Chapter 7

Adherence to internet-based and face-to-face cognitive behavioural therapy for depression: a meta-analysis

Submitted:
Abstract

Background
Internet-based cognitive behavioural therapy (iCBT) is an effective and acceptable treatment for depression, especially when it includes guidance, e.g. by email, but its treatment adherence has not yet been systematically studied. We conducted a meta-analysis, comparing the adherence rates of guided iCBT for depression with the adherence rates of individual face-to-face CBT for depression.

Methods
Studies were selected from a comprehensive database of trials that investigate treatment for adult depression, updated to January 2012. We identified 20 studies that described 21 treatment conditions (8 guided iCBT, 13 face-to-face CBT), by means of the following inclusion criteria: targeting depressed adults, no comorbid somatic disorder or substance abuse, recruitment conducted in the community, published in the year 2000 or later. We did not find studies that compared guided iCBT and face-to-face CBT in a single trial that met our inclusion criteria. We coded four outcome measures for each study: percentage of treatment completers (either 100% or 80% of treatment completed), number of completed sessions divided by the total number of sessions, and percentage of study drop-out.

Results
Guided iCBT interventions consisted of 5 to 9 sessions, and face-to-face CBT treatments ranged from 12 to 28 sessions. The percentage of completers (total intervention) was significantly lower in guided iCBT than in face-to-face CBT (guided iCBT: 62.3%, face-to-face CBT: 83.6%, \( P < .001 \)), as was the percentage of completers of 80% or more of the intervention (guided iCBT: 65.1%, face-to-face CBT: 84.0%, \( P = .002 \)). However, participants in guided iCBT completed on average 80.7% of their treatment, which did not differ significantly from participants in face-to-face CBT (84.6%, \( P = .51 \)). Non-completers of guided iCBT completed on average 48.8% of their treatment, while non-completers of face-to-face CBT completed on average 6.1% of their treatment. Study drop-out did not differ between studies on face-to-face CBT and guided iCBT (\( P = .37 \)).

Conclusion
In terms of completers, adherence to guided iCBT is lower than adherence to face-to-face CBT, but in terms of exposure to the treatment, guided iCBT and face-to-face CBT appear to be equal. Adherence to guided iCBT appears to be adequate.
Introduction

A growing number of self-help interventions for depression are available on the internet. Internet-delivered self-help programmes can be an effective treatment for depression (Andersson & Cuijpers, 2009; Richards & Richardson, 2012). These interventions can be roughly divided into guided and unguided interventions. Unguided interventions are fully automated self-help programmes without any therapist support (e.g., Christensen, Griffiths, Mackinnon, & Brittiffe, 2006; Clarke, et al., 2005; Meyer, et al., 2009). Guidance in guided self-help interventions is usually conducted via email by a therapist or coach (e.g., Andersson, et al., 2005; Titov, et al., 2010; Warmerdam, Van Straten, Twisk, Riper, & Cuijpers, 2008). In contrast to a therapist, a coach does not need to be a licensed professional, but can also be a trained volunteer or lower educated professional. Guided internet interventions are more effective in reducing depressive symptoms than unguided ones (Johansson & Andersson, 2012; Richards & Richardson, 2012; Spek, et al., 2007).

Most internet interventions for depression consist of internet-delivered cognitive behavioural therapy (iCBT), or related therapies, such as problem solving therapy (Van Straten, Cuijpers, & Smits, 2008; Warmerdam, et al., 2008), even though internet interventions might also be based on other therapeutic orientations, e.g. psychodynamic therapy (Johansson, et al., 2012). Guided iCBT has proved to be an effective form of treatment for depression (Andersson & Cuijpers, 2009; Richards & Richardson, 2012) and acceptable for both patients and professionals (Gerhards, et al., 2010; Gun, Titov, & Andrews, 2011; Kaltenthaler, et al., 2008). However, internet interventions can be associated with substantial attrition (Christensen, Griffiths, & Farrer, 2009; Kelders, Kok, Ossebaard, & Van Gemert-Pijnen, 2012). The attrition or adherence rates for guided iCBT for depression have not yet been systematically studied, while they are an important measure of acceptability and could be related to treatment outcome (Donkin, et al., 2011).

Attrition can be defined in a number of ways. Previous studies have discussed terms like therapy drop-out and premature discontinuation (Swift & Greenberg, 2012), premature termination (Hatchett & Park, 2003), non-usage attrition (Eysenbach, 2005), (non-)persistence (Donkin & Glozier, 2012), and (non-)adherence (Christensen, et al., 2009). Although all these terms describe the extent to which an individual completes the treatment, the definitions differ. For the present study, we will use the terms adherence and non-adherence to describe the extent to which individuals are exposed to the content of the intervention (Christensen, et al., 2009). These terms can apply both to face-to-face treatment
and internet-based treatment. We will add to this definition that participants allocated to an intervention who do not start the treatment should also be included in the non-adherence rate. There are two reasons for this addition. First, in randomised trials, it is important that all randomised participants are included in intention-to-treat analyses to preserve the unbiased comparison between groups allowed by randomisation (Tierney & Stewart, 2005). Second, individuals who proceeded as far as allocation to a treatment can be regarded as having the intention to be treated. When participants allocated to an intervention did not start, they discontinued the treatment at the earliest stage and did not adhere to the treatment protocol.

Non-adherence should not be confused with study drop-out. Study drop-out means non-compliance with the study protocol, i.e. those participants in a study who are randomised and included in the study, but fail to respond to follow-up measurements.

The first meta-analysis on non-adherence to psychotherapy in its traditional face-to-face setting showed that about 50% of those that started their treatment completed it (Wierzbicki & Pekarik, 1993). However, in a new meta-analysis among more recently published studies (1990-2010), the adherence rate was 80.3% (Swift & Greenberg, 2012). Cognitive behavioural therapy (CBT) performed slightly better (81.6%), as did therapies for patients with mood disorders (82.6%). It is important to note that both meta-analyses (Swift & Greenberg, 2012; Wierzbicki & Pekarik, 1993) included only participants who had started the intervention. Patients who did not show up for their first session were excluded from the analyses. Although adherence according to our definition would, therefore, be lower, it is evident that adherence to CBT for depression could be relatively high, which is further underlined by other studies (Mitchell & Selmes, 2007).

To date, the adherence rate of guided iCBT for depression has not been systematically studied. With regard to computerised CBT (a broader definition than iCBT, for instance including a self-help course on CD-ROM) for depression, the drop-out rate averages 31.75% (Kaltenthaler, et al., 2008). However, the definition of drop-out was quite diverse among the sixteen studies in the review by Kaltenthaler et al. (2008) and comprised both non-adherence to treatment and study drop-out. Waller and Gilbody (2009) found that a median of 56% treatment starters completed a full course of computerised CBT. In their meta-analytic review, Richards & Richardson (2012) found that adherence to computerised CBT was associated with type of guidance. Overall, the adherence rate was 43%. For therapist-guided computerised CBT interventions, it was 72%, for administrative
support 65.2% and for no support 26%. These rates of adherence in computerised CBT cannot be easily generalised to guided iCBT. Computerised CBT may also include therapy sessions on CD-ROM or DVD, or on stand-alone computers in a clinical practice, and guidance may be given by face-to-face contact, telephone or email. iCBT programmes, on the other hand, are followed completely on the internet, and can be guided by email, chat or telephone.

Guided iCBT is a promising treatment for depression, but to date, the adherence rate is unknown. It is also unknown how the adherence rate of guided iCBT compares with face-to-face CBT for depression. The present study is a meta-analysis investigating the adherence rates in guided iCBT self-help interventions, and comparing these with adherence rates in individual face-to-face CBT interventions.

Method

**Identification and selection of studies**

We used an existing database that includes all randomised trials of the psychological treatments of depression. This database has been described in detail elsewhere (Cuijpers, Van Straten, Warmerdam, & Andersson, 2008) and has been used in a series of meta-analyses (www.evidencebasedpsychotherapies.org). The database contains studies from 1974 and has been continuously updated through comprehensive literature searches up to January 2012. In these searches, 13,407 abstracts were examined in PubMed (3320 abstracts), PsycInfo (2710), Embase (4389) and the Cochrane Central Register of Controlled Trials (2988). These abstracts were identified by combining terms indicative of psychological treatment and depression, using both MeSH-terms and text words. Details of the search strings are presented in a previous study (Cuijpers, et al., 2008). Non-randomised studies are also relevant when examining adherence, but were excluded. These are few in number and do not compare well with randomised studies, because randomised allocation may have an effect on adherence. For the current study, previous reviews and meta-analyses on computerised CBT and face-to-face CBT for depression were also checked for additional studies.

For the present meta-analysis, we included studies on CBT among depressed adults (18+ years), including student samples and elderly samples. 'Depressed' was defined as major or minor depressive disorder according to a diagnostic interview or an elevated level of depressive symptoms. Depressive symptoms could be indicated by a score above a cut-off point on a validated self-
report depression scale like the Beck Depression Inventory. We only included trials in which at least one treatment group was offered guided iCBT or individual face-to-face CBT. CBT was defined as treatment in which cognitive restructuring is the core element, commonly based on the manual developed by Beck, Rush, Shaw & Emery (1979), or treatment in which cognitive restructuring is an important component, but where components such as behavioral activation, social skills training, relaxation, or coping skills also have a prominent place. An example of the latter approach is the Coping with Depression course (Lewinsohn, Antonucci, Breckenridge, & Teri, 1984). Guided iCBT was defined as an internet-based self-help CBT that includes coaching or guidance by email, chat or telephone. Face-to-face CBT was defined as CBT delivered face-to-face by a therapist to an individual. When a study contained several treatment groups who were offered CBT or iCBT, these were coded as separate, independent groups. The selection of the studies was conducted by the first author.

We excluded studies that examined CBT for patients with comorbid somatic conditions (e.g., diabetes) or addictions, and studies on relapse prevention. Also excluded were studies on CBT delivered by book (bibliotherapy), CD-ROM, email or telephone, unguided iCBT, studies in which the CBT intervention was combined with pharmacotherapy, and studies on group CBT. Group CBT was an exclusion criterion, because guided iCBT is individual and, therefore, more comparable with individual face-to-face therapy. To further increase the comparability between studies on guided iCBT and studies on individual face-to-face CBT, we also excluded studies based on publication year and recruitment method. Research on iCBT emerged in the early 2000s, so we excluded all studies that were published before the year 2000. Because participants in iCBT are often self-referred (Waller & Gilbody, 2009), we excluded studies on inpatients and only included studies that recruited their sample largely or entirely from the community, i.e., by means of advertisements in newspapers or magazines, banners on websites, or large scale mailings.

No language restrictions were applied.

Coding and data extraction
We defined adherence using four outcome variables. The first variable is the number of participants that had completed the full intervention. This was defined as having completed the maximum number of sessions or modules. Studies did not always report the number of participants that completed the maximum number of sessions, for example stating that participants completing twelve or more sessions were considered completers. In those cases, the respective authors’ definition of
completers was used. The second variable is the number of participants that had completed at least 80% of the intervention, i.e. 80% of the total number of sessions. These participants may not have completed the entire intervention, but were exposed to a substantial part of the treatment content. Thirdly, we coded the average number of modules, lessons or treatment sessions (and standard deviation) that were completed by the participants, which could be divided by the total number of sessions to obtain a percentage. In some cases, these values were not reported, but could be calculated based on the flow-chart, or could be estimated. Estimates were always conservative, i.e. expecting low adherence. For example, a study could describe an intervention of eight sessions with one session every week, and report that two participants dropped out during the first four weeks. In that case, we considered these two participants to have completed one session. The fourth variable is the number of participants that completed post-treatment measurements, in order to obtain the study drop-out rate.

We included in our analyses all participants who had completed the pre-treatment measures and were allocated to a CBT condition, regardless of whether or not the participant started the intervention. Data abstraction from the studies was conducted by the first author.

Quality assessment
The validity of included studies in meta-analyses is usually assessed, for example, by using criteria of the ‘Risk of bias’ assessment tool, developed by the Cochrane Collaboration (Higgins & Green, 2008). This tool assesses possible sources of bias in randomised trials. In the current study, criteria pertaining to randomisation, allocation concealment and blinding of participants, personnel and outcome assessors were not assessed. These criteria were not relevant to our study, because we did not assess effectiveness or outcomes of the interventions. We assessed studies for the quality criterion pertaining to adequate dealing with incomplete outcome data. This involved examining whether all participants allocated to the intervention were included in the analyses and how missing data were analysed. We also coded whether adherence and drop-out rates were reported. The quality assessment was conducted by two independent reviewers (WB and PC), and disagreements were resolved by discussion.
Figure 1. Flow chart of included studies.

13,407 references identified by literature search:
- PubMed: 3,320
- PsycINFO: 2,710
- Embase: 4,389
- Cochrane: 2,988

After removal of duplicates: 9,880 abstracts

1,344 publications retrieved

317 randomised trials on psychotherapy for adult depression (described in 559 papers)

Excluded: 785
- Studies with adolescents (69)
- No random assignment (54)
- Not only depression (165)
- No psychotherapy (151)
- No comparison condition (113)
- Maintenance trial (53)
- Non-included duplicate papers (64)
- Other reason (116)

Excluded: 297
- Published before 2000 (127)
- Not on CBT (84)
- No community recruitment (51)
- Duplicates (1)
- Somatic conditions, addictions (9)
- Group CBT (15)
- Bibliotherapy (3)
- Unguided CBT (7)

20 studies included
- 8 treatment conditions of guided CBT
- 13 treatment conditions of face-to-face CBT
**Meta-analyses**

Our analyses comprised three dichotomous outcome measures and one continuous outcome measure. The first dichotomous outcome measure was the completion of 100% of the intervention, i.e. a participant was either a completer or a drop-out. This also applies to 80% treatment completion (yes/no), and post-treatment response (yes/no). The fourth outcome, percentage of treatment completed (number of sessions exposed to/total number of sessions), is a continuous measure. When the 80% treatment completion was not reported, we analysed the number of participants who had completed 100% of the intervention for that study. These four proportions were pooled in the subgroups guided iCBT and face-to-face CBT.

The heterogeneity between studies was calculated using the $I^2$-statistic. This $I^2$ is expressed in percentages. A value of 0% indicates no heterogeneity, 25% indicates low, 50% indicates moderate, and 75% indicates high heterogeneity (Higgins, Thompson, Deeks, & Altman, 2003). We also report the significance of the Q-statistic, which indicates whether heterogeneity was significant or not. Since we expected considerable heterogeneity, we decided to calculate the adherence rates using a random effects model. In this model, the adherence rates from included studies differ not only because of the random error within studies (as in the fixed effects model), but also because of true variation in adherence from one study to the next.

We performed subgroup analyses to compare adherence rates between face-to-face CBT and guided iCBT. These analyses were conducted according to the mixed effect model. In this model, studies within subgroups are pooled with the random effects model, while tests for significant differences between subgroups are conducted with the fixed effects model. All analyses were performed with Comprehensive Meta-Analysis (CMA; version 2.2.021).

**Results**

**Selection and inclusion of studies**

Having examined a total of 13,407 abstracts (9,860 after removal of duplicates), we retrieved 1,344 full-text papers for further consideration. We excluded 785 of the retrieved papers (studies with adolescents: 69; no random assignment: 54; included patients who were not depressed: 165; did not meet definition of psychotherapy: 151; no comparison group: 113; maintenance trial: 53; duplicate papers: 64; other reason: 116). This resulted in a total of 317 randomised psychotherapy trials on adult depression. Twenty studies on individual or internet-based CBT met
<table>
<thead>
<tr>
<th>Type</th>
<th>n completers (100%)</th>
<th>n completers (80%)</th>
<th>n responders to post-treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andersson et al., 2005</td>
<td>guid. iCBT</td>
<td>57</td>
<td>37</td>
</tr>
<tr>
<td>Berger et al., 2011</td>
<td>guid. iCBT</td>
<td>25</td>
<td>14</td>
</tr>
<tr>
<td>Bodenmann et al., 2008</td>
<td>FtF CBT</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Castonguay et al., 2004</td>
<td>FtF CBT</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Constantino et al., 2008</td>
<td>FtF CBT</td>
<td>11</td>
<td>8</td>
</tr>
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<td>David, Szentagotai, Lupu &amp; Cosman, 2008</td>
<td>FtF CBT</td>
<td>56</td>
<td>50</td>
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<tr>
<td>DeRubeis et al., 2005</td>
<td>FtF CBT</td>
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<td>51</td>
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<tr>
<td>Dimidjian et al., 2006</td>
<td>FtF CBT</td>
<td>45</td>
<td>39</td>
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<tr>
<td>Hautzinger &amp; Welz, 2008</td>
<td>FtF CBT</td>
<td>31</td>
<td>26</td>
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<td>McBride, Atkinson, Quilty &amp; Bagby, 2006</td>
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<td>37</td>
<td>29</td>
</tr>
<tr>
<td>Perini, Titov &amp; Andrews, 2009</td>
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<td>27</td>
<td>20</td>
</tr>
<tr>
<td>Serfaty et al., 2009</td>
<td>FtF CBT</td>
<td>70</td>
<td>NR</td>
</tr>
<tr>
<td>Strauman et al., 2006</td>
<td>FtF CBT</td>
<td>21</td>
<td>17</td>
</tr>
<tr>
<td>Teismann, Dymel, Schulte &amp; Willutzki, 2011</td>
<td>FtF CBT</td>
<td>34</td>
<td>33</td>
</tr>
<tr>
<td>Thompson et al., 2001</td>
<td>FtF CBT</td>
<td>31</td>
<td>24</td>
</tr>
<tr>
<td>Titov et al., 2010***</td>
<td>guid. iCBT</td>
<td>43</td>
<td>33</td>
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<td>Titov et al., 2010****</td>
<td>guid. iCBT</td>
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<td>32</td>
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<td>Titov et al., 2011*****</td>
<td>guid. iCBT</td>
<td>18</td>
<td>NR</td>
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<tr>
<td>Vernmark et al., 2010</td>
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<td>29</td>
<td>17</td>
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<td>Warmerdam et al., 2008</td>
<td>guid. iCBT</td>
<td>88</td>
<td>34</td>
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<tr>
<td>Watson et al., 2003</td>
<td>FtF CBT</td>
<td>NR</td>
<td>33</td>
</tr>
</tbody>
</table>

Abbreviations: guid. iCBT = guided internet-delivered cognitive behavioural therapy; FtF CBT = individual face-to-face cognitive behavioural therapy; NR = not reported; SD = standard deviation; ITT = intention to treat

*Standard deviation estimated
**Mean and standard deviation estimated
***Technician assisted
****Clinician assisted
*****Transdiagnostic intervention. Adherence was reported, but not specifically for the depressed group.
Table 1. Included studies (continued).

<table>
<thead>
<tr>
<th>Sessions completed mean (SD)</th>
<th>Maximum amount of sessions</th>
<th>country</th>
<th>ITT analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.7 (1.9)</td>
<td>5</td>
<td>Swe</td>
<td>yes</td>
</tr>
<tr>
<td>8.52 (2.86)</td>
<td>10</td>
<td>Swiss/Ger</td>
<td>yes</td>
</tr>
<tr>
<td>20.0 (0)</td>
<td>20</td>
<td>Swiss</td>
<td>yes</td>
</tr>
<tr>
<td>NR</td>
<td>20</td>
<td>US</td>
<td>no</td>
</tr>
<tr>
<td>14.38 (2.39)</td>
<td>16</td>
<td>US</td>
<td>yes</td>
</tr>
<tr>
<td>17.39 (5.84)**</td>
<td>20</td>
<td>Rom</td>
<td>yes</td>
</tr>
<tr>
<td>23.95 (9.72)**</td>
<td>28</td>
<td>US</td>
<td>yes</td>
</tr>
<tr>
<td>20.91 (7.97)**</td>
<td>24</td>
<td>US</td>
<td>yes</td>
</tr>
<tr>
<td>NR</td>
<td>15</td>
<td>Ger</td>
<td>yes</td>
</tr>
<tr>
<td>16.56 (3.22)</td>
<td>20</td>
<td>Can</td>
<td>yes</td>
</tr>
<tr>
<td>5.33 (1.21)</td>
<td>6</td>
<td>Aus</td>
<td>yes</td>
</tr>
<tr>
<td>7.09 (4.41)</td>
<td>12</td>
<td>UK</td>
<td>yes</td>
</tr>
<tr>
<td>18.2 (3.83)*</td>
<td>20</td>
<td>US</td>
<td>yes</td>
</tr>
<tr>
<td>22.4 (3.8)</td>
<td>24</td>
<td>Ger</td>
<td>no</td>
</tr>
<tr>
<td>NR</td>
<td>20</td>
<td>US</td>
<td>yes</td>
</tr>
<tr>
<td>5.30 (1.57)</td>
<td>6</td>
<td>Aus</td>
<td>yes</td>
</tr>
<tr>
<td>5.21 (1.43)</td>
<td>6</td>
<td>Aus</td>
<td>yes</td>
</tr>
<tr>
<td>NR</td>
<td>8</td>
<td>Aus</td>
<td>yes</td>
</tr>
<tr>
<td>6 (1.58)</td>
<td>7</td>
<td>Swe</td>
<td>yes</td>
</tr>
<tr>
<td>4.99 (3.47)**</td>
<td>9</td>
<td>NL</td>
<td>yes</td>
</tr>
<tr>
<td>NR</td>
<td>16</td>
<td>Can</td>
<td>yes</td>
</tr>
</tbody>
</table>
inclusion criteria and were included in this study (21 treatment conditions; 13 individual face-to-face CBT and 8 guided iCBT). See Figure 1 for a flow chart. None of these studies included both a guided iCBT condition and a face-to-face CBT condition.

**Characteristics of the included studies**
The 21 treatment groups included in our analyses comprised 797 participants who completed pre-treatment measurements and were allocated to CBT. Of these, 463 were allocated to face-to-face CBT and 334 to guided iCBT. See Table 1 for an overview of the included studies. One study, which was on face-to-face CBT, did not report the total number of participants who had completed pre-treatment measurements and were allocated to the treatment group. Therefore, this study could not be included in all of the analyses. Two studies did not report the number of participants who completed 100% of their treatment (1 iCBT, 1 face-to-face), while 12 studies did not report the percentage of participants who had completed 80% or more of the treatment (5 iCBT, 7 face-to-face). When the 80% completion rate was not available, but the 100% completion rate was, the 100% completion data was used. Otherwise, studies with incomplete data were not included in the analyses. The average number of completed sessions was not reported or could not be calculated for 10 groups (2 iCBT, 8 face-to-face). For 5 of these 10 groups, this variable could be estimated, while it could not be retrieved for the other 5 groups. For all but 1 group (iCBT), the study drop-out rate was reported or could be deduced, so this 1 study was not included in the analyses of study drop-out. All but two face-to-face studies performed intention-to-treat analyses. Four studies on iCBT were conducted in Europe (2 in Sweden, 1 in Switzerland and Germany, 1 in the Netherlands), while 3 were conducted in Australia. Six studies on face-to-face CBT were conducted in the United States, 2 in Canada, 2 in Germany, 1 in the United Kingdom, 1 in Switzerland and 1 in Romania.

**Adherence**
In order to compare the percentage of participants who completed the entire intervention (100%), included 7 iCBT groups and 11 face-to-face CBT groups in our analyses (Figure 2). There was significant heterogeneity between the studies ($P < .001$, $I^2 = 78.6%$). Of the participants in the guided iCBT groups, 62.3% completed the entire intervention (CI 50.3% - 73.0%). In the face-to-face groups, this was 83.6% (CI 78.6% - 87.6%). The difference between these rates for guided iCBT and face-to-face CBT was statistically significant ($P < .001$; Table 2).
Results of the 80% completion analyses were similar to the 100% completion analyses in terms of overall heterogeneity ($P < .001$, $I^2 = 79.7\%$). The percentage of completers of guided iCBT was 65.1\% (CI 51.1\% - 76.9\%), and the percentage of completers of face-to-face CBT was 84.0\% (CI 79.0\% - 87.9\%). Again, this difference was statistically significant ($P = .002$). See Figure 3 and Table 2.

We compared 7 groups of guided iCBT and 8 groups of face-to-face CBT in the analyses of the percentage of treatment completion (Figure 4). One study on face-to-face CBT was excluded from the analysis, because it had a completion rate of 100\% with a standard deviation of 0\% and could therefore not be analysed. Heterogeneity tests demonstrated significant heterogeneity between studies (overall $I^2 = 86.7\%$). Guided iCBT interventions ranged in length from 5 to 9 sessions. On average, participants completed 80.7\% of their treatments (CI 71.4\% - 90.0\%). Face-to-face CBT ranged in length from 12 to 28 sessions. The average completion rate for face-to-face CBT was 84.6\% (CI 77.8\% - 91.5\%). The difference between the completion rates for iCBT and face-to-face CBT was not statistically different ($P = .51$). See Table 2.

Table 2. Meta-analyses of adherence rates of guided iCBT and individual face-to-face CBT.

<table>
<thead>
<tr>
<th></th>
<th>Guided iCBT (95% C.I.)</th>
<th>Ff F CBT (95% C.I.)</th>
<th>$P$</th>
<th>$I^2$***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completers (total)*</td>
<td>62.3% (50.3% - 73.0%)</td>
<td>83.6% (78.6% - 87.6%)</td>
<td>&lt; .001</td>
<td>78.6%</td>
</tr>
<tr>
<td>Completers (≥ 80%)*</td>
<td>65.1% (51.1% - 76.9%)</td>
<td>84.0% (79.0% - 87.9%)</td>
<td>.002</td>
<td>79.7%</td>
</tr>
<tr>
<td>Session completion**</td>
<td>80.7% (71.4% - 90.0%)</td>
<td>84.6% (77.8% - 91.5%)</td>
<td>.51</td>
<td>86.7%</td>
</tr>
<tr>
<td>Post-treatment response*</td>
<td>78.6% (63.8% - 88.5%)</td>
<td>84.1% (79.7% - 87.7%)</td>
<td>.37</td>
<td>74.4%</td>
</tr>
</tbody>
</table>

*As percentage of all participants who were allocated to the treatment.
**As percentage of the total number of sessions.
***Overall heterogeneity ($Q$ value) was significant for all analyses.

Abbreviations: guided iCBT = guided internet-delivered cognitive behavioural therapy; Ff CBT = individual face-to-face cognitive behavioural therapy; C.I. = confidence interval.

Adherence of non-completers
Non-completers of face-to-face CBT often dropped out early in their treatment. They either did not start the intervention or discontinued it after only one or a few sessions. In contrast, non-completers of guided iCBT dropped out gradually over the treatment course. Based on the percentage of completers and the average
amount of sessions completed, we calculated that non-completers of guided iCBT completed on average 48.8% of their treatment. Non-completers of face-to-face CBT, on the other hand, completed on average 6.1% of their treatment.

Study drop-out
There was considerable heterogeneity between studies regarding response to the post-treatment measurement, i.e. completion of the study (\(P < .001, I^2 = 74.4\%\)). See Figure 5. There was no significant difference between the guided iCBT sub-group and the face-to-face CBT sub-group (guided iCBT: 78.6%, CI 63.8% - 88.5%; face-to-face CBT: 84.1%, CI 79.7% - 87.7%; \(P = .37\)). We compared 7 guided iCBT groups and 12 face-to-face CBT groups.

Figure 2. Meta-analysis of 100% completers.
Discussion

In this meta-analysis, we examined the adherence rates in guided iCBT, and compared these with the adherence in individual face-to-face CBT. We analysed 797 participants, who were divided over 21 treatment groups and described by 20 studies. The percentage of completers was higher in face-to-face CBT than in guided iCBT. Of all participants starting guided iCBT, 62.3% fully completed their treatment and 65.1% completed at least 80% of their treatment. These numbers were 83.6% and 84.0% for face-to-face CBT, respectively, which is significantly higher. However, in the guided iCBT groups, participants completed on average 80.7% of their treatment, which did not differ significantly from the face-to-face CBT groups (84.6%). It appeared that non-completers of guided iCBT followed on
average about half of their treatment programmes, while non-completers of face-to-face CBT discontinued treatment earlier and followed only 6% of their treatment programmes. It should be taken into account that guided iCBT interventions consisted of 5 to 9 sessions, while face-to-face CBT treatments ranged from 12 to 28 sessions. Study drop-out did not differ between studies on face-to-face CBT and guided iCBT.

To date, adherence rates are often expressed as the percentage of a sample that completed an intervention. Looking at this outcome only, our results show a difference between adherence to face-to-face CBT and adherence to guided iCBT. However, the percentage of completed sessions did not differ between face-to-face CBT and iCBT. The percentage of completed sessions may be a more accurate measure of adherence than the percentage of completers, because it gives insight into the adherence of all participants, including the non-completers.
Adherence to iCBT
Richards and Richardson (Richards & Richardson, 2012) analysed computerised psychological treatments for depression, of which several were iCBT interventions, and found 65% adherence to internet interventions with administrative support and 72% for those with therapist-support. We included in our analyses both iCBT groups guided by clinicians and iCBT groups with other guidance. Therefore, our finding that 62.3% of participants completed the treatment is low in comparison with the study of Richards and Richardson. Regarding the percentage of completed sessions, this has not been reported in previous reviews and meta-analyses (Kaltenthaler, et al., 2008; Richards & Richardson, 2012). Our finding that participants in guided iCBT groups completed on average 80.7% of their treatment therefore cannot be compared with any figures in the previous literature.

In internet treatments for psychological disorders, 21% of eligible
Participants drop out before commencing treatment and 21% do so during the treatment (Melville, Casey, & Kavanagh, 2010). Depressed mood may be a factor that decreases adherence (Melville, et al., 2010). The drop-out rates reported in the review by Melville cannot be compared directly with the adherence rates described in our results, because Melville et al. calculated drop-out rates at various points in the process of a study, maintaining the number of eligible participants as denominator. Arguably, this method of analysing drop-out and adherence is the most objective and complete, because it gives an overview of attrition in the entire research and intervention process. However, adherence and drop-out according to this definition are difficult to review, because many studies do not supply sufficient information (Melville, et al., 2010).

Factors that may explain adherence to internet interventions are related to guidance, study design, regularity of updates to the intervention website and persuasive technology (i.e. technology designed to include persuasion and social influence)(Kelders, et al., 2012). With regard to studies on iCBT for depression, the use of persuasive technology and the regularity of updates is usually not reported. Concerning guidance and study design, previous literature does indicate that these factors may affect the adherence to iCBT for depression. Study design has proved to be an important factor, as adherence to treatment in randomised trials is high relative to adherence to open access websites (Christensen, et al., 2009). Guidance is an important factor as well. As previously stated, therapist support leads to better adherence than administrative support in computerised CBT for depression, and both therapist and administrative support lead to better adherence than no support (Richards & Richardson, 2012). Previous studies have also shown that guided iCBT is more effective than unguided iCBT (Andersson & Cuijpers, 2009). However, when directly comparing therapist support with administrative support in iCBT for depression, in the same trial and using the same intervention, the adherence rates hardly differed and there was no significant difference in clinical outcome or acceptability (Titov, et al., 2010). Similarly, directly comparing guided iCBT with unguided iCBT for depression, in the same trial and using the same intervention, differences in adherence and clinical effect were small to moderate and not significant (Berger, Hammerli, Gubser, Andersson, & Caspar, 2011). The lack of a difference in clinical effect may be explained by the fact that participants in both arms of the study by Berger et al. had contact with the study team before the treatment started (Johansson & Andersson, 2012). Both of these studies (Berger, et al., 2011; Titov, et al., 2010) may have been underpowered. More trials of such direct comparisons would be welcome, in order to gain more insight into the factors that explain adherence to iCBT for depression.
It is often not reported why participants decided to discontinue their treatment. One study on unguided iCBT for depression suggested that drop-outs may have stopped the treatment because they had recovered (Clarke, et al., 2009). It was found that fewer minutes spent on the website and fewer page hits were associated with greater symptom reduction (Clarke, et al., 2009). On the other hand, completion of more of a internet-based intervention was associated with better psychological outcomes in another study (Christensen, Griffiths, Groves, & Korten, 2006). A qualitative study suggested that participants are more likely to complete an internet intervention when they perceive the treatment as beneficial for themselves or for others (Donkin & Glozier, 2012). Another qualitative study on guided iCBT pointed out that there may be subgroups who only read the instructions provided in the treatment without following them (Bendelin, et al., 2011), which could indicate that adherence does not always equal compliance with the treatment protocol. More research is needed to understand adherence to internet interventions from the participant’s perspective.

Adherence to face-to-face CBT compared with iCBT
The adherence rates we found in face-to-face CBT interventions are in line with previous research. Swift & Greenberg (2012) found that face-to-face psychotherapy is completed by 80.3% of the participants who start the intervention. Moderators that resulted in adherence rates slightly above average included cognitive behavioural orientation, individual treatment format, and mood disorder as client diagnosis (Swift & Greenberg, 2012). These findings are in accordance with our finding that 83.6% of participants allocated to individual face-to-face CBT for depression complete their treatment.

In terms of clinical effect for depression and anxiety, computerised interventions and face-to-face interventions tend to be equal (Cuijpers, Donker, Van Straten, Li, & Andersson, 2010). Our results indicate that there is also equivalence in session completion between guided iCBT and face-to-face CBT. Little attention was given to session completion in previous reviews. One review that did examine session completion pointed out that, in internet-based treatment of depression and anxiety, it could be associated with clinical effect (Donkin, et al., 2011), which would put our results in line with the meta-analysis of Cuijpers, et al. (2010).

In the studies we examined, non-completers of guided iCBT completed half of their treatment on average, while non-completers of face-to-face CBT completed only 6% of their treatment sessions. This suggests that participants in face-to-face CBT might discontinue their treatment at the start, but if they have completed one or two sessions, they are likely to continue until the end.
Participants in guided iCBT, on the other hand, drop out gradually over the course of treatment. The reasons for discontinuing could be quite different between participants who drop out early and participants who drop out late. If a participant discontinues after only one session, the intervention may not be the kind of treatment he was looking for, or he may not find it acceptable. If an individual discontinues when he is already halfway through, he may have decided he does not need the treatment any more. It is important to note that the guided iCBT interventions in our study are self-help courses. Participants in self-help interventions have more control over their pace and treatment progress than participants in face-to-face therapy, which might explain the difference in adherence behaviour.

Regarding study drop-out, our results indicate that the drop-out rate in face-to-face CBT hardly differs from the non-adherence rate. In iCBT, there appeared to be less study drop-outs than non-completers of the treatment. Apparently, many participants in studies on guided iCBT who did not complete their treatment were prepared to complete the post-treatment measurements.

**Limitations**

Our findings should be interpreted with some caution. A first limitation of our study is that the 21 treatment groups we analysed were described by 20 different studies, each with a different design. As has been demonstrated in our results, heterogeneity among studies was large. For example, participants were administered a diagnostic interview in some studies, while other studies included participants based on self-report questionnaires. Studies differed not only by design, but also by their treatment protocol. Some interventions could be tailored (i.e. there was no set maximum number of sessions), while others were fixed. The length of the therapy sessions also differed between studies. These factors limit the comparisons in our analyses. This limitation could be overcome by directly comparing face-to-face CBT and guided iCBT in a single trial, but this was not done in any of the included studies. Secondly, not all studies reported all adherence rates, so we could not compare all studies in our selection. This reduced the power of our analysis. Thirdly, we had to estimate the mean session completion of four studies, of which three were studies on face-to-face CBT. Because our estimations were performed conservatively, the session completion of face-to-face CBT might be underestimated. Finally, our results showed a small difference in session completion between face-to-face CBT and guided iCBT. This difference did not reach significance, perhaps because we could not include a sufficiently large number of studies. A future meta-analysis that would include more studies might
show whether our results remain confirmed or whether our meta-analysis was underpowered. Still, we can conclude that in terms of completed sessions, there is no difference or only a marginal difference between guided iCBT and face-to-face CBT.

Implications and future research

Adherence is an important measure of acceptability, appropriateness and effect of a psychological treatment. Studies on iCBT and face-to-face CBT should include more detailed information on adherence, preferably both the number of completers and the average number of sessions completed. Additionally, more research is needed on factors that could explain adherence and the participants’ reasons for dropping out. Reasons for dropping out can also be assessed by qualitative studies (Donkin & Glozier, 2012). Our results would become more meaningful if such data were available.

The adherence to guided iCBT for depression appears to be adequate relative to other internet interventions. Completers of guided iCBT are relatively fewer in number than completers of face-to-face CBT, but, overall, the exposure to the treatment programmes is similar in both these forms of treatment. Guided iCBT appears to be an acceptable treatment for depression and efforts should be made to increase its implementation in clinical practice.

References

References with an asterisk were included in the meta-analyses.

Consult Clin Psychol, 76(6), 944-954.


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