Guided Internet-based vs. face-to-face cognitive behavior therapy for psychiatric and somatic disorders: a systematic review and meta-analysis

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Internet-delivered cognitive behavior therapy (ICBT) has been tested in many research trials, but to a lesser extent directly compared to face-to-face delivered cognitive behavior therapy (CBT). We conducted a systematic review and meta-analysis of trials in which guided ICBT was directly compared to face-to-face CBT. Studies on psychiatric and somatic conditions were included. Systematic searches resulted in 13 studies (total N=1053) that met all criteria and were included in the review. There were three studies on social anxiety disorder, three on panic disorder, two on depressive symptoms, two on body dissatisfaction, one on tinnitus, one on male sexual dysfunction, and one on spider phobia. Face-to-face CBT was either in the individual format (n=6) or in the group format (n=7). We also assessed quality and risk of bias. Results showed a pooled effect size (Hedges' g) at post-treatment of −0.01 (95% CI: −0.13 to 0.12), indicating that guided ICBT and face-to-face treatment produce equivalent overall effects. Study quality did not affect outcomes. While the overall results indicate equivalence, there are still few studies for each psychiatric and somatic condition and many conditions for which guided ICBT has not been compared to face-to-face treatment. Thus, more research is needed to establish equivalence of the two treatment formats.

Key words: Guided Internet-delivered cognitive behavior therapy, face-to-face therapy, anxiety and mood disorders, somatic disorders, meta-analysis

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Internet-delivered psychological treatments have a relatively short history, with the first trials being conducted in late 1990s (1). A large number of programs have been developed, and trials have been conducted for a range of psychiatric and somatic conditions, mostly using Internet-delivered cognitive behavior therapy (ICBT) (2).

Many ICBT programs involve therapist guidance over encrypted e-mail, which to date, with a few exceptions (3), tend to generate larger effects than unguided programs (4). Many interventions are text-based and can be described as online bibliotherapy, even if streamed video clips, audio files and interactive elements are involved. These programs are typically comprised of 6-15 modules, which are text chapters corresponding to sessions in face-to-face therapy, and require little therapist involvement more than guidance and feedback on homework assignments (approximately 10-15 min per client and week). Other programs, such as Interapy (5), require more therapist input, as more text is exchanged between the therapist and the client. Finally, there are real time chat-based Internet treatments in which no therapist time is saved (6).

In terms of content, programs vary as well, but many tend to mirror face-to-face treatments in terms of content and length. Thus, for example, a program for depression can be 10 weeks long, with weekly modules mirroring sessions in manualized cognitive behavior therapy (CBT) (4), and the content may include psychoeducation, behavioral activation, cognitive restructuring, relapse prevention and homework assignments (7).

While most studies have been on ICBT (8), there are also studies on other psychotherapeutic orientations, such as psychodynamic psychotherapy (9), and physical exercise (10). Different forms of ICBT have also been used, such as attention bias modification (11), problem solving therapy (12), and acceptance and commitment therapy (13). In addition to short-term effects indicating equivalence compared to therapist administered therapy (14-16), there are also a few long-term follow-up studies showing lasting effects over as much as 5 years post-treatment (17).

In spite of promising results in the controlled trials, an outstanding question is how well-guided ICBT compares against standard manualized face-to-face treatments. This was partly investigated in a meta-analysis by Cuijpers et al (18), who studied the effects of guided self-help on depression and anxiety vs. face-to-face psychotherapies. They included 21 studies with 810 participants and found no differences between the formats (Cohen's d=0.02). However, that meta-analysis mixed bibliotherapy and Internet interventions and focused on anxiety and depression only. Furthermore, new studies have emerged since that publication. Thus, there is a need for a systematic review and meta-analysis focusing on guided ICBT.

The aim of this study was to investigate the efficacy of guided ICBT compared to face-to-face CBT for psychiatric and somatic disorders. We conducted a systematic review and meta-analysis of studies directly comparing the two treatment formats in randomized trials. We hypothesized that guided ICBT and face-to-face CBT would produce equivalent treatment effects.

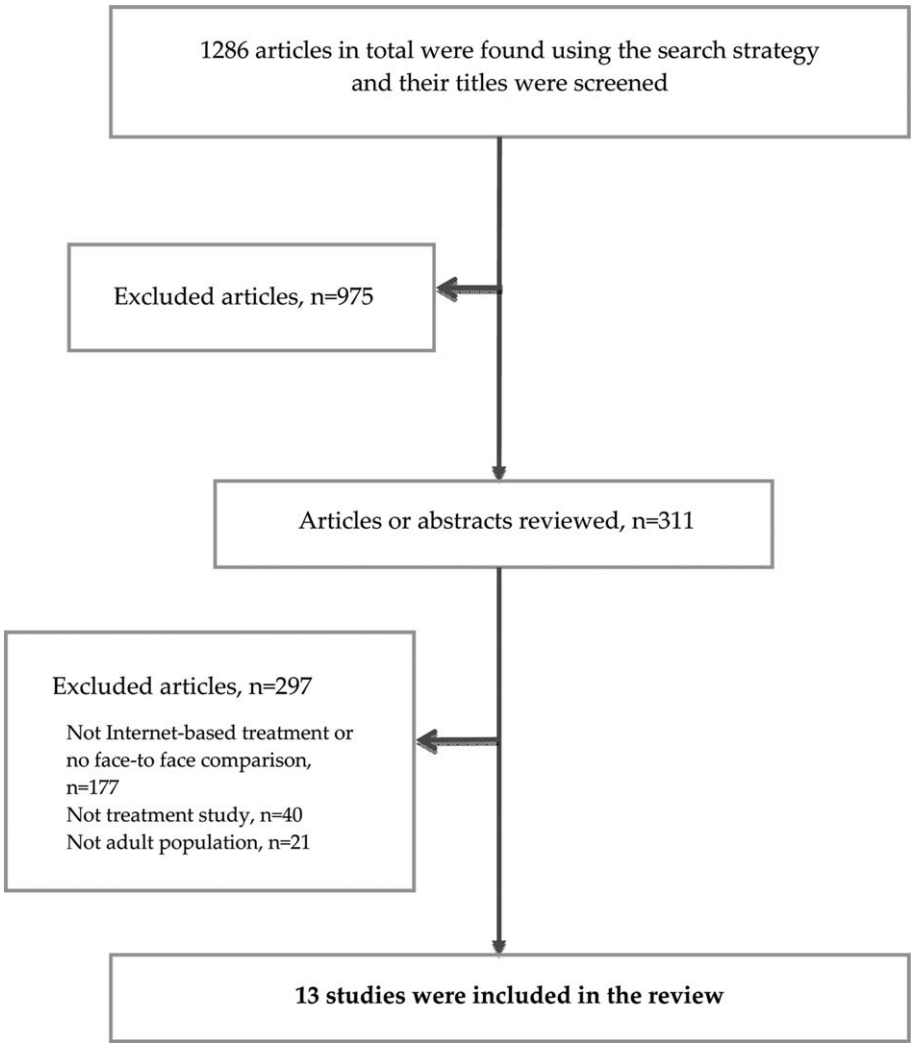

Figure 1 Study inclusion process

METHODS

This was a systematic review and meta-analysis of original articles investigating the effect of guided ICBT compared to face-to-face treatments. To be included in the review, the original studies had to: a) compare therapist-guided ICBT to face-to-face treatment using a randomized controlled design; b) use interventions that were aimed at treatment of psychiatric or somatic disorders (not, for example, prevention or merely psychoeducation); c) compare treatments that were similar in content in both treatment conditions; d) investigate a form of ICBT where the Internet treatment was the main component and not a secondary complement to other therapies; e) investigate a form of full length face-to-face treatment; f) report outcome data from an adult patient sample; g) report outcomes in terms of assessment of symptoms of the target problem; and h) be written in English. We included only studies in which there was some therapist contact during the trial (7).

We calculated effect sizes based on the primary outcome measure at post-treatment in each study. If no primary outcome measure was specified in the original study, a validated measure assessing target symptoms of the clinical problem was used, following the procedures by Thomson and Page (19).

To identify studies, systematic searches in PubMed (Medline database) were conducted using various search terms related to psychiatric and somatic disorders, such as "depression", "panic disorder", "social phobia", "social anxiety disorder", "generalized anxiety disorder", "obsessive-compulsive disorder", "post-traumatic stress disorder", "specific phobia", "hypochondriasis", "bulimia", "tinnitus", "erectile dysfunction", "chronic pain", or "fatigue". These search terms relating to the clinical problem were combined with "Internet" or "computer", or "computerized", and the search filter "randomized controlled trial" was used.

In addition to the above, reference lists in the included studies were checked for potential additional studies. We

Table 1 Characteristics of the included studies

Study	Disorder	N INT	N FTF	Outcome evaluation	Mean (SD) INT pre	Mean (SD) INT post	Mean (SD) FTF pre	Mean (SD) FTF post	Quality*	Dropout rate	ITT	Sample
Hedman et al (25)	Social anxiety disorder	62	64	LSAS	68.4 (21.0)	39.4 (19.9)	71.9 (22.9)	48.5 (25.0)	Low risk of bias on all criteria	12%	Yes	Mixed
Andrews et al (23)	Social anxiety disorder	23	14	SIAS	54.5 (12.4)	44.0 (15.9)	57.8 (43.9)	43.9 (18.7)	Unclear/high risk on at least one criterion	32%	Yes	Clinical
Botella et al (24)	Social anxiety disorder	62	36	FPSQ	53.3 (14.3)	39.7 (15.5)	50.5 (11.9)	39.3 (13.0)	Unclear/high risk on at least one criterion	55%	Yes	Mixed
Carlbring et al (27)	Panic disorder	25	24	BSQ	48.7 (11.7)	31.8 (11.6)	52.6 (10.8)	31.3 (9.1)	Low risk of bias on all criteria	12%	Yes	Self-referred
Bergström et al (26)	Panic disorder	53	60	PDSS	14.1 (4.3)	6.3 (4.7)	14.2 (4.0)	6.3 (5.6)	Low risk of bias on all criteria	18%	Yes	Mixed
Kiropoulous et al (28)	Panic disorder	46	40	PDSS	14.9 (4.4)	9.9 (5.9)	14.8 (4.0)	9.2 (5.7)	Low risk of bias on all criteria	0%	Yes	Self-referred
Spek et al (29)	Depressive symptoms in elderly	102	99	BDI	19.2 (7.2)	12.0 (8.1)	17.9 (10.0)	11.4 (9.4)	Low risk of bias on all criteria	39%	Yes	Self-referred
Wagner et al (30)	Depressive symptoms	32	30	BDI	23.0 (6.1)	12.4 (10.0)	23.4 (7.6)	12.3 (8.8)	Unclear/high risk on at least one criterion	15%	Yes	Self-referred
Gollings & Paxton (31)	Body dissatisfaction	21	19	BSQ	129.1 (27.3)	98.4 (35.6)	140.8 (37.2)	109.6 (47.7)	Unclear/high risk on at least one criterion	17.5%	Yes	Self-referred
Paxton et al (32)	Body dissatisfaction, disordered eating	42	37	BSQ	134.3 (22.5)	116.8 (35.9)	143.3 (28.9)	105.8 (34.0)	Low risk of bias on all criteria	26%	Yes	Self-referred
Kaldo et al (33)	Tinnitus	26	25	TRQ	26.4 (15.6)	18.0 (16.2)	30.0 (18.0)	18.6 (17.0)	Low risk of bias on all criteria	14%	Yes	Mixed
Schover et al (34)	Male sexual dysfunction	41	40	IIEF	27.4 (17.3)	31.3 (20.4)	26.4 (18.2)	34.4 (22.2)	Unclear/high risk on at least one criterion	20%	Yes	Mixed
Andersson et al (35)	Specific phobia (spider)	15	15	BAT	6.2 (2.6)	10.5 (1.5)	7.3 (1.6)	11.1 (1.2)	Unclear/high risk on at least one criterion	10%	No	Self-referred

[a]Five dimensions of quality were assessed (see text); in this table, the criterion of blinding of outcome assessment is disregarded in the studies assessing outcome only through self-report
INT – guided Internet-based treatment, FTF – face-to-face treatment, ITT – intention-to-treat analysis, LSAS – Liebowitz Social Anxiety Scale, SIAS – Social Interaction Anxiety Scale, FPSQ – Fear of Public Speaking Questionnaire, BSQ – Body Sensation Questionnaire, PDSS – Panic Disorder Severity Scale, BDI – Beck Depression Inventory, TRQ – Tinnitus Reaction Questionnaire, IIEF – International Index of Erectile Function, BAT – Behavioural Approach Test

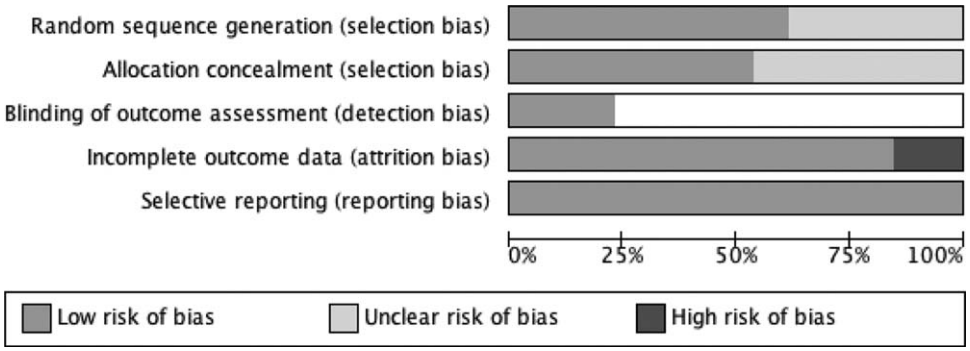

Figure 2 Estimated risk of bias across all included studies

did not search for unpublished studies. There were no restrictions regarding publication date. Searches were last updated in July 2013. We also consulted other databases (Scopus, Google Scholar and PsychInfo), and reference lists of recent studies and reviews on Internet interventions.

Two researchers read the abstracts independently and, in case of disagreement on inclusion, they discussed it amongst themselves or asked a third researcher for advice.

Each included study was assessed for quality using the criteria proposed by the Cochrane collaboration (20). Five dimensions were assessed: risk of selection bias due to the method for generating the randomization sequence; risk of selection bias in terms of allocation concealment, i.e., due to foreknowledge of the forthcoming allocations; detection bias in terms of blinding of outcome assessors; attrition bias due to incomplete outcome data; and reporting bias due to selective reporting of results. The criterion for performance bias relating to masking of participants was not used, as that form of masking is not possible in the types of treatments investigated in this review. On each dimension, the status of the studies was rated using the response options "low risk", "high risk" or "unclear". The alternative "unclear" was used when there was no data to assess the quality criterion in the original study. In studies using self-report, the criterion of blinding of outcome assessors was judged to be not applicable.

Data were analysed using Review Manager (RevMan) version 5.1.0 (20). In the main meta-analyses, we assessed the effect of guided ICBT compared to face-to-face treatment using the standardized mean difference at post-treatment (Hedges' g) as outcome, meaning that the difference between treatments was divided by the pooled standard deviation. If both intention-to-treat and per-protocol data were presented, the former estimate was used in the meta-analysis. Estimates of treatment effects were conducted both using all included studies and separately for each clinical disorder (e.g., depression). Potential differences in dropout rates between guided ICBT and face-to-face treatment were analysed using meta-analytic logistic regression.

All pooled analyses were carried out within a random effects model framework, assuming variation in true effects

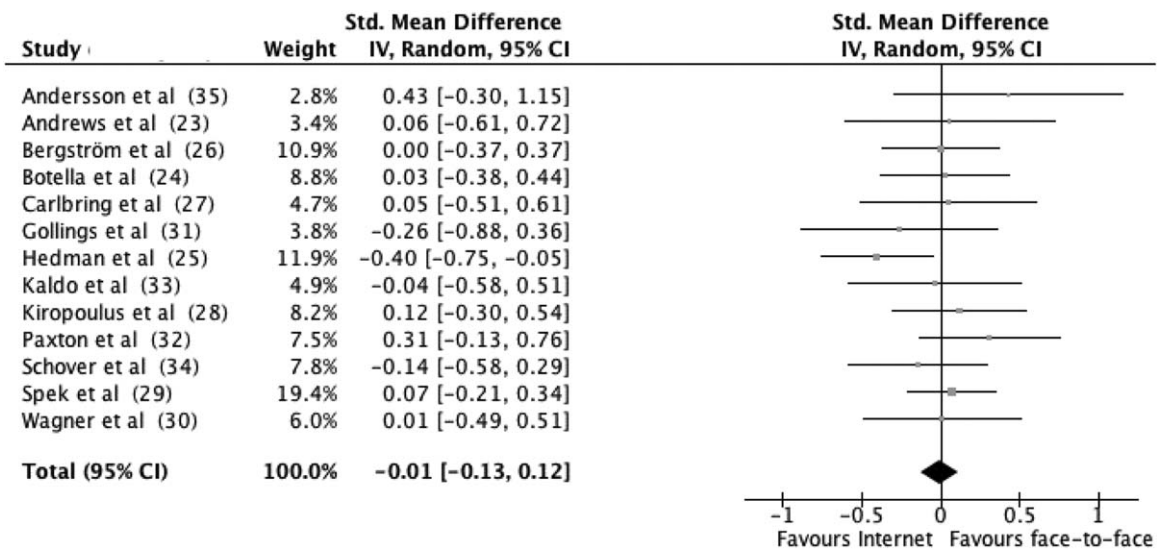

Figure 3 Forest plot displaying effect sizes of studies comparing guided Internet-based treatment with face-to-face treatment

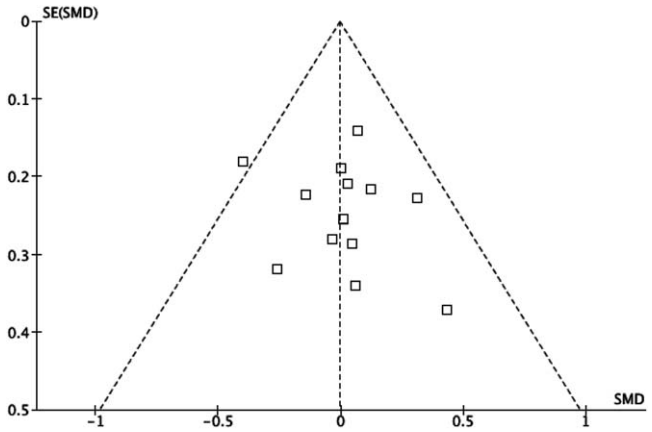

Figure 4 Funnel plot to assess for publication bias by relating effect sizes of the studies to standard errors. SE – standard error, SMD – standardized mean difference (Cohen's d)

in the included studies and accounting for the hypothesized distribution of effects (21,22). Studies were assessed for heterogeneity using χ^2 and I^2 tests, where an estimate above 40% on the latter test suggests presence of heterogeneity (21). In addition, forest plots were inspected to assess variation in effects across studies. Sensitivity analyses were conducted to assess whether study quality was related to outcome, by comparing studies judged as having a low risk of bias on all five quality criteria dimensions with the other studies (i.e., those assessed as "unclear" or "high risk" on at least one quality criterion). Publication bias was investigated using funnel plots.

Power calculations were conducted as suggested by Borenstein et al (22) and showed that, in order to have a power of 80% to detect a small effect size (d=0.3), given an alpha-level of 0.05, 14 studies with an average of 25 participants in each treatment arm were needed.

RESULTS

Of 1,286 screened studies, 13 (total N=1053) met all review criteria and were included in the analysis. Figure 1 displays the study inclusion process. All the 13 studies investigated guided ICBT against some form of CBT (individual format, n=6 and group format, n=7). In terms of conditions studied, three targeted social anxiety disorder (23-25), three panic disorder (26-28), two depressive symptoms (29,30), two body dissatisfaction (31,32), one tinnitus (33), one male sexual dysfunction (34), and one spider phobia (35). The total number of participants was 551 in guided ICBT and 502 in the face-to-face condition.

The studies were conducted by eight independent research groups and carried out in Australia, the Netherlands, Spain, Sweden, Switzerland, or the U.S.. The smallest study had 30 participants and the largest 201. Seven studies recruited participants solely through self-referral, while the remainder included participants from clinical samples or using a mix of self-referral and clinical recruitment. All studies were published between 2005 and 2013. The characteristics of each study are presented in Table 1.

When blinding of outcome assessment was included, only three studies were judged as having low risk of bias on all five quality dimensions (25,26,28). When that criterion was disregarded in the studies assessing outcome only through self-report, 7 of 13 studies were judged as having low risk of bias on all quality dimensions. Figure 2 displays the averaged risk of bias in the included studies.

In terms of dropout, meta-analytic logistic regression showed no significant difference between the two treatment formats (OR=0.79; 95% CI: 0.57-1.09), indicating that dropout did not systematically favour one treatment over the other. Tests of heterogeneity did not demonstrate significant differences in effects across treatments (χ^2=9.91; I^2= 0%; p=0.62).

A forest plot presenting effect sizes (g) of each study as well as the pooled between-group effect size of all studies is presented in Figure 3. An effect size estimate below 0 favours guided ICBT, while an effect size above 0 represents larger effects for face-to-face CBT. The pooled between-group effect size (g) at post-treatment across all 13 studies was −0.01 (95% CI: −0.13 to 0.12), showing that guided ICBT and face-to-face treatment produced equivalent overall effects.

In the three studies targeting social anxiety disorder (23-25), the pooled between-group effect size (g) was −0.16 (95% CI: −0.47 to 0.16), in favour of guided ICBT but indicating equivalent effects. In the three studies targeting panic disorder (26-28), the effect size was 0.05 (95% CI: −0.20 to 0.30), in line with the notion of equivalent effects. In the two studies targeting depressive symptoms (29,30), the effect size was 0.05 (95% CI: −0.19 to 0.30), showing equivalent effects for this condition as well.

In the two studies targeting body dissatisfaction (31,32), the effect size was 0.07 (95% CI: −0.49 to 0.62), again showing largely equivalent effects. In the only study targeting tinnitus (36), the effect size was −0.04 (95% CI: −0.58 to 0.51), suggesting no difference between the formats for this condition as well. In the only study targeting male sexual dysfunction (34), using a clinical sample of patients that had been treated for prostate cancer, the effect size was −0.14 (95% CI: −0.58 to 0.29), which is a small effect again in slight favour of ICBT. In the only study targeting spider phobia (35), the effect size was 0.43 (95% CI: −0.30 to 1.15), in favour of face-to-face treatment, but given the small size of the study not significant.

In order to estimate whether there was an association of study quality and treatment effects, subgroup analyses were conducted. In the three studies judged to have low risk of bias on all five quality criteria, the pooled effect size (g) was −0.11 (95% CI: −0.42 to 0.21), while it was 0.05 (95% CI: −0.10 to 0.19) for the other ten studies, suggesting that study quality did not affect outcomes significantly.

Figure 4 presents a funnel plot relating effect sizes on the primary outcome of the studies to the standard errors of the estimates. Effect sizes were evenly distributed around the averaged effect. Of specific interest, the lower right section of the funnel plot is not devoid of studies, suggesting that there is no major bias of the pooled effect estimate due to unpublished small studies with results favouring face-to-face treatment.

DISCUSSION

The aim of this systematic review and meta-analysis was to collect and analyse studies in which guided ICBT had been directly compared with face-to-face CBT. Altogether, the findings are clear in that the overall effect for the main outcomes was close to zero, indicating that the two treatment formats are equally effective in social anxiety disorder, panic disorder, depressive symptoms, body dissatisfaction, tinnitus, male sexual dysfunction, and spider phobia, when analysed as an aggregated cohort.

Thus, the present meta-analytic review mirrors the findings by Cuijpers et al (18), who found no differences between guided self-help and face-to-face therapies. Interestingly, there is only a minor overlap between that meta-analysis and the present one. We included the studies by Spek et al (29) and Botella et al (24), as they involved therapist contact in association with inclusion (but not during treatment). We did not include a study (included in Cuijpers et al's meta-analysis) that was judged to compare two forms of ICBT rather than ICBT vs. face-to-face treatment (37).

While there were relatively few studies on each condition, the overall number of studies and number of participants gave us power to detect differences of importance between the formats. There was a low risk of bias, including publication bias, but many individual studies were much underpowered to detect differences, and for each of the included conditions there were few studies and sometimes only one.

The results of this meta-analysis are thought-provoking both from a theoretical and practical point of view. In terms of theories about change in psychotherapeutic interventions, the results suggest that the role of a face-to-face therapist may not be as crucial as suggested in the literature (38) to generate large treatment effects. Even if factors such as therapeutic alliance are established in guided ICBT (39), they are rarely important for outcome. Indeed, understanding what makes ICBT work is a challenge for future research, as only a few studies to date have investigated mediators of outcome (e.g., 40,41).

From a practical point of view, the findings call for research on treatment preferences and effectiveness in real life settings, as most studies in this review involved self-referred participants recruited via advertisements. There are studies on treatment acceptability of ICBT showing that patient tend to appreciate the ICBT format (42-44), but also one study reporting the opposite (45). When it comes to effectiveness, there are now at least four controlled trials and eight open studies showing that ICBT works in regular clinical settings (46). However, controlled trials such as the ones reviewed in this meta-analysis all require that participants consent to being randomized to either ICBT or face-to-face treatment, a requirement that limits the generalizability of the results.

The present meta-analysis has several strengths, such as a consistent outcome across studies regarding efficacy of guided ICBT compared to face-to-face CBT, the relatively high quality of the trials included, little heterogeneity and no indication of publication bias. However, there are also limitations. First, the included studies differed substantially in terms of treatment content, not so much within studies as between ICBT programs. We endorsed a broad definition of CBT, but it would of course have been preferable to have many studies on the same program, as is the case in reviews of cognitive therapy for depression (47). Second, we compared against different formats of face-to-face therapy and it could be argued that group CBT is a suboptimal comparison (48), at least when it comes to patient preferences. Third, we analysed the primary outcome measures in the trials and did not include secondary outcomes. Indeed, the heterogeneity of clinical conditions included can be viewed as a problem on its own, but we cannot at this stage and with very few studies for each condition conclude that guided ICBT and face-to-face therapy are equally effective on all outcomes. For example, there are very few studies on knowledge acquisition following CBT and even fewer on ICBT (49), and this can be something that differs between the therapy formats (in particular in the long run). In addition, patient characteristics have not been taken into account. This is potentially important, since there are studies suggesting that different predictors of outcome (e.g., agoraphobic avoidance) are relevant when comparing face-to-face versus Internet treatment. Fourth, we only included studies on adult samples. However, a study by Spence et al (50) on adolescents is clearly in line with our findings, suggesting equivalence. Finally, we did not analyse long-term effects of the treatments. This is a possible area for future research, as the type of trials included here has the advantage that randomization can be maintained for long time periods.

ICBT has only been around for a short time and is still developing rapidly (51). A recent change is the use of mobile smart phones in treatment, and it is likely that smart phone applications and ICBT will blend in with face-to-face treatment in the near future. Finally, while we performed this review in the form of a study-level meta-analysis, there is an emerging trend to instead conduct patient-level meta-analyses with primary data (52).

In conclusion, guided ICBT has the promise to be an effective, and potentially cost-effective, alternative and complement to face-to-face therapy. More studies are needed before firm conclusions can be drawn, but the findings to date, including this meta-analysis, clearly show that guided ICBT is a treatment for the future.

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