the majority of studies which considered comorbid conditions measured the comorbid condition as a secondary outcome. In this regard, study protocols and sampling procedures were often designed with the primary condition in mind, which may have introduced sources of bias with regard to the comorbid condition. It is therefore important to remain cautious about drawing conclusions from secondary outcomes to the wider population who are experiencing a particular condition.

However, while it is difficult, therefore, to draw definitive conclusions from the available literature, the results indicate that the presence and influence of comorbid symptoms may be an important consideration when designing or tailoring specific mental health interventions.

3.3.2. Few studies examined work-related outcomes of the cCBT tools, but those that did showed a small mean effect size

Overview

Of the 44 articles included in the review, only 10 examined outcomes relating to work or employment of people with mental health needs who used cCBT tools. Of these, 6 tools were meant for people with depression, 2 for people with recovery from work issues, and 1 each for people with anxiety disorders and insomnia. The tools were available (and tested) in at least five different countries, including: the United Kingdom (two), the United States (two), Australia (two), and Ireland and Japan (one each).

The measures used to track progress included six different metrics, with the Work and Social Adjustment Scale (WSAS) being the most common (used in four articles). The remaining measures included:

- Sheehan Disability Scale (SDS) – used in three articles
- Work-related Rumination Questionnaire (WRRQ) – used in one article
- Maslach Burnout Inventory – General Scale – used in one article
- Utrecht Work Engagement Scale (UWES) – used in one article
- Work Limitations Questionnaire (WLQ) and Workplace Outcome Suite (WOS) – used in one article.

Table 25 summarises statistics for four articles that compared work-related outcomes of cCBT with wait-list control at post-treatment and that used the WSAS score. The overall mean effect size is 0.35.

Table 25. Effect sizes of studies comparing work-related outcomes on WSAS.

| Reference | n | ES superiority (intervention) |
|-------------------------|-----|-------------------------------|
| Richards et al. (2015) | 262 | 0.40 |
| Twomey et al. (2014) | 201 | 0.14 |
| Proudfoot et al. (2013) | 720 | 0.29 |
| Holmqvist et al. (2014) | 73 | 0.56 |
| Mean ES | | 0.35 |

Overall, the 10 articles showed a wide range of outcomes, from the most promising to those that show no effect of treatment on work-related outcomes (Table 23). We now look at these outcomes in more detail.

Three tools showed positive significant work-related outcomes as well as mental health improvements

Three of the examined tools showed significant positive outcomes related to work and employment:

- *SilverCloud*, for people with depression, was tested in the UK. The study demonstrated significant improvements on the WSAS among the treatment group compared with the waiting list control at post-treatment and at 6-month follow-up (Richards et al. 2015).
- *BeMindful*, for people with recovery from work issues (such as work-related rumination, fatigue and poor sleep quality), was tested in the UK. The study showed significantly lower self-reported levels of active rumination at work as measured by the WRRQ (Querstret et al. 2016)
- *myCompass*, for people with depression and anxiety disorders, was tested in Australia. The study proved that the treatment group made significantly greater improvements on the WSAS compared with the attention-control support and wait-list control groups at post-treatment (Proudfoot et al. 2013).

Notably, all these tools also showed significant mental health improvements, making the directionality of the effect unclear (see section 3.3.1). The direct comparison between these tools is difficult because of the different contexts in which these tools were tested.

For example, the UK (where both *SilverCloud* and *BeMindful* were trialled) seems to rely on medication more than is the case in Australia (where *myCompass* was tested), where psychotherapy alone – or in

combination with medication – is still more widespread in mental health treatment generally (see OECD 2015). In addition, the prevalence of a certain type of treatment may be related to different levels of acceptance for (online) therapies, and this in turn may affect their effectiveness. Also, the tools were tested with different groups of participants. In particular, the treatment groups for *BeMindful* and *myCompass* had much higher proportions of people in full-time employment (95% and 84%, respectively) compared with *SilverCloud* (41%). Further, while the study of participants testing *myCompass* stated that they were not receiving medication for their condition, this information was not given in the publications for the remaining two trials. Finally, the platforms with more participants in full-time employment were more likely to be unguided.

Remaining tools showed unclear or no results

The remaining tools, although tested, showed unclear results or no results. We grouped them in three categories:

- Tools showing significant work-related outcomes but very small effect sizes:
 - *Useful mental health solutions series for business*, for people with work health issues (Imamura et al. 2015b)
- Tools demonstrating significant work-related outcomes where evidence is limited by issues with RCT design, small sample sizes or high attrition rates:
 - *Acceptance Based Behaviour Therapy for Social Anxiety Disorder* (Gershkovich et al. 2015)
 - *The Get Happy Program*, for people with depression (Watts et al. 2013)
 - *MoodHacker*, for people with depression (Birney et al. 2016)
 - A tool for people with insomnia – name unknown (Holmqvist et al. 2014)
- Tools for which the reviewed articles showed that treatment had no effect on work-related outcomes:
 - *MoodGYM*, for people with depression and anxiety disorders (Twomey et al. 2014)
 - *Happy@Work*, for people with depression (Geraedts et al. 2014)

While these studies tested the tools and failed to unambiguously demonstrate that they help improve work-related outcomes, it is possible that future (larger or better) trials may prove that these tools work for different groups of participants or in different contexts.

Table 26. Mental health and work-related outcomes of platforms for people with mental health needs.

| Reference | Condition | Comparison group(s) | Sample size(s) | Significant outcome(s) | Work-related outcome† | Mental health outcome† |
|---------------------------|---------------------|----------------------------|---|---|-----------------------|------------------------|
| Richards et al. (2015) | Depression | Wait-list control | Total = 262 Intervention = 133 Wait-list control = 129 | The cCBT treatment group improved significantly on BDI-II compared with waiting list control at post-treatment (BG ES = 0.50). The cCBT treatment group improved significantly on GAD-7 compared with waiting list control at post-treatment (BG ES = 0.32). The cCBT treatment group improved significantly on WSAS compared with waiting list control at post-treatment (BG ES = 0.40). The cCBT treatment group improved significantly on BDI-II from baseline at 6-month follow-up (WG ES = 1.29 ITT; 1.52 completers). The cCBT treatment group improved significantly on GAD-7 from baseline at 6-month follow-up (WG ES = 1.58 ITT; 0.98 completers). The cCBT treatment group improved significantly on WSAS from baseline at 6-month follow-up (WG ES = 1.22 ITT; 0.39 completers). | G | G |
| Querstret et al. (2016) | Work health | Wait-list control | Total = 127 Intervention = 63 Wait-list control = 64 | Participants who completed the online mindfulness course reported significantly lower levels of affective rumination ($\eta^2 = 0.11$), problem-solving pondering ($\eta^2 = 0.13$), chronic fatigue ($\eta^2 = 0.24$) and acute fatigue ($\eta^2 = 0.26$), and significantly higher levels of sleep quality ($\eta^2 = 0.16$) than waiting-list control.‡ | G | G |
| Proudfoot et al. (2013) | Depression, anxiety | Wait-list control Other | Total = 720 Intervention = 242 Attention control = 248 Wait-list control = 230 | The myCompass treatment group made significantly greater improvements on the WSAS compared with the attention-control (BG ES = 0.22) and wait-list control (BG ES = 0.29) groups at post-treatment. The myCompass treatment group made significantly greater improvements on the DASS total compared with the attention-control (BG ES = 0.41) and wait-list control (BG ES = 0.55) groups at post-treatment. | G | G |
| Gershkovich et al. (2015) | Social anxiety | No comparison group | Total = 13 | Significant change on SPAI from baseline to 3-month follow-up (ES = 1.39). Significant change on LSAS from baseline to 3-month follow-up (ES = 0.86). Significant change on BDI from baseline to post-treatment (ES = 1.11). Significant change on SDS-total from baseline to 3-month follow-up (ES = 0.84). Significant change on SDS-Work from baseline to post-treatment (ES = 0.61). | A | A |
| Watts et al. (2013) | Depression | Another cCBT | Total = 52 Intervention mobile = 22 Intervention computer = 30 | The mCBT group improved from pre- to post-treatment on BDI-II (ES = 1.79), PHQ-9 (ES = 1.41) and K-10 (ES = 1.05). The cCBT group improved from pre- to post-treatment on BDI-II (ES = 1.88), PHQ-9 (ES = 0.92) and K-10 (ES = 1.22). The study population as a whole showed a significant reduction in absenteeism and presenteeism. | A | A |
| Birney et al. (2016) | Depression | Other | Total = 300 Intervention = 150 Other form of support = 150 | The treatment group with access to EAP support improved significantly on PHQ-9 scores from pre-test to 6-week follow-up ($\eta^2 = 0.093$). The treatment group with access to EAP support improved significantly on WLQ productivity loss from pre-test to 6-week follow-up ($\eta^2 = 0.052$). The treatment group with access to EAP support improved significantly on WLQ work absence from pre-test to 6-week follow-up | A | A |

| Reference | Condition | Comparison group(s) | Sample size(s) | Significant outcome(s) | Work-related outcome† | Mental health outcome† |
|-------------------------|---------------------|---------------------|--|--|-----------------------|------------------------|
| | | | | ($\eta^2 = 0.070$). The treatment group with access to EAP support improved significantly on WOS workplace distress from pre-test to 6-week follow-up ($\eta^2 = 0.080$). The treatment group without access to EAP support did not improve significantly on these measures. | | |
| Holmqvist et al. (2014) | Insomnia | Other | Total = 73 Intervention = 39 Other form of support = 34 | There were no significant differences between the c-CBT group and telehealth group at post-treatment except for sleep quality (SQ) scores (BG ES = -0.80). The cCBT group improved significantly from baseline to post-treatment on TST (WG ES = -0.48), SOL (ES = 0.68), NWAK (ES = 0.81), WASO (ES = 0.59), SE (ES = -0.99), SQ (ES = -0.83), MFI-20 (ES = 0.91), ISI (ES = 1.56) and WSAS (ES = 0.56). | A | A |
| Imamura et al. (2015b) | Work health | Other | Total = 762 Intervention = 381 Other form of support = 381 | The cCBT group improved significantly on the UWES relative to non-cCBT control at 6-month follow-up (ES = 0.16). | A | N/A |
| Twomey et al. (2014) | Depression, anxiety | Wait-list control | Total = 201 Intervention = 101 Wait-list control = 100 | MoodGYM was significantly more effective than the waiting list control condition for the reduction of symptoms of general psychological distress (BG ES = 0.14) and stress (BG ES = 0.15) at post-test. | R | A |
| Geraedts et al. (2014) | Depression | Other | Total = 231 Intervention = 116 care as usual = 115 | The study showed no significant benefit of treatment over control. | R | R |

* Outcomes are displayed selectively; these were outcomes which showed a benefit of treatment over control or improvement in the treatment group from baseline, at the longest point from baseline at which these remained significant.

† As assessed by this review. Green (G) – improvements in mental health outcomes; Amber (A) – unclear results; Red (R) – no effects of treatment. Outcomes are displayed selectively; these were outcomes which showed a benefit of treatment over control or improvement in the treatment group from baseline, at the longest point from baseline at which these remained significant. Cohen’s d effect sizes are usually interpreted as small (0.2), medium (0.5) and large (0.8).

‡ η^2 = partial eta squared. Cohen (1988) sets rule-of-thumb guidelines for interpreting partial eta squared effect sizes: 0.01 = small; 0.06 = medium; 0.14 = large. Cohen’s d effect sizes are usually interpreted as small (0.2), medium (0.5) and large (0.8). Outcomes are displayed selectively; these were outcomes which showed a benefit of treatment over control or improvement in the treatment group from baseline, at the longest point from baseline at which these remained significant.

3.3.3. Adherence to treatment remains a concern but was not often analysed

Online mental health interventions often see high attrition rates and varying levels of user adherence, both of which may affect their effectiveness. In a systematic review of predictors of, and reasons for, adherence to online psychological interventions, Beatty and Binnion (2016) examined 36 studies and predictors, including demographic, problem and psychological characteristics, as well as intervention-/computer-related predictors. They found there was a high degree of variability in adherence measurement and that the most commonly used measure was the number of modules or sessions completed.¹⁸ The authors showed that only a few predictors of high adherence could be found so far. These included: female gender, higher treatment expectancy, sufficient time and personalized intervention content.

Only a few articles reviewed in this study examined the relation between adherence to treatment and improvements in mental health scores. For instance, high levels of adherence and high treatment credibility were found to be significant predictors of improvement in mental health needs and a faster rate of improvement in a longitudinal study by El Alaoui et al. (2015a). However, this study was not designed as RCTs and did not use any comparison group.

A useful analysis of usage data and functionalities that affect effectiveness was offered by Whitton et al. (2015). The authors of this RCT study found that the most commonly used elements of the examined platform were short motivational messages and the symptom tracking feature and that the increased use of these features was associated with significant improvements in anxiety and functional impairment. Their findings suggest that alerts may be an especially powerful element of effective online mental health treatment. However, researchers agree that more (and more robust) studies are needed to fully determine the most ideal platform for delivery of online interventions (Donkin et al. 2011; Whitton et al. 2015; Beatty and Binnion 2016).

¹⁸ In the Donkin et al. (2011) study, this measure was preceded by the number of log-ins. The authors showed that mean study discontinuation rate was approximately 23% of all trial participants (range: 0%–83%).

4. Conclusions and implications for future cCBT

4.1. Limitations to the report

There are a number of limitations to the current report that need to be considered before drawing overall conclusions from the study. First, publication bias is likely to be a factor, because the literature review conducted was targeted and limited in scope and we did not systematically search for unpublished reports. We also excluded from the review tools that were aimed at children, students and the elderly – which largely affected the profile of the cCBT participants presented in this report. We considered all of the available evidence regarding what is and is not effective, but in the report we focused on discussing the key features that seem important in designing an effective cCBT intervention. This decision was dictated by the desire to inform future interventions based on cCBT.

Second, as the effectiveness of cCBT and alternative treatments are now being established by the body of literature, ethics concerns about denying patients access to a potentially effective treatment have resulted in studies moving towards trial designs in which cCBT interventions are compared with alternative, established treatments (i.e. non-inferiority trials; see, for example, Gilbody et al. 2015) or by comparing two different forms of cCBT (e.g. Lancee 2013; Kaldo 2015). The resulting diversity in control groups can complicate efforts to compare outcomes and draw conclusions relevant to the wider population, who may or may not have access to these alternative treatment options.

While it is possible to instead compare the effect size of an intervention on a treatment group from baseline to post-treatment, it is possible also that these improvements are driven in part by regression to the mean – in other words, that people participating in cCBT trials may be actively seeking help at a particularly low point, and so it can be expected that they might see some natural tendency toward normal functioning without treatment. A differing severity or baseline symptoms may also be a factor in this regard. As a result, studies that show improvement from the baseline may overestimate the contribution of the intervention alone to this outcome.

Third, study inclusion decisions were accomplished by one researcher. Similarly, as mentioned in section 2.1, coding decisions were accomplished by a team of researchers who worked independently and all articles but one were reviewed and coded by one researcher working alone.

Finally, due to the limited scope of this study and the limited comparable and robust data, we relied on a narrative synthesis of the results, rather than meta-analysis and statistical methods.

For these reasons, the study conclusions are largely indicative and need to be considered with care.

4.2. Key findings, conclusions and implications

We summarise the key findings of the study below, starting with the characteristics of the cCBT platforms under review and of their participants, through to outcomes in terms of mental health and work-related improvements.

Products

Thirty-three of the reviewed articles (75%) presented tools that were developed as online platforms, and only nine (14%) presented tools that were available both through a website and an application for tablets or mobile phones. Of the 44 reviewed articles, 21 referred to tools for depression (48%), 19 to tools for anxiety disorders (43%) and 6 to tools for insomnia (14%).

The tools offered support through a varying number of modules, from as few as 3 sessions through to 16. Platforms for anxiety disorders were on average lengthier (including more than 10 modules), than those for depression or insomnia (each including 7 modules on average).

Overall, 21 tools (53%) were based on linear treatment protocols, 7 (18%) allowed for some degree of flexibility in the choice of treatment modules or their sequence, and 6 (15%) provided content entirely flexible to participants' preferences. Data suggest that tools for anxiety disorders tend to be more structured (i.e. more often follow a linear protocol) than tools for depression

A total of 27 tools (68%) included some form of additional guidance, while 10 (25%) were found to be unguided. The evidence indicates that tools for people with depression were more often unguided than those for people with anxiety disorders. When additional guidance was provided, it most often comprised email or telephone contacts; 17 tools (63%) envisaged a minimal level of support, and in 4 (15%) the intensity of additional guidance matched the support offered via the cCBT tool itself.

Overall, we conclude that the review showed a variety of cCBT products, both in terms of conditions they aimed to address and the ways in which they were designed. Such diversity reflects the fact that cCBT interventions (supported by technology developments) lend themselves well to, and offer space for, experimentation in terms of their design and delivery mechanisms.

At the same time, there is no one recipe for future designs of cCBT. One can, however, expect that the number of tools that combine website platforms with mobile applications will increase, also considering promising results of some of their functionalities – discussed in section 3.3.3 and reiterated under mental health outcomes below. Most of the future cCBT platforms are also likely to provide at least a basic level of additional support and follow a linear protocol – until a firm association of specific characteristics of their design and outcomes is established – as explained in section 3.3.1 and under the header mental health outcomes below.

Participants

The cCBT tools under review were used by people in their early twenties to their fifties, with participants having a median age of 38. The evidence suggests that:

- Tools for anxiety, panic, and obsessive-compulsive disorders had slightly younger participants (in their early to mid-thirties).
- Tools for depression and work health-related issues were tested with people in their late thirties.
- Tools for insomnia and PTSD had relatively older participants, who were on average in their mid- to late forties.

The examined platforms predominantly attracted women (with an average female participation rate of 62%, range: 0–85%), people in full-time employment (60% on average, range: 0–95%) and highly educated (59% held a university degree, range: 21–87%). In particular, tools treating insomnia and recovering from work issues had, on average, samples with the highest proportion of participants in full-time employment, and a similar trend was observed for the level of education.

Guided tools were tested with groups with a larger share of female participants (on average 65%, range: 15–85%) compared with self-assisted tools (58%, range: 0–80%). Unguided tools were more often used by people in full-time employment (68%, range: 0–95%) and with a university degree (67%, range 25–87%) compared with the guided platforms (54%, range: 24–85%, and 52%, range: 21–73%, respectively).

Overall, we conclude that cCBT products target a wide range of potential users and reach out to the general population. However, our study confirmed that some groups seem to be less likely to use cCBT tools or to participate in cCBT research. Men as well as people less educated are particular hard-to-reach groups, in terms of getting them to seek help for mental health needs they may have or getting them to participate in research testing cCBT tools. This last characteristic has direct implications for platforms that would aim at people who are unemployed or economically inactive – as these groups are characterised by lower levels of completed education. Unfortunately, information on whether the reviewed tools were tested with unemployed people, as well as these participants' unemployment history, was not available. We were therefore unable to analyse this aspect in more detail.

In terms of implications for future cCBT, there is a risk that such platforms will fail to reach those who need help most, and we therefore expect continued challenges in engaging the hard-to-reach groups with cCBT. It might mean that this type of treatment is simply not well suited for these groups or that more effective methods of increasing their participation and adherence to treatment need to be found.

Mental health outcomes

A total of 39 (89%) of the articles included in this review examined outcomes relating to mental health improvements among cCBT users: 19 (49%) were meant for people with depression, 14 (36%) for people with anxiety disorders, 6 (15%) for people with insomnia, 2 (5%) for people with OCD, work health issues and PTSD, and 1 (3%) for those with panic disorder.

The measures used to track progress included various primary and secondary outcome measures, with the most frequently used including PHQ-9, BDI-II and MADRS-S (for depression), BAI, GAD-7 and LSAS (for anxiety disorders), and ISI and TST (for insomnia).

And earlier systematic review showed an overall effect size of $g = 0.77$, 95% CI [0.59–0.95], in favour of cCBT interventions versus no or different treatment (Grist and Cavanagh 2013). The scope of and

method adopted in the current study did not allow for advanced statistical analysis. However, our narrative synthesis suggested that:

- 17 (44%) articles showed clear benefits of treatment, 20 (51%) provided unclear results, and 2 (5%) showed that cCBT platforms had no effect on improving the mental health of the treatment groups. The mean effect sizes varied from large to medium for tools for depression (WG ES = 1.23), anxiety disorders (BG ES = 0.79) and insomnia (WG ES = 1.40). We also found that condition-specific tools showed concurrent improvement on comorbid conditions.
- There were no evident patterns that would suggest that certain types of tools (or which elements of their design) determined the level of their effectiveness, and this lack of clarity is reflected in the wider literature (see Grist and Cavanagh 2013).
- The data did not point to a relation between the level of employment or education of the treated individuals and the effectiveness of platforms. However, the tools that proved to be effective appeared to be more often associated with older participants (aged above 35.5) and those study samples were dominated by women (with an average female participation rate of 62% and more). However, the limited number of articles that matched our criteria for review do not allow us to make a firm link between these factors. Also, we cannot exclude that there was a selection effect, in that the examined studies included participants who were more likely to participate in cCBT research or to benefit from treatment and that, as such, these studies overstated the effects of the tools.

Finally, we found some emerging evidence suggesting that alerts and short motivational messages enabled by mobile applications or email were associated with significant reduction in anxiety and functional impairment.

Among the tools that address common mental health problems, we found the following ones to be the most promising:

- *SilverCloud*, which was tested in the UK for people with depression, in addition to showing improvement on the primary depression measure, demonstrated significant improvements on the secondary *anxiety* measures (Richards et al. 2015).
- *Useful mental health solutions series for business* for people with depression, was tested and proven effective in Japan (Imamura et al. 2014, 2015a).
- A tool for people with social anxiety disorder, name unknown, which was tested in Sweden, was shown to be superior to waiting list controls in randomized trials and long-term follow-up (Hedman et al. 2014).
- A tool for people experiencing insomnia, which was trialled in the Netherlands, showed significant improvements for the treatment group compared with wait-list control at post-test (van Straten et al. 2014).
- A tool for people with insomnia, name unknown, which was also piloted in the Netherlands, showed significant improvements for the treatment group from baseline to follow-up (Lancee et al. 2013).

Overall, we conclude that although the evidence of long-term effects of cCBT treatment is sparse and dependent on the time of follow-up (So et al. 2013), 6 of the available tools demonstrated their

effectiveness in the short to medium term and the long term (i.e. from a few months to four years). Of these 6 platforms, 4 (67%) were guided and provided minimal additional email support; the remaining 2 (33%) were unguided. And of these 6 tools, 4 (67%) were based on a linear treatment protocol and 2 (33%) offered an unrestricted choice for users in terms of modules offered and their sequence. Almost all (5 tools, i.e. 83%) offered between 6 and 8 modules, although one outlier envisioned 15 modules.

Although based on a limited number of studies, these conclusions reinforce our expectations that future cCBT may favour minimal additional guidance, linear structures, and notifications features.

Work-related outcomes

Only 10 of the reviewed articles (23%) examined work-related outcomes for people who used cCBT tools.¹⁹ Given that the tools examined in these articles aimed to address different mental health conditions, subgroup analysis was not possible.

While the studies used different metrics to track work-related progress, the Work and Social Adjustment Scale (WSAS) was the most common. The calculated mean effect size of cCBT superiority over wait-list control at post-test was 0.35. Although this figure is at the low end, one cannot ignore the fact that it is positive and thus translates not only into individual and societal benefits, but also into productivity gains for employers.

Three of the examined tools showed significant positive outcomes related to work and employment:

- *SilverCloud*, for people with depression (Richards et al. 2015)
- *BeMindful*, for people with work health issues (Querstret et al. 2016)
- *myCompass*, for people with depression and anxiety disorders (Proudfoot et al. 2013)

Two of the platforms showing significant positive outcomes were unguided. This result may partly relate to the fact that our review included only a small sample of articles relating to work and employment. It may possibly also relate to the fact that both of these tools had high proportions of participants in full-time employment, who might be expected to seek out an unguided tool because they are less likely to collide with their work schedule. Although we did not find strong evidence, our review suggests that platforms directed at people with full-time work may offer self-administered help, while cCBT tools for those without jobs could include additional guidance.

4.3. Final reflection

Van Stolk et al. (2014) provided initial mapping of possible cCBT interventions and pointed in particular to Beating the Blues,²⁰ FearFighter,²¹ Living Life to the Full²² and MoodGYM.²³ However, their study did not attempt to compare these tools in a comprehensive manner.

¹⁹ However, one should keep in mind that the focus of the cCBT tools was on mental health improvements, rather than on employment-related improvements. Also, work-related outcomes usually fell under secondary outcomes.

²⁰ Beating the Blues (homepage). (2016). As of 04 August 2016: www.beatingtheblues.co.uk

²¹ FearFighter (homepage). (2016). As of 04 August 2016: <http://www.fearfighter.com>

This report provides an updated and more systematic assessment of cCBT platforms examined since 2013 in the academic literature. However, when reading this report, one should bear in mind that cCBT is only one form of possible e-therapies. Technology-enabled care includes a wide spectrum of possible interventions, such as virtual reality, avatar chats, or game techniques. While these fell outside the scope of this study, there is emerging evidence of the effectiveness of these tools (e.g. Smith et al. 2015; Fleming et al. 2014; Turner and Casey 2014). These methods may form a compelling alternative or complement to computerised cognitive behavioural therapy interventions.

²² Living Life to the Full (homepage). (2016). As of 04 August 2016: <http://www.lltff.com/>

²³ MoodGYM (homepage). (2016). As of 04 August 2016: www.moodgym.anu.edu.au

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Appendix A. Coding protocol

PREFACE

- Link to article
- Coder

BACKGROUND

Publication

- Type of source
 - *Journal, open-source, thesis, etc.*
- Year of publication
- Short reference
 - *e.g. Imamura et al. 2015*
- Full reference
 - *For use in bibliography*
- Abstract
 - *Copy and paste*

PRODUCT

NB Record any information about the product itself, and any specific way in which this is used in the study (e.g. 'PRODUCT offers courses of between 2 and 20 weeks. This study used a 6-week module').

- Name of the product
- Provider
- Country of origin
 - *e.g. where it was first used*
- Countries where tool is available
- Any cost information
 - *e.g. one-off setting up the platform, estimated cost per user, fees, etc.*

Delivery of tool

- App for smartphones & tablets / Online platform (website) / Other
- Online only / Blended (combined with other forms of support)

RAND Europe

- If blended: How is it blended?
- If blended: What are the proportions between online and other forms of support?
- Free access/registration/restricted
- Characteristics of the target group which the tool is aimed at (age, gender, employment status, diagnosis, severity of problem, etc.)

Content of tool

- Linear / Mix / Flexible
- Modules
 - *no of modules, summary of their content – brief narrative*
- Functionalities
 - *1. Static info; 2. dynamic info: videos, audios, chat rooms, forums; 3. tailored info – based on assessment results; 4. personal info – based on personalised account*
- Duration / Length
 - *no of sessions, duration of each / all in total*
- Intensity
 - *recommended frequency of doing the sessions*
- Additional information

STUDY

Method of assessment

- Treatment details
 - *e.g. particular way in which tool was used in this study – duration, platform, functionalities, etc.*
- Study method: RCT / observational / other
- Sample size
- Sample characteristics
 - *age, gender, employment status, diagnosis, severity of problem, formal diagnosis/self-reported, etc.*
- Timeframe
 - *data on outcomes collected during / at the end / 3, 6, 12 months after completion of the treatment*
- Follow-up assessment

Outcomes

- Engagement and participation data
 - *e.g. visits to site, length of time spent on pages, number of click-throughs, number of times videos watched, numbers of times a unique user returns to the same site*
- Participant engagement rates
 - *Completion rates for treatment modules, homework, etc.*
- Overall attrition rates

- *record all at different points of the study*
- Statistical significance and effect size
- Mental health improvements (PHQ-9; GAD-7; other)
- Employment outcomes
 - *Rate of return-to-work / moving off benefits / increasing secure employment / moving into employment / getting a job / other employment outcomes*
- Other (*if any*)

OTHER

- Risk of bias
 - *Record both risks stated by author and any coder concerns*
- Other
 - *Any other relevant information and general coder comments*

TRAFFIC LIGHTS

- Mental health
 - *Coder judgement: use drop-down menu to judge whether the effect of treatment on mental health is clear and reliable (green); whether results are unclear or the study carried a high risk of bias (amber); or whether treatment showed no impact (red).*
- Employment outcomes
 - *Coder judgement: use drop-down menu to judge whether the effect of treatment on employment outcomes is clear and reliable (green); whether results are unclear or the study carried a high risk of bias (amber); or whether treatment showed no impact (red).*

Appendix B. Overview of prominent cCBT platforms available



Beating the Blues is an eight-module, self-paced service aimed at people experiencing depression or anxiety, designed by a team from King's College University of London. It is available to NHS patients in some areas, and users can purchase it online. access directly.



Big White Wall is an anonymous digital service that supports people experiencing common mental health problems, such as depression and anxiety. It's available around the clock and is staffed by trained 'Wall Guides', who make sure that the community is safe and supportive. Available on the NHS in some areas.



Buddy is a mobile phone app that allows one to keep a daily diary of one's thoughts, feelings and behaviours via text messaging. It's designed to be used alongside face-to-face sessions with a therapist rather than as a mental health treatment in its own right.



FearFighter is a CBT-based online self-help course for treating panic and phobias. It explains how anxiety affects the mind and body and helps people face the things they fear and avoid. It is available on the NHS in some areas with a referral from a GP or other health professional.



Ieso digital health offers live, confidential, one-to-one CBT with a therapist via secure instant messaging. It's available to anyone with common mental health problems, such as depression, anxiety, pain management, obsessive compulsive disorder, phobias and stress management. It is available to NHS patients in some areas.



Kooth is an online service that offers emotional and mental health support for children and young people aged 11 to 19 (or 25 in some areas). It is available in certain NHS areas.



MoodGYM is a free online programme provided by Australian National University which offers a five-module course geared towards preventing depression and dealing with wider stress.



MyCompass is an Australian personalized programme available on mobile, computer or tablet, funded in part in part by the Commonwealth Department of Health. Users can access the service for no fee and without a referral.



SilverCloud is a safe, secure online space offering personalised programmes to help people experiencing mental and behavioural problems, including depression, anxiety, eating issues and obsessive compulsive disorder. It is available via NHS hospitals, trusts and clinics, plus some non-NHS organisations.



Sleepio is an online programme that helps people overcome sleep problems. It is based on CBT, and evidence suggests it can even help people with long-term sleep problems. It is used by the NHS in a few areas.



ThisWayUp is an Australian non-profit which offers self-paced cCBT courses for a number of different mental health conditions, available on both computers and mobiles. Available online for a fee.

Appendix C. Outcome matrix

NOTE: Due to the variety of the reviewed articles (various conditions considered; comparison groups and outcome measures used), it was not possible to directly compare the effectiveness of all the tools according to one established measure. To enable some comparisons, we established a scoring system for work-related and mental health improvements (the last two columns):

- **Green (G)** was scored if the article showed clear benefits of treatment, in that the outcome measures showed improvements (e.g. statistically significant reductions on depression or anxiety scales within or between group effects) and the study was not subject to major limitations (such as lack of control groups, small sample sizes, etc.).
- **Amber (A)** was scored if the results of the study were unclear (for example, mental health outcomes showed improvements but the study lacked control groups to attribute these effects to the intervention), or if the results were subject to important limitations (for instance, small sample sizes of treatment or control groups).
- **Red (R)** was scored if the article showed that the treatment had no effect compared with the control groups.

| Reference | Condition | Name | Delivery | Content | Additional guidance | Intensity of guidance | Structure | Number of modules | Mean age | Female (%) | In full-time employment (%) | With university degree (%) | Comparison group | Significant outcomes* | Work-related | Mental health |
|------------------------|------------|--|-----------------|----------|---------------------|-----------------------|-----------|-------------------|----------|------------|-----------------------------|----------------------------|-------------------|---|--------------|---------------|
| Richards et al. (2015) | Depression | SilverCloud | Website and app | Guided | Email | Minimal | Flexible | 7 | 41 | 74 | 41 | N/A | Wait-list control | The cCBT treatment group improved significantly on BDI-II compared with waiting list control at post-treatment (BG ES = 0.50). The cCBT treatment group improved significantly on GAD-7 compared with waiting list control at post-treatment (BG ES = 0.32). The cCBT treatment group improved significantly on WASA compared with waiting list control at post-treatment (BG ES = 0.40). The cCBT treatment group improved significantly on BDI-II from baseline at 6-month follow-up (WG ES = 1.29 ITT; 1.52 completers). The cCBT treatment group improved significantly on GAD-7 from baseline at 6-month follow-up (WG ES = 1.58 ITT; 0.98 completers). The cCBT treatment group improved significantly on WASA from baseline at 6-month follow-up (WG ES = 1.22 ITT; 0.39 completers). | G | G |
| Imamura et al. (2015a) | Depression | Useful mental health solutions series for business | Website | Guided | Email | Minimal | Linear | 6 | 38 | 15 | 70 | 73 | Other | The iCBT group experienced significantly lower incidence of MDE at 12-month follow-up compared with care-as-usual control group. | | G |
| Imamura et al. (2014) | Depression | Useful mental health solutions series for business | Website | Unguided | N/A | N/A | Linear | N/A | 38 | 15 | 70 | 73 | Other | The iCBT group improved significantly on BDI-II from baseline at 3-month follow-up (WG ES = -0.14) and 6-month follow-up (WG ES = -0.16). | | G |
| Andrews et al. (2016) | Depression | Various | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Various | The mean effect size of treatment over control groups across studies was ES = 0.86. | | G |
| Donker et al. (2013) | Depression | - MoodGYM - e-Couch | Website | Unguided | N/A | N/A | Flexible | 3 | 27 | 72 | N/A | 87 | Other | There were no significant differences between groups on CES-D scores at post-test. The cCBT e-couch (WG ES = 1.44) and MoodGYM (ES = 1.04) groups improved significantly on CES-D scores from baseline to follow-up. (Effect sizes for ITT were 0.80 and 0.66, respectively; ES for adherent completers scores were 1.33 and 1.21 respectively.) | | G |
| Watts et al. (2013) | Depression | - The Sadness Program - The Get Happy Program | Website and app | Unguided | N/A | N/A | Linear | 6 | 41 | 80 | N/A | N/A | Another cCBT | The mCBT group improved from pre- to post-treatment on BDI-II (ES = 1.79), PHQ-9 (ES = 1.41) and K-10 (ES = 1.05). The cCBT group improved from pre- to post-treatment on BDI-II (ES = 1.88), PHQ-9 (ES = 0.92) and K-10 (ES = 1.22). The study population as a whole showed a significant reduction in absenteeism and presenteeism. | A | A |

| Reference | Condition | Name | Delivery | Content | Additional guidance | Intensity of guidance | Structure | Number of modules | Mean age | Female (%) | In full-time employment (%) | With university degree (%) | Comparison group | Significant outcomes* | Work-related | Mental health |
|-------------------------|---------------------------|-------------------------------------|-----------------|----------|-----------------------------|-----------------------|-----------|-------------------|----------------|----------------|-----------------------------|----------------------------|---------------------------------------|--|--------------|---------------|
| Birney et al. (2016) | Depression | MoodHacker | Website and app | Guided | Email | N/A | Flexible | N/A | 41 | 74.6 | 56 | 40 | Other | The treatment group with access to EAP support improved significantly on PHQ-9 scores from pre-test to 6-week follow-up ($\eta^2 = 0.093$). [†] The treatment group with access to EAP support improved significantly on WLQ productivity loss from pre-test to 6-week follow-up ($\eta^2 = 0.052$). The treatment group with access to EAP support improved significantly on WLQ work absence from pre-test to 6-week follow-up ($\eta^2 = 0.070$). The treatment group with access to EAP support improved significantly on WOS workplace distress from pre-test to 6-week follow-up ($\eta^2 = 0.080$). Only work absence remained significant at 10-week follow up. The treatment group without access to EAP support did not improve significantly on these measures. | A | A |
| Botella et al. (2016) | Depression | Smiling Is Fun | Website and App | Unguided | N/A | N/A | Linear | 8 | 32 | 0 | 0 | 58 | - Wait-list control - Another cCBT | The results have large confidence intervals and the effect is unclear. | | A |
| Gilbody et al. (2015) | Depression | - MoodGYM - Beating the Blues | Website | Guided | Telephone | Minimal | Linear | 15 | 40 | 67 | N/A | N/A | - Another cCBT - Other | There was no significant difference in PHQ-9 scores between Beating the Blues and GP care-as-usual at any time point. There was limited evidence of an improvement in PHQ-9 scores in favour of MoodGYM over GP care-as-usual at 12 months only, but not at other follow-up time points. | | A |
| Sharry et al. (2013) | Depression | Mind Balance (renamed: SilverCloud) | Website | Guided | Email | Minimal | Flexible | 7 | 23 | 69 | N/A | N/A | None | Participants improved significantly on BDI-II from baseline to post-intervention (WG ES = 1.17). | | A |
| Linder et al. (2014) | Depression | Depressionshjälpen | Website | Guided | Telephone (T) and email (E) | Minimal | Linear | 7 | T: 20 E: 40 | T: 95 E: 74 | N/A | N/A | Another cCBT | The email support iCBT treatment group improved significantly from pre-treatment to 3-month follow-up on QOLI (WG ES = 0.90), BDII (1.36), BAI (0.77) and MADRS-S (0.86). The telephone support iCBT treatment group improved significantly from pre-treatment to 3-month follow-up on QOLI (WG ES = 0.45), BDII (1.21), BAI (0.67) and MADRS-S (0.98). | | A |
| Berman et al. (2014) | Depression | ePST | Website | Unguided | N/A | N/A | Mixed | 6 | 53 | 79 | 66 | 83 | - Another cCBT - Other | The treatment group improved significantly from baseline on PHQ-9 scores ($\eta^2 = 0.931$). When the authors compared ePST intervention with a previous RCT of Beating the Blues (Ormrod et al. 2010), ePST scored significantly higher on ARM subscales at week 10: Bond (BG ES = 1.57), Partnership (ES = 0.70), Confidence (ES = 1.36), Openness (ES = 1.38). | | A |
| Geraedts et al. (2014) | Depression | Happy@Work | Website | Guided | Online homework feedback | Minimal | Linear | 6 | N/A | 62.3 | >50 | 64 | Other | The study showed no significant benefit of treatment over control. | R | R |
| Proudfoot et al. (2013) | - Depression - Anxiety | myCompass | Website and App | Unguided | N/A | N/A | Mixed | N/A | 39 | 70 | 84 | 54 | - Wait-list control - Other | The myCompass treatment group made significantly greater improvements on the WSAS compared with waitlist control (BG ES = 0.29) groups at post-treatment. The myCompass treatment group made significantly greater improvements on the DASS total compared with waitlist control (BG ES = 0.55) at post-treatment. | G | G |
| Newby et al. (2014b) | - Depression - Anxiety | Mixed Depression and Anxiety Course | Website and App | Guided | N/A | N/A | Flexible | N/A | 44 | 78 | 36 | 59 | Wait-list control | The treatment group improved significantly at post-treatment on PHQ-9 scores compared with control (BG ES [Hedge's g] = 1.00). The treatment group improved significantly at post-treatment on GAD-7 scores compared with control (BG ES [Hedge's g] = 0.85). The treatment group improved significantly at post-treatment on PHQ-9 scores compared with baseline (WG ES = 1.05). The treatment group improved significantly at post-treatment on GAD-7 scores compared with baseline (WG ES = 0.96). | | G |
| Månsson et al. (2013) | - Depression - Anxiety | Stödsystem | Website and app | Guided | Face to face | N/A | N/A | N/A | 43 | 67 | 60 | 47 | None | Participants improved significantly from baseline to 12-month follow-up on QOLI (WG ES = 1.29), BAI (1.09), PHQ-9 (1.31), GAD-7 (1.08) and MADRS-S (1.94). | | A |

| Reference | Condition | Name | Delivery | Content | Additional guidance | Intensity of guidance | Structure | Number of modules | Mean age | Female (%) | In full-time employment (%) | With university degree (%) | Comparison group | Significant outcomes* | Work-related | Mental health |
|--------------------------------|-------------------------------|-------------------------------------|-----------------|----------|---------------------|-----------------------|-----------|-------------------|----------|------------|-----------------------------|----------------------------|-------------------|---|--------------|---------------|
| Newby et al. (2014a) | - Depression - Anxiety | Mixed Depression and Anxiety Course | Website and app | Guided | N/A | N/A | Flexible | 6 | 40 | 67 | N/A | N/A | None | Sample participants improved significantly from pre- to post-treatment on GAD-7 (WG ES = 1.20), PHQ-9 (1.11), SPIN (0.69), PDSS (0.51), K-10 (1.06) and WHODAS-II (0.61). | | A |
| Twomey et al. (2014) | - Depression - Anxiety | MoodGYM | Website | Unguided | N/A | N/A | Linear | 5 | 35 | 73.8 | N/A | N/A | Wait-list control | MoodGYM was significantly more effective than the waiting list control condition for the reduction of symptoms of general psychological distress (BG ES = 0.14) and stress (BG ES = 0.15) at post-test. | R | A |
| Hedman et al. (2014) | Social anxiety | Name unknown | Website | Guided | Email | Minimal | Linear | 15 | 35 | N/A | N/A | N/A | Other | There were no significant differences between the cCBT and group-CBT groups at 4-year follow-up. The cCBT group improved significantly from baseline to 4-year follow-up on LSAS-SR (WG ES = 1.34), SIAS (ES = 1.18), SPS (ES = 1.09), MADRS-S (ES = 0.71) and BAI (ES = 1.04). | | G |
| Bergman Nordgren et al. (2014) | Anxiety | Name unknown | Website | Guided | Email | Minimal | Linear | 10 | 36 | 63 | 24 | 21 | Other | The treatment group made greater improvements at post-treatment on CORE-OM scores compared with the control (BG ES = 0.86). The treatment group made greater improvements at post-treatment on BAI scores compared with the control (BG ES = 0.58). The treatment group made greater improvements at post-treatment on MADRS-S scores compared with the control (BG ES = 0.70). The treatment group made greater improvements at post-treatment on QOLI scores compared with the control (BG ES = 0.20). The treatment group improved significantly from baseline on CORE-OM scores at 1-year follow-up (0.75). The treatment group improved significantly from baseline on BAI scores (0.53), on MADRS-S scores (1.00) and on QOLI scores (0.57). | | G |
| Boettcher et al. (2014a) | - Social anxiety - Anxiety | Name unknown | Website | Unguided | N/A | N/A | Linear | 8 | 38 | 76 | N/A | 76 | Other | The mindfulness group improved significantly more on the BAI than the control at post-test (between-group ES = 0.99). The mindfulness group improved significantly more on the BDI than the control at post-test (between-group ES = 0.84). The mindfulness group improved significantly more on the ISI than the control at post-test (between-group ES = 0.36). There was a significant difference in the rate of recovery and improvement between groups at post-test, favouring the mindfulness group. | | G |
| Gershkovich et al. (2015) | Social anxiety | Name unknown | Website | Guided | Video | Minimal | Linear | 8 | 33 | 70 | 70 | 54 | None | There was a significant change on SPAI from baseline to 3-month follow-up (ES = 1.39). There was a significant change on LSAS from baseline to 3-month follow-up (ES = 0.86). There was a significant change on BDI from baseline to post-treatment (ES = 1.11). There was a significant change on SDS-total from baseline to 3-month follow-up (ES = 0.84). There was a significant change on SDS-Work from baseline to post-treatment (ES = 0.61). | A | A |
| El Alaoui et al. (2015b) | Social anxiety | Name unknown | Website | Guided | eChat and email | Equal share | Linear | 11 | 33 | 55 | 50 | 59 | None | Participant mean LSAS-SR scores improved significantly from screening to 6-month follow-up (ES = 1.15). Participant mean MADRS-S scores improved significantly from screening to 6-month follow-up (ES = 0.57). | | A |
| El Alaoui et al. (2015c) | Social anxiety | Name unknown | Website | Guided | Email | Minimal | Linear | 12 | 33 | 54.9 | N/A | 42.5 | None | The group improved on LSAS-SR scores from baseline to post-treatment (ES = 0.79) and 6-month follow-up (ES = 0.92). The group improved on MADRS-S scores from baseline to post-treatment (ES = 0.61) and 6-month follow-up (ES = 0.59). Note: We have estimated the parameters from growth curve analysis of continuous outcomes. | | A |

| Reference | Condition | Name | Delivery | Content | Additional guidance | Intensity of guidance | Structure | Number of modules | Mean age | Female (%) | In full-time employment (%) | With university degree (%) | Comparison group | Significant outcomes* | Work-related | Mental health |
|---------------------------|-------------------------------|--------------|----------|----------|--------------------------|-----------------------|-----------|-------------------|----------|------------|-----------------------------|----------------------------|---|---|--------------|---------------|
| Mathiasen et al. (2016) | Anxiety | FearFighter | Website | Guided | Telephone | Minimal | Linear | 9 | 32 | 63 | 39 | N/A | Wait-list control | Quality of life (EQ-vas) improved significantly more for the iCBT group at post-treatment compared with control (BG ES = 0.81). There were no significant between-group differences on the BDI-II nor BAI at post-treatment. The treatment group improved significantly on BDI-II from baseline to post-treatment. | | A |
| Berger et al. (2014) | - Social anxiety - Anxiety | Name unknown | Website | Guided | eChat and email | Equal share | Mixed | 8 | 35 | 56 | 37.9 | N/A | <ul style="list-style-type: none"> • Wait-list control • Another cCBT | <p>The tailored cCBT group improved significantly relative to wait-list control on the BAI at post-treatment (BG ES = 0.87).</p> <p>The standardized cCBT group improved significantly relative to wait-list control on the BAI at post-treatment (BG ES = 0.91).</p> <p>The tailored cCBT group improved significantly relative to wait-list control on the BDI-II at post-treatment (BG ES = 0.83).</p> <p>The standardized cCBT group improved significantly relative to wait-list control on the BDI-II at post-treatment (BG ES = 0.88).</p> <p>The tailored cCBT group improved significantly relative to wait-list control on the SIAS at post-treatment (BG ES = 1.15).</p> <p>The standardized cCBT group improved significantly relative to wait-list control on the SIAS at post-treatment (BG ES = 1.12).</p> | | A |
| Lancee et al. (2013) | Insomnia | Name unknown | Website | Guided | Email | N/A | Flexible | 8 | 48 | 75 | N/A | N/A | Other | <p>The group who received cCBT and support improved significantly on the ISI from baseline to 6-month follow-up (WG ES = 1.76).</p> <p>The group who received cCBT improved significantly on the ISI from baseline to 6-month follow-up (WG ES = 1.01).</p> <p>The group who received cCBT and support improved significantly on the ISI from baseline to post-treatment (WG ES = 1.55).</p> <p>The group who received cCBT improved significantly on the ISI from baseline to post-treatment (WG ES = 1.08).</p> | | G |
| van Straten et al. (2014) | Insomnia | Name unknown | Website | Unguided | N/A | N/A | Linear | 6 | N/A | 70.3 | 70 | 59 | Wait-list control | The cCBT treatment group improved significantly compared with control at post-test on PSQI (BG ES = 1.06), TST (BG ES = 0.57), SE (BG ES = 0.95), soundness of sleep (BG ES = 0.88) and quality of life (BG ES = 0.58) scores. | | G |
| Holmqvist et al. (2014) | Insomnia | Name unknown | Website | Unguided | N/A | N/A | Linear | 6 | N/A | 72 | 72 | 85 | Other | <p>There were no significant differences between the cCBT group and telehealth group at post-treatment except for sleep quality (SQ) scores (BG ES = -0.80).</p> <p>The cCBT group improved significantly from baseline to post-treatment on TST (WG ES = -0.48), SOL (ES = 0.68), NWAK (ES = 0.81), WASO (ES = 0.59), SE (ES = -0.99), SQ (ES = -0.83), MFI-20 (ES = 0.91), ISI (ES = 1.56) and WSAS (ES = 0.56).</p> | A | A |
| Kaldo et al. (2015) | Insomnia | Name unknown | Website | Guided | Online homework feedback | Minimal | Mixed | 8 | 47 | 81 | 80 | N/A | Another cCBT | <p>Both the ICBT-with-therapist support (WG ES = 1.95) and ICBT-control (WG ES = 1.50) groups improved on ISI scores from baseline to 12-month follow-up.</p> <p>The ICBT-with-therapist support group experienced a significantly greater reduction in ISI scores relative to the ICBT-control at post-treatment (BG ES = 0.85) and 6-month follow-up (ES = 0.55).</p> | | G |
| Lancee et al. (2014) | Insomnia | Name unknown | Website | Guided | Email | Minimal | N/A | N/A | 48 | 75 | N/A | N/A | Other | Therapist support had a greater effect on SE, TST and SOL outcomes for participants with a high severity of depression at post-treatment (BG ES = -0.85, -0.41 and 0.52, respectively) and 6-month follow-up (BG ES = -0.67, 0.57 and -0.56, respectively) than for participants with a low severity of depression. | | A |

| Reference | Condition | Name | Delivery | Content | Additional guidance | Intensity of guidance | Structure | Number of modules | Mean age | Female (%) | In full-time employment (%) | With university degree (%) | Comparison group | Significant outcomes* | Work-related | Mental health |
|-------------------------|--------------------------|--|----------|----------|---|-----------------------|-----------|-------------------|----------|------------|-----------------------------|----------------------------|-----------------------------------|--|--------------|---------------|
| Blom et al. (2015) | - Depression Insomnia | Name unknown | Website | Guided | Email and tailored educational material | Minimal | Linear | 8 | N/A | N/A | N/A | N/A | Same cCBT with other participants | The insomnia-cCBT treatment group improved significantly more on ISI than did the depression-cCBT group at post-treatment. There was no significant difference on MADRS-S between the groups. The insomnia-cCBT treatment group improved significantly from baseline on ISI (WG ES = 1.84) and MADRS (WG ES = 1.12) at 12-month follow-up. The depression-cCBT treatment group improved significantly from baseline on ISI (WG ES = 0.95) and MADRS (WG ES = 0.94) at 12-month follow-up. | | A |
| Kobak et al. (2015) | OCD | Name unknown | Website | Guided | Telephone | N/A | Mixed | 9 | N/A | N/A | N/A | N/A | Another cCBT | The cCBT-only group improved significantly on YBOCS scores from baseline to endpoint (WG ES = 1.17). The cCBT-with-lay-coaching group improved significantly on YBOCS scores from baseline to endpoint (WG ES = 1.42). The cCBT-with-therapist group improved significantly on YBOCS scores from baseline to endpoint (WG ES = 1.13). | | G |
| Wootton et al. (2013) | OCD | The OCD Course | Website | Guided | Telephone | Minimal | Linear | 5 | 35 | 76 | 53 | 49 | - Wait-list control - Other | The iCBT group improved significantly on the YBOCS scale from baseline to 3-month follow-up (WG ES = 2.16). The iCBT group made significantly greater improvements on the YBOCS scale than did the waitlist control from baseline to post-treatment (BG ES = 1.57). | | A |
| Ivarsson et al. (2014) | PTSD | Name unknown | Website | Guided | Email | Minimal | Linear | 8 | 46 | 82 | 57 | 57 | Wait-list control | The cCBT treatment group improved significantly more on the Impact of Event Scale – Revised (IES-R) total than did the control at post-treatment (BG ES = 1.25). The cCBT treatment group improved significantly more on the BDI-II than did the control at post-treatment (BG ES = 0.55). The cCBT treatment group improved significantly more on the BAI than did the control at post-treatment (BG ES = 0.60). The cCBT treatment group improved significantly more on the QOLI than did the control at post-treatment (BG ES = 0.53). | | G |
| Mouthaan et al. (2013) | PTSD | Trauma TIPS | Website | Unguided | N/A | N/A | Linear | 6 | 44 | 41 | 72 | 25 | Wait-list control | The study showed no significant benefit of treatment over control. | | R |
| El Alaoui et al. (2013) | Panic disorder | Name unknown | Website | Guided | eChat | Equal share | Linear | 10 | 34 | 62 | N/A | N/A | Other | The cCBT group made greater improvements on the PDSS than did the CBT control group (BG ES = 0.23). The iCBT group improved significantly on the PDSS from baseline to 6-month follow-up (WG ES = 2.35). | | G |
| Querstret et al. (2016) | Work health | BeMindful | Website | Unguided | N/A | N/A | Mixed | 6 | 41 | 80 | 95 | 69 | Wait-list control | Participants who completed the online mindfulness course reported significantly lower levels of affective rumination ($\eta^2 = 0.11$), problem-solving pondering ($\eta^2 = 0.13$), chronic fatigue ($\eta^2 = 0.24$) and acute fatigue ($\eta^2 = 0.26$), and significantly higher levels of sleep quality ($\eta^2 = 0.16$) than did the waiting-list control. | G | G |
| Imamura et al. (2015b) | Work health | Useful mental health solutions series for business | Website | Unguided | N/A | N/A | Linear | 6 | 38 | 15 | 70 | 73 | Other | The cCBT group improved significantly on the UWES relative to the non-cCBT control at 6-month follow-up (ES = 0.16). | A | |

* Outcomes are displayed selectively; these were outcomes which showed a benefit of treatment over control or improvement in the treatment group from baseline, at the longest point from baseline at which these remained significant. Cohen's d effect sizes are usually interpreted as small (0.2), medium (0.5) and large (0.8).

† η^2 = partial eta squared.