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The impact of guidance on Internet-based mental health interventions — A systematic review

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A B S T R A C T

Introduction: The aim of this study was to systematically review the impact of guidance on the efficacy of Internet-based interventions.
Methods: Included were RCTs with a comparison of (1) guided vs. unguided interventions, (2) different doses of guidance, (3) different qualification levels of e-coaches, and (4) synchronous vs. asynchronous communication mode. Outcomes were symptom severity, completer rates and number of completed intervention modules. A systematic search of MEDLINE, CENTRAL and PsycINFO, PsycARTICLES and Psyndex (search date 4th June 2013) was conducted, as well as a hand search of trial-registers and the reference lists of included articles. Methodological quality was rated using the Cochrane Risk of Bias tool. Relevant study characteristics and outcome data were extracted. Random-effects analyses were conducted if appropriate.
Results: 5328 articles were retrieved of which 14 fulfilled inclusion criteria. Guided interventions were significantly superior to unguided interventions ((symptom severity: *standardized mean difference* (SMD) $= -.27$ [*95% CI*: $-.45$; $-.10$]), n = 8; completed modules: $SMD = .52$ [.37; .67], n = 7; completer rate: $OR = 2.76$ [1.68; 4.53], n = 6). The four trials that examined different levels of e-coach qualification showed no significant differences on either of the outcome measures. Only one trial each examined the remaining two research questions, without significant effects on either of the outcome measures.
Conclusions: Guidance is a beneficial feature of Internet-based interventions, although its effect is smaller than reported before when compared to unguided interventions. The qualification of the e-coaches seems of minor importance. However, methodological limitations need to be considered when interpreting these findings. Overall, the number of studies was small and mainly limited to depression and social phobia restricting the generalizability of the findings.

1. Introduction

Several reviews indicate that Internet-based interventions (IBIs) are efficacious in treating mental disorders (Richards and Richardson, 2012; Lin et al., 2013; Andrews et al., 2010), however, they also report substantial heterogeneity of examined treatment effects across included studies. A review by Richards and Richardson (2012) on the efficacy of Computer-based psychological treatments for depression, for example, highlighted a standardized mean difference (SMD) regarding depressive symptoms of $g = -.56$ in favor of Computer-based interventions compared to treatment as usual or waitlist, with single trial results ranging from -1.42 to 0.03. To dismantle this heterogeneity and to examine the efficacious components of IBIs, research focuses on the mechanisms

underlying the efficacy of IBIs as well as possible predictors of therapeutic success or failure (Andersson et al., 2009; Nordgreen et al., 2012; Richards and Richardson, 2012). One of the core factors discussed in this context is guidance as part of IBIs. There are automated interventions independent of human support (self-guided or unguided interventions, e.g. Christensen et al., 2006) and interventions with some kind of human support (guided interventions, e. g. Nobis et al., 2013). Literature so far suggest that users benefit more from IBIs when guidance is provided (Andersson and Titov, 2014; Richards and Richardson, 2012; Johansson and Andersson, 2012). Beyond the dichotomy of unguided versus guided interventions, the efficacy of IBIs might further vary depending on the quantity (dose–response relationship) and quality of guidance (e.g. qualification of e-coaches providing guidance and communication mode used for guidance). Subgroup analyses conducted in the aforementioned review on depression (Richards and Richardson, 2012), suggested a hierarchy with therapist-supported interventions being most efficacious ($g = .78$), followed by interventions supported by non-clinical staff ($g = .58$) and unguided interventions ($g = .36$).

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Moreover, studies with asynchronously provided support (e.g. email contact; $g = .70$) showed a larger pooled *SMD* than studies with synchronous support (e.g. chat; $g = .28$, Richards and Richardson, 2012).

While these findings are important to better understand the underlying mechanisms of IBIs, they need to be interpreted cautiously given their explorative character comparing results across trials. Confounding variables such as technological developments over time (unguided interventions were more frequently conducted in the early years of Internet intervention research; Richards and Richardson, 2012) might partly explain the aforementioned differences. Titov and colleagues' trials on Internet-based social phobia interventions, for example, indicated that the efficacy of unguided interventions can substantially be increased when adherence facilitating components such as automated prompts are incorporated (Titov et al., 2008, 2009a).

To improve the validity of findings on the impact of guidance, it therefore seems important to focus on trials that experimentally examined the effects of guidance in randomized controlled clinical trials with a direct comparison of the aforementioned variations of guidance (i.e. unguided vs. guided; interventions with different doses of guidance; qualification of e-coaches; asynchronous vs. synchronous). The present systematic review extends the current state of evidence regarding these subjects by investigating the following four research questions:

1. Is there a difference in treatment outcome between guided and unguided interventions?
2. Is there a difference in treatment outcome depending on the dose of guidance?
3. Is there a difference in treatment outcome depending on the qualification of the e-coaches?
4. Is there a difference in treatment outcome between guided interventions with synchronous or asynchronous communication?

2. Material and methods

2.1. Inclusion criteria

Randomized controlled trials were included if they fulfilled the following criteria: 1) adult participants ($\geq$18 years), 2) with a mental disorder according to relevant classification systems (e.g. DSM-V or ICD-10) including subthreshold disorders as well as dimensionally measured mental disturbances of the respective disorder, 3) published in English or German, 4) comparing variations of an IBI with regard to (a) guided vs. unguided interventions, (b) at least two guided interventions with different guidance intensities, (c) at least two guided interventions with different levels of qualification of the e-coaches, or (d) at least two guided interventions using synchronous vs. asynchronous communication modes for guidance. 5) Trials had to report (a) symptom severity at the time of the follow up or (b) adherence to the program as outcomes. Symptom severity was operationalized by using the sum-score of a validated rating scale or self-report questionnaire for assessing the symptoms in question. Adherence was operationalized following Donkin et al. (2011) as a) the mean number of modules completed and b) the percentage of persons that completed the whole treatment.

2.2. Literature search and selection of studies

A systematic database search and additional hand search was conducted (compare PRISMA flow chart Moher et al., 2009, Fig. 1). Search strategies were developed and applied for MEDLINE, PsychINFO, PsychARTICLES and Psyndex (via EBSCO) and CENTRAL (via Wiley Online Library) (search date 4th June 2013) (see Appendix 1). All search strategies linked keyword-based and text-based searches. Hand search was conducted by searching the literature references of the included studies found through database search. We sent emails to the contact authors of included studies requesting further information on possible eligible studies. Additionally, the clinical trial registers ClinicalTrials.gov and the German Clinical Trials Register (drks-neu.uniklinik-freiburg.de) were searched for eligible trials. In a two-step process titles and abstracts were screened for eligibility by one assessor (LR) (screening phase, n = 5328). All studies not excluded in step one were examined in detail on an abstract and full text basis by two assessors (HB, LR; n = 195).

2.3. Data extraction

Two assessors (HB, LR) extracted the following data from the included studies: basic sample characteristics (sample size, sex, age), information on how studies dealt with missing values, mental disorder identification, duration of the treatment in weeks, number of intervention modules and outcome measures. For the relevant trial groups, we extracted sample size, mean values, standard deviations and frequency of the respective outcome measures. Details of the pre- and post-treatment severity outcome data can be found in Appendix 2. Missing values were determined based on the reported data where feasible or requested from the respective primary author of included trials.

In case of multiple assessment instruments used for the assessment of an outcome, the data selection followed a hierarchical selection process favoring rating scales over self-report questionnaires. In case of multiple assessment instruments of the same hierarchical level, we randomly chose one assessment instrument for the meta-analysis, except for trials that compared unguided and guided interventions for social phobia. Here, all three studies (Berger et al., 2011a; Titov et al., 2008, 2009a) measured social phobia symptom severity by means of both the Social Phobia Scale (SPS) (Mattick and Clarke, 1998) and the Social Interaction Anxiety Scale (SIAS) (Mattick and Clarke, 1998). This allowed us to conduct a sensitivity analysis examining the robustness of the results by comparing the pooled standardized mean difference of two assessment instruments used for the same outcome. The SPS was randomly selected for the main analysis, while the sensitivity analysis was based on the SIAS.

2.4. Assessment of methodological quality

The methodological quality of the included studies was assessed using the Cochrane Risk of Bias tool (Higgins and Altman, 2008). It includes the categories "random sequence generation", "allocation concealment", "blinding", "incomplete outcome data", "selective outcome reporting" and "other sources of bias". Blinding was subdivided into "blinding of participants and staff", "blinding of outcome": a) symptom severity, b) completed modules, and c) completer rate. The included studies were ranked on a three-step scale ("low", "unclear" and "high") regarding the risk of possible bias.

2.5. Data analysis

Meta-analyses were conducted using Review Manager 5.2 (The Cochrane Collaboration, 2012). Standardized mean differences (*SMD*) with 95% confidence intervals (*CI*) were computed for all continuous outcomes. For dichotomous variables, odds ratios (*OR*) with *95%-CI* were computed. Random effects meta-analyses were performed to compute overall estimates of treatment outcomes. The effect sizes of the primary studies are presented in forest plots. Heterogeneity was examined with the I^2 statistic (Higgins and Thompson, 2002; Higgins et al., 2003). In the event of considerable heterogeneity ($I^2 > 75\%$), study results were not aggregated in meta-analyses. Following Sterne et al. (2011), publication bias was not examined by using a funnel plot due to the small amount of included studies.

For the comparison of unguided vs. guided interventions, results were analyzed for the three subgroups of trials that examined participant samples with depression (respectively depressive symptoms), social phobia or other mental disorders. For further comparisons subgroup analyses were not feasible due to the low number of primary trials per comparison.
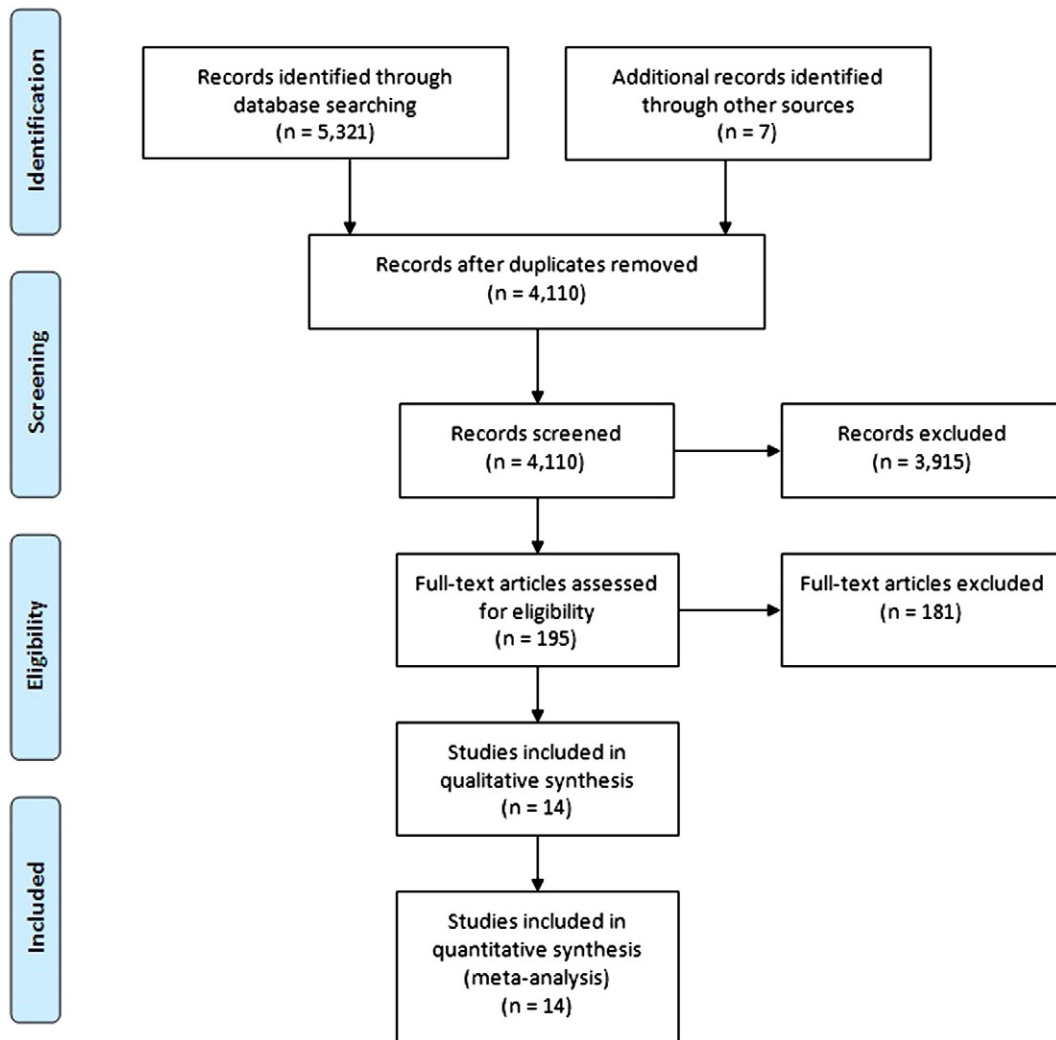
Fig. 1. PRISMA flow chart.

3. Results

Electronic database search revealed 5321 studies (Fig. 1). After screening titles, abstracts and full text papers for inclusion, conducting the reference search, contacting authors of included trials and searching trial registers for eligible studies, 14 studies have been identified as eligible for inclusion (Titov et al., 2008, 2009a,b, 2010; Berger et al., 2011a, b; Farrer et al., 2011; Low et al., 2006; Andersson et al., 2012; Johnston et al., 2011; Robinson et al., 2010; Lancee et al., 2013; Mohr et al., 2013; Klein et al., 2009) (Table 1). Five trials with a research focus similar to the research questions examined in the present review have been excluded after careful consideration due to ineligibility of the control condition (Blankers et al., 2011; Clarke et al., 2005; Pier et al., 2008), guidance form (Boettcher et al., 2012) and assessed outcomes (Simon et al., 2011). Searching trial registers as well as personal information identified seven studies which could be considered as eligible following the information provided on the trial registers. Four of these studies were ongoing (Chung, 2012; Clarke, 2011; Greist and Kobak, 2012; Ebert, 2014). The remaining three studies were registered as completed (Lancee et al., 2013; Mohr et al., 2013; Severson, 2009) and data from two of these studies were available (Lancee et al., 2013; Mohr et al., 2013).

Eight studies compared guided and unguided interventions (Berger et al., 2011a,b; Farrer et al., 2011; Lancee et al., 2013; Low et al., 2006; Mohr et al., 2013; Titov et al., 2008, 2009a), one compared the dose–response-relationship of guidance (Klein et al., 2009), four studies investigated the effects of different e-coach qualifications (Andersson et al., 2012; Johnston et al., 2011; Robinson et al., 2010; Titov et al., 2010) and one study contrasted interventions with asynchronous and synchronous communication mode (Titov et al., 2009b) (Table 1).

3.1. Assessment of methodological quality

Risk of bias regarding random sequence generation was rated as low for all trials, except for Low et al. (2006), who did not report sufficient information to evaluate this aspect (Table 2). Similarly, eight trials did not report sufficient information to evaluate the risk of bias regarding allocation concealment (Lancee et al., 2013; Low et al., 2006; Titov et al., 2008, 2009a,b, 2010; Robinson et al., 2010; Klein et al., 2009). Blinding was subdivided into blinding of participants and staff and blinding of outcomes. As it is the case for most psychological intervention trials, blinding of participants and therapists (e-coaches) was not possible for the comparison of guided versus unguided interventions and communication modes. Blinding of participants regarding the level of e-coach qualification would have been possible and might have taken place. However, the four studies that examined this question did not provide sufficient information to evaluate risk of bias concerning

blinding of participants. While completed modules and completer rates were assessed by objective data (program data such as logins), all trials based their severity assessment on self-reports from unblinded participants, increasing the likelihood of biased results. Statistical analyses of symptom severity were based on the intention-to-treat (ITT) principle in all trials except for one (Low et al., 2006). However, Titov et al. (2008, 2009a,b, 2010), Johnston et al. (2011), and Robinson et al. (2010) based their ITT analyses only on the participants that have started the intervention instead of those who were randomized. Similarly, Farrer et al. (2011) based their ITT analyses only on those randomized participants with available baseline depression scores not judged as outlying scores. Low et al. (2006) provided mainly per-protocol analyses, which might have introduced bias. Regarding selective outcome reporting, result papers of four trials followed an a-priori trial protocol (Andersson et al., 2012; Farrer et al., 2011; Johnston et al., 2011; Mohr et al., 2013), while eight trials did not mention an a-priori trial protocol (Berger et al., 2011a,b; Lancee et al., 2013; Low et al., 2006; Titov et al., 2008, 2009a,b; Klein et al., 2009). The remaining two trials (Titov et al., 2010; Robinson et al., 2010) showed substantial inconsistencies (e.g. different objectives, different outcome measures) between the published trial protocols (Supplementary document of trial result papers) and the trial result papers. Risk of bias was therefore rated as high. Finally, studies showed no other sources of risk of bias, except for the four trials comparing different levels of e-coach qualification (Andersson et al., 2012; Johnston et al., 2011; Robinson et al., 2010; Titov et al., 2010). Results of these trials might be biased due to the possible risk of between-trial arm e-coach contamination, referring to the possibility that e-coaches interchanged with each other.

3.2. Research question 1: comparison of guided and unguided interventions

Eight studies were included in the meta-analysis on between-group treatment differences of unguided and guided interventions (Berger et al., 2011a,b; Farrer et al., 2011; Lancee et al., 2013; Low et al., 2006; Mohr et al., 2013; Titov et al., 2008, 2009a). Standardized mean differences (SMD) for symptom severity ranged from −.66 to .12 (Fig. 2), resulting in a pooled SMD of −.27 [95%-CI: −.45; −.10; n = 8], favoring guided interventions. The magnitude of the difference between guided and unguided interventions thereby (non-significantly) differed

between trials that examined participants with depression (SMD: −.15 [−.46; .16], n = 3) and social phobia (SMD: −.27; [−.59; .05], n = 3). The sensitivity analysis, using the self-report questionnaire SIAS instead of the SPS as outcome measure for three social phobia trials resulted in a (non-significantly) higher SMD of −.39 [−.63; .15], n = 3. In line with these findings, the pooled mean number of completed modules (SMD: .52 [.37; .67], n = 7; Fig. 3) and completer rates (OR: 2.76 [1.68; 4.53], n = 6; Fig. 4) was higher for guided interventions compared to unguided interventions. Statistical heterogeneity of the reported meta-analyses was low to moderate ($I^2 = 0–61\%$).

3.3. Research question 2: dose–response relationship

One study focused on the dose–response-relationship regarding guidance (Klein et al., 2009). The authors compared a group with higher dose of guidance (i.e. at least three email conversations per week) against a lower dose of guidance group (one email contact per week), assuming the first group to be superior. In contrast to this hypothesis, no significant effect was reported on the Panic Disorder Severity Scale (d = .09; 95%-CI: −.46; .64) or any of the other outcomes on symptom severity reported in this trial (Klein et al., 2009). Accordingly, completer rate and mean number of modules completed were comparable between the trial groups (mean number of completed modules: intensive guidance M = 4.18 (SD = 2.40), less intensive guidance M = 3.90 (SD = 2.50), SMD = .11 [−.41; .63]; completer rate: intensive guidance 22/28 (79%), less intensive guidance 21/29 (72%), OR = 1.40 [.41; 4.71]).

3.4. Research question 3: qualification of e-coaches

Four trials examined the effect of e-coach qualification by comparing two guided interventions with differently qualified guides (Andersson et al., 2012; Titov et al., 2010; Johnston et al., 2011; Robinson et al., 2010). Andersson et al. (2012) compared clinical psychology student guides with licensed clinical psychologists with at least two years of professional experience. Johnston et al. (2011) compared guidance by an experienced clinician who had completed specialist post-graduate training in clinical psychology with guidance by a psychologist without this special post-graduate training. Robinson et al. (2010), as well as

Table 1
Main characteristics of included trials.

Study	n_{IG1} (% female)	n_{IG2} (% female)	Age_{IG1} (M; SD)	Age_{IG2} (M; SD)	Guidance	Modules	Disorder	Severity measure[a]
Guidance	Guided	Unguided	Guided	Unguided				
Berger et al. (2011a)	27 (48.1)	27 (55.6)	36.9 (11.6)	37.3 (11.1)	Email	5	Social phobia	SPS, SIAS, (LSAS-SR)
Berger et al. (2011b)	25 (68.0)	25 (72.0)	38.2 (15.1)	38.6 (14.2)	Email	10	Depression	BDI-II
Farrer et al. (2011)	45 (82.0)	38 (86.0)	41.7 (12.1)	37.5 (12.0)	Phone	5	Depression	CES-D
Lancee et al. (2013)	129 (76.7)	133 (73.7)	49.3 (13.2)	47.4 (11.8)	Email	8	Insomnia	ISI
Low et al. (2006)	14 (100.0)	19 (100.0)	n.s.	n.s.	Forum	8	Eating disorders	WSC (EDI)
Mohr et al. (2013)	34 (73.5)	35 (71.4)	47.6 (12.4)	48.9 (14.6)	Phone	18	Depression	PHQ-9
Titov et al. (2008)	31 (54.8)	30 (76.7)	39.7 (9.5)	36.9 (10.8)	Email/Forum	6	Social phobia	SPS, SIAS
Titov et al. (2009a)	84 (n.s.)	84 (n.s.)	n.s.	n.s.	Phone	6	Social phobia	SPS, SIAS
Dose–response	Higher dose	Lower dose	Higher dose	Lower dose				
Klein et al. (2009)	28 (82.1)	29 (82.8)	39.2 (10.7)	39.8 (10.8)	Email	6	Panic disorder	PDSS (ASP, DASS, ACQ)
Qualification	Higher	Lower	Higher	Lower				
Andersson et al. (2012)	42 (n.s.)	60 (n.s.)	n.s.	n.s.	Email	9	Social phobia	LSAS-SRS (SPS, SIAS, SPSQ)
Johnston et al. (2011)	47 (n.s.)	46 (n.s.)	n.s.	n.s.	Email/phone	8	Anxiety disorders	GAD-7 (DASS-21, PSWQ, SIAS-6, SPS-6, PDSS)
Robinson et al. (2010)	51 (n.s.)	50 (62.0)	n.s	44.2 (12.4)	Email/phone/forum	6	GAD	GAD-7
Titov et al. (2010)	49 (n.s.)	47 (n.s.)	n.s	n.s.	Email/phone/forum	6	Depression	BDI-II (PHQ-9)
Communication mode	Synchrony	Asynchrony	Synchrony	Asynchrony				
Titov et al. (2009b)	43 (n.s.)	42 (n.s.)	n.s.	n.s.	Phone vs. forum	6	Social phobia	SPS, SIAS

BDI-II = Beck Depression Inventory-II; CES-D = Center for Epidemiological Studies Depression Scale; GAD = general anxiety disorder; GAD-7 = Generalized Anxiety Disorder 7-Item Scale; ISI = Insomnia Severity Index; LSAS-SR = Liebowitz Social Anxiety Scale; n.s. = not specified; PDSS = Panic Disorder Severity Scale; PHQ-9 = Patient Health Questionnaire 9-item scale; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; WSC = Weight and Shape Concerns Scale.
[a] Severity measures not chosen for statistical analysis reported in brackets.

Table 2
Risk-of-bias of included trials.

	Random sequence generation	Allocation concealment	Blinding of participant and staff	Blinding of outcome			Incomplete outcome data	Selective outcome reporting	Other
				Symptom severity	Completed modules	Completer rate			
Guided vs. unguided									
Berger et al. (2011a)	Low	Low	High[a]	High[b]	Low	Low	Low	Unclear[c]	Low
Berger et al. (2011b)	Low	Low	High[a]	High[b]	Low	Low	Low	Unclear[c]	Low
Farrer et al. (2011)	Low	Low	High[a]	High[b]	Low	Low	High[d]	Low	Low
Lancee et al. (2013)	Low	Unclear[e]	High[a]	High[b]	Low	Low	Low	Unclear[c]	Low
Low et al. (2006)	Unclear[f]	Unclear[e]	High[a]	High[b]	Low	Low	High[g]	Unclear[c]	Low
Mohr et al. (2013)	Low	Low	High[a]	High[b]	Low	Low	Low	Low	Low
Titov et al. (2008)	Low	Unclear[e]	High[a]	High[b]	Low	Low	High[d]	Unclear[c]	Low
Titov et al. (2009a)	Low	Unclear[e]	High[a]	High[b]	Low	Low	High[d]	Unclear[c]	Low
Dose–response									
Klein et al. (2009)	Low	Unclear[e]	High[a]	High[b]	Low	Low	Low	Unclear[c]	Low
Qualification									
Andersson et al. (2012)	Low	Low	Unclear[h]	High[b]	Low	Low	Low	Low	Unclear[i]
Johnston et al. (2011)	Low	Low	Unclear[h]	High[b]	Low	Low	High[d]	Low	High[j]
Robinson et al. (2010)	Low	Unclear[e]	Unclear[h]	High[b]	Low	Low	High[d]	High[k]	High[j]
Titov et al. (2010)	Low	Unclear[e]	Unclear[h]	High[b]	Low	Low	High[d]	High[k]	High[j]
Communication mode									
Titov et al. (2009b)	Low	Unclear[e]	High[a]	High[b]	Low	Low	High[d]	Unclear[c]	Low

[a] Blinding of participants and therapist/personnel not possible.
[b] Based on self-reports of unblinded participants.
[c] No a-priori study protocol mentioned.
[d] Intention-to-treat analysis only on participants having started intervention or provided baseline depression scores.
[e] Allocation concealment not sufficiently specified.
[f] Random sequence generation not sufficiently specified.
[g] Per-protocol analysis.
[h] Blinding of participants regarding e-coach qualification not specified.
[i] Measures against between trial arm e-coach contamination not specified.
[j] Risk of e-coach contamination (e-coaches from the same research unit with the same supervisor).
[k] Inconsistencies between protocol and trial result paper.

Titov et al. (2010), compared guidance from a qualified clinical psychologist (Johnston et al., 2011) respectively qualified psychiatrist (Titov et al., 2010) with guidance provided by an administration employee without clinical experience.

Standardized mean differences for symptom severity ranged from −.11 to .26 (Fig. 5), resulting in a non-significant pooled *SMD* of −.01 [*95%-CI*: −.21; .19], n = 4. In line with this finding, the pooled mean number of completed modules (*SMD*: −.15 [−.36; .05], n = 4; Fig. 6) and completer rates (*OR*: .85 [.54; 1.35], n = 4; Fig. 7) did not differ between the intervention groups. Statistical heterogeneity of the reported meta-analyses was low ($I^2 = 0\%$).

3.5. Research question 4: communication mode

One trial compared two interventions providing guidance by means of a synchronous and asynchronous communication mode (Titov et al., 2009b). The one intervention group obtained weekly encouraging telephone calls from an administration employee without offering clinical advice, while the other group obtained guidance from a clinician by means of an Internet forum (read and responded three times a week). The authors presumed equivalence of both communication modes. Consistently, no significant difference between the groups was found with regard to symptom severity (SPS: $d = .16$ [*95%-CI*: −.27; .60]; SIAS: $d = −.18$ [−.61; .25]), number of completed modules (phone: $M = 5.58$ ($SD = 1.03$); forum: $M = 5.62$ ($SD = .96$), $d = −.04$ [−.47; .39] and completer rates (phone: 34/43 (79%); forum: 31/39 (79%); $OR = .97$ [.33; 2.84])).

4. Discussion

The present study systematically summarized the current state of research on the role of guidance in Internet-based interventions

(IBIs), thereby highlighting the superiority of guided interventions over unguided interventions. The evidence further suggests that the qualification of those providing guidance might be of minor importance. Methodological limitations of the primary trials, however, restrict the level of evidence regarding the latter conclusion. With regard to both remaining questions, the dose–response relationship of guidance and the effect of synchronous vs. asynchronous communication, only one trial each has been found, underscoring the still limited knowledge on the specific effects of guidance on the efficacy of IBIs.

Our finding on guided interventions being more efficacious than unguided interventions is in line with the results of former systematic reviews (Richards and Richardson, 2012; Johansson and Andersson, 2012). However, the extent of the effect size ($SMD = −.27$) is considerably lower than that reported by e.g. Richards and Richardson (2012) on Computer-based depression interventions ($d_{guided} = −.78$ vs. $d_{unguided} = −.36$; $d_{g-u} = −.42$). The gap becomes even more pronounced when focusing only on the depression trials in the present review too ($SMD = −.15$). The different effect sizes across reviews might partly be due to the various assessment instruments used to examine depression with their focus on varying aspects of depression and their different sensitivities to change. Our sensitivity analysis on the effects of using the SIAS instead of the SPS as severity measure for social phobia highlights the variability of effect sizes ($SMDs$ −.39 vs. −.27) that results from using different severity measures as basis for meta-analyses. Both instruments have been developed to assess symptoms of social anxiety. However, whereas the SIAS focuses on anxiousness in situations that require social interactions, the SPS examines situations in which one's own actions might be evaluated by others (Mattick and Clarke, 1998). Given that guidance entails social interaction, it is possible that social anxiety assessed through the SIAS is more affected by being guided than when assessed through the SPS. Moreover, the SIAS
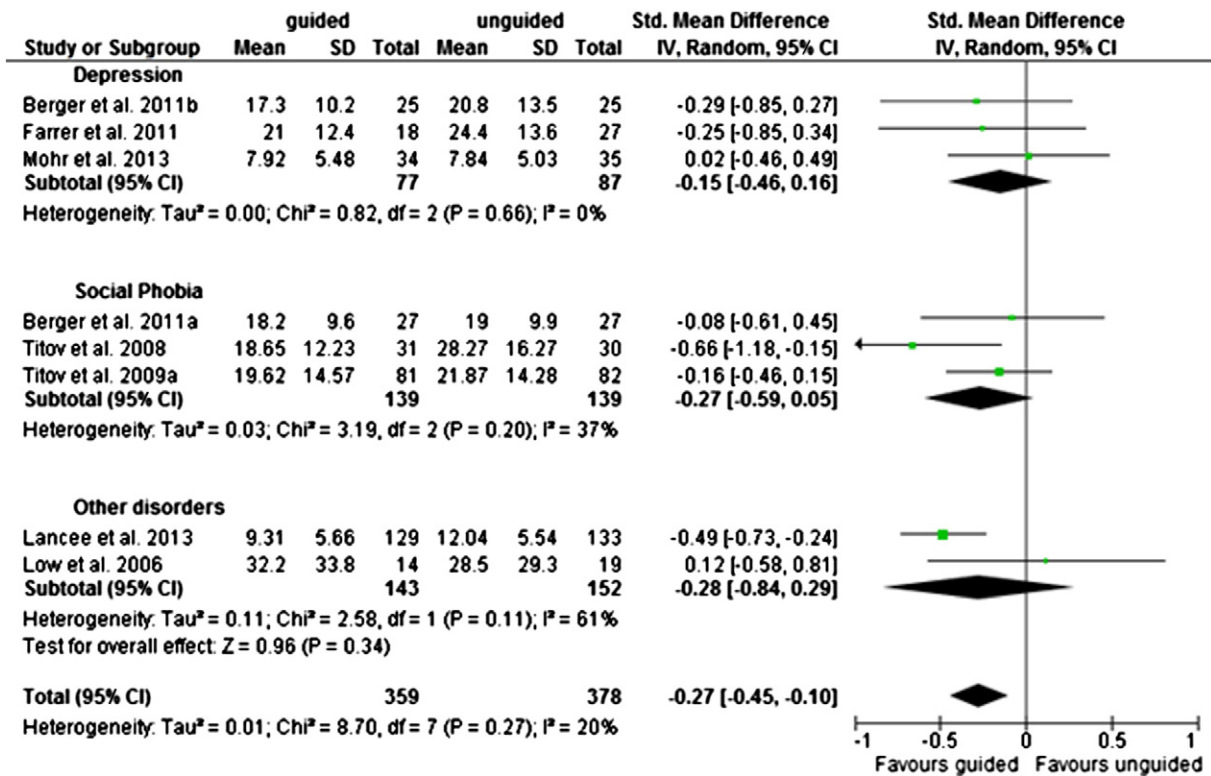
	guided			unguided			Std. Mean Difference	Std. Mean Difference
Study or Subgroup	**Mean**	**SD**	**Total**	**Mean**	**SD**	**Total**	**IV, Random, 95% CI**	**IV, Random, 95% CI**
Depression								
Berger et al. 2011b	17.3	10.2	25	20.8	13.5	25	-0.29 [-0.85, 0.27]	
Farrer et al. 2011	21	12.4	18	24.4	13.6	27	-0.25 [-0.85, 0.34]	
Mohr et al. 2013	7.92	5.48	34	7.84	5.03	35	0.02 [-0.46, 0.49]	
Subtotal (95% CI)			77			87	-0.15 [-0.46, 0.16]	
Heterogeneity: Tau² = 0.00; Chi² = 0.82, df = 2 (P = 0.66); I² = 0%								
Social Phobia								
Berger et al. 2011a	18.2	9.6	27	19	9.9	27	-0.08 [-0.61, 0.45]	
Titov et al. 2008	18.65	12.23	31	28.27	16.27	30	-0.66 [-1.18, -0.15]	
Titov et al. 2009a	19.62	14.57	81	21.87	14.28	82	-0.16 [-0.46, 0.15]	
Subtotal (95% CI)			139			139	-0.27 [-0.59, 0.05]	
Heterogeneity: Tau² = 0.03; Chi² = 3.19, df = 2 (P = 0.20); I² = 37%								
Other disorders								
Lancee et al. 2013	9.31	5.66	129	12.04	5.54	133	-0.49 [-0.73, -0.24]	
Low et al. 2006	32.2	33.8	14	28.5	29.3	19	0.12 [-0.58, 0.81]	
Subtotal (95% CI)			143			152	-0.28 [-0.84, 0.29]	
Heterogeneity: Tau² = 0.11; Chi² = 2.58, df = 1 (P = 0.11); I² = 61%								
Test for overall effect: Z = 0.96 (P = 0.34)								
Total (95% CI)			359			378	-0.27 [-0.45, -0.10]	
Heterogeneity: Tau² = 0.01; Chi² = 8.70, df = 7 (P = 0.27); I² = 20%								

Favours guided   Favours unguided

Fig. 2. Comparison guided vs. unguided — symptom severity.

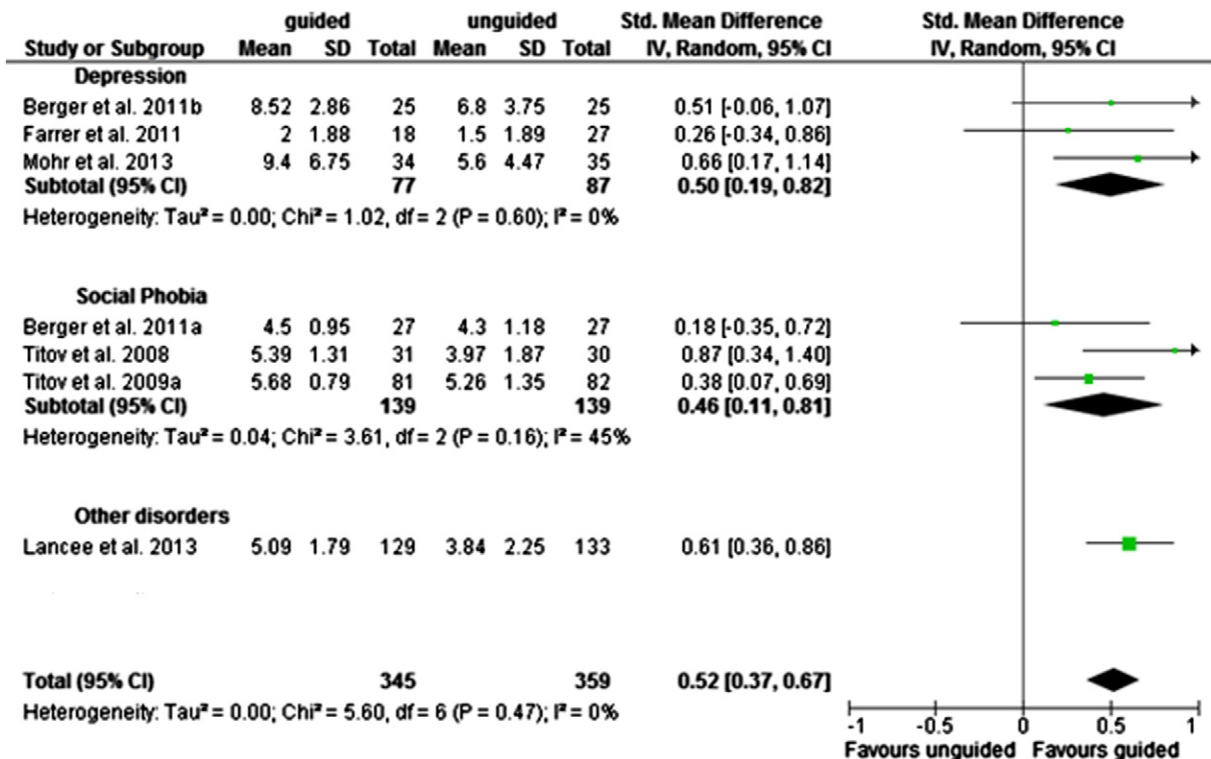|	guided			unguided			Std. Mean Difference	Std. Mean Difference
Study or Subgroup	**Mean**	**SD**	**Total**	**Mean**	**SD**	**Total**	**IV, Random, 95% CI**	**IV, Random, 95% CI**
Depression								
Berger et al. 2011b	8.52	2.86	25	6.8	3.75	25	0.51 [-0.06, 1.07]	
Farrer et al. 2011	2	1.88	18	1.5	1.89	27	0.26 [-0.34, 0.86]	
Mohr et al. 2013	9.4	6.75	34	5.6	4.47	35	0.66 [0.17, 1.14]	
Subtotal (95% CI)			77			87	0.50 [0.19, 0.82]	
Heterogeneity: Tau² = 0.00; Chi² = 1.02, df = 2 (P = 0.60); I² = 0%								
Social Phobia								
Berger et al. 2011a	4.5	0.95	27	4.3	1.18	27	0.18 [-0.35, 0.72]	
Titov et al. 2008	5.39	1.31	31	3.97	1.87	30	0.87 [0.34, 1.40]	
Titov et al. 2009a	5.68	0.79	81	5.26	1.35	82	0.38 [0.07, 0.69]	
Subtotal (95% CI)			139			139	0.46 [0.11, 0.81]	
Heterogeneity: Tau² = 0.04; Chi² = 3.61, df = 2 (P = 0.16); I² = 45%								
Other disorders								
Lancee et al. 2013	5.09	1.79	129	3.84	2.25	133	0.61 [0.36, 0.86]	
Total (95% CI)			345			359	0.52 [0.37, 0.67]	
Heterogeneity: Tau² = 0.00; Chi² = 5.60, df = 6 (P = 0.47); I² = 0%								

Favours unguided   Favours guided

Fig. 3. Comparison guided vs. unguided — completed modules.
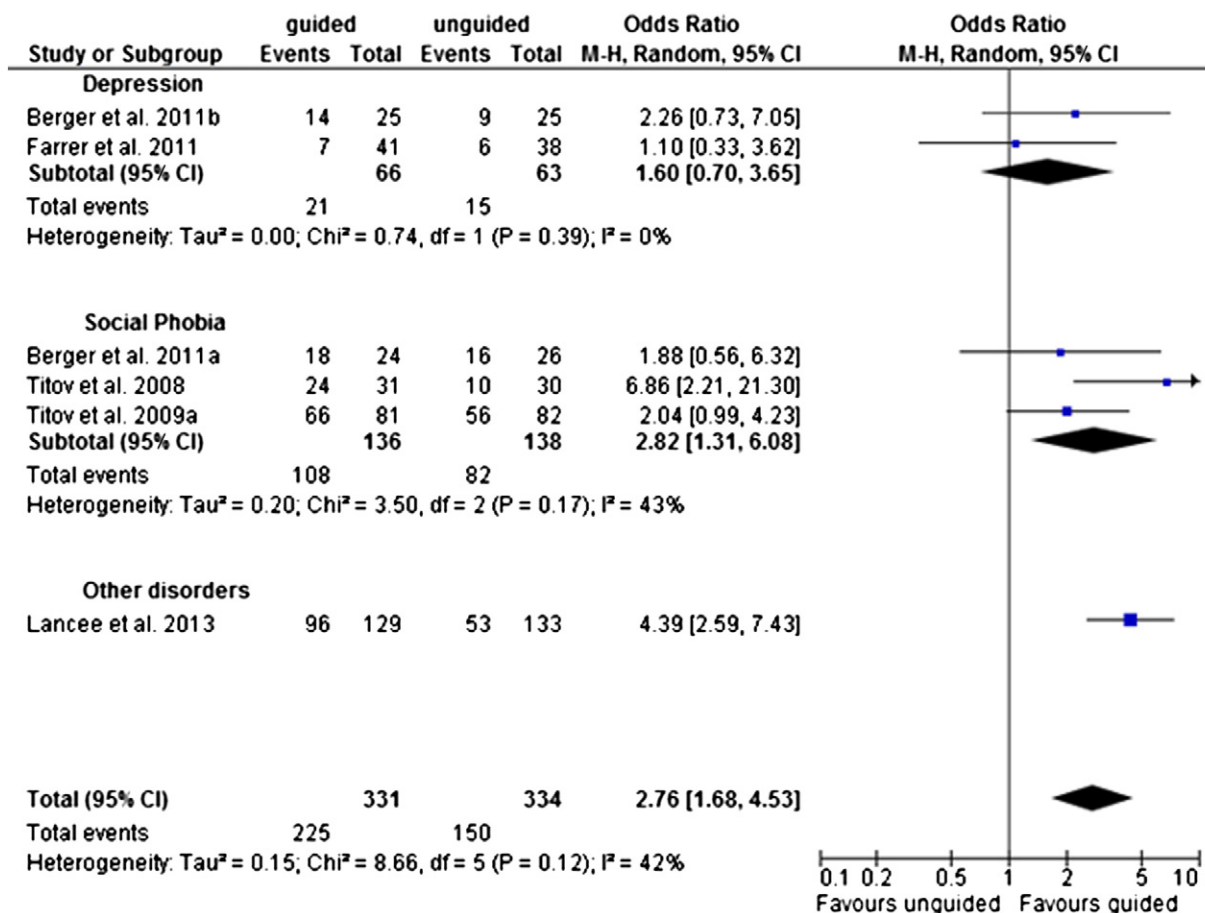
Fig. 4. Comparison guided vs. unguided — completer rate.

and the SPS might be differently sensitive to change, which could explain the different effect sizes from a methodological point of view.

The lower effect sizes found in the present review might also indicate that important confounding variables need to be considered when comparing effect sizes of guided and unguided interventions across trials as conducted in previous systematic reviews (Richards and Richardson, 2012; Johansson and Andersson, 2012), instead of experimentally comparing guided and unguided interventions as conducted in the trials of the present review. As illustrated by the results on completed modules and completer rates, the larger effect sizes found in guided interventions might result from increased intervention adherence in case of guided interventions. Guidance is, however, not the only adherence facilitating measure (Christensen et al., 2009; Donkin et al., 2011; Andersson et al., 2009; Brouwer et al., 2009; Baumeister et al., 2014, online first) and a comparison across trials might overlook other important differences between the compared

interventions, such as differences with regard to automated email and text-message prompts, Web-design and interactive tasks. In this context, it would be interesting to know whether guidance has a specific effect beyond facilitating intervention adherence and whether an incremental adherence facilitating effect would remain after optimizing the aforementioned intervention components known to facilitate adherence as well. Andersson and Titov (2014) suggest that the possibilities to make a diagnosis, to tailor the intervention and to actively assist patients to access other needed services are further advantages of guided interventions which might contribute to their efficacy. However, beyond expert opinions there is little evidence yet on the mechanisms for the incremental effects of guidance in IBIs and dismantling studies are need to better understand the underlying process.

Given that guidance is superior over non-guidance, the question on the best quantity and quality of guidance arises, as examined in the present review for the dose–response relationship (quantity of
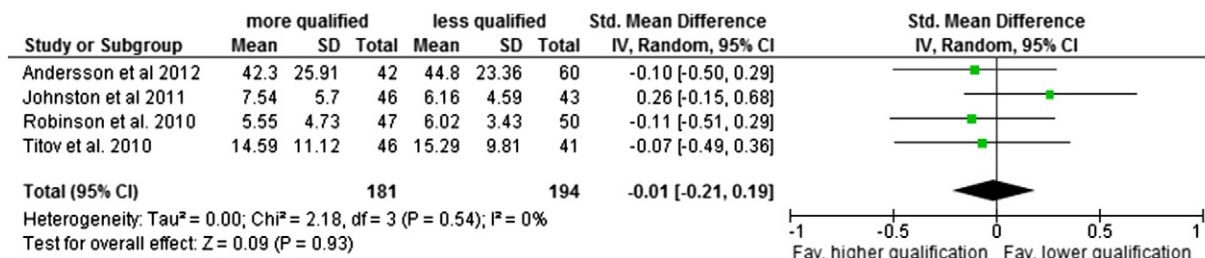

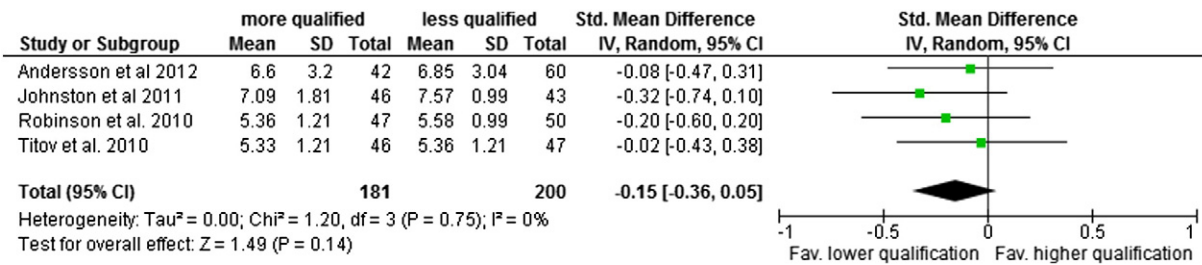**Fig. 5.** Comparison lower vs. higher qualification — symptom severity.

Study or Subgroup	more qualified			less qualified			Std. Mean Difference	Std. Mean Difference
	Mean	SD	Total	Mean	SD	Total	IV, Random, 95% CI	IV, Random, 95% CI
Andersson et al 2012	6.6	3.2	42	6.85	3.04	60	-0.08 [-0.47, 0.31]	
Johnston et al 2011	7.09	1.81	46	7.57	0.99	43	-0.32 [-0.74, 0.10]	
Robinson et al. 2010	5.36	1.21	47	5.58	0.99	50	-0.20 [-0.60, 0.20]	
Titov et al. 2010	5.33	1.21	46	5.36	1.21	47	-0.02 [-0.43, 0.38]	
Total (95% CI)			181			200	-0.15 [-0.36, 0.05]	

Heterogeneity: Tau² = 0.00; Chi² = 1.20, df = 3 (P = 0.75); I² = 0%
Test for overall effect: Z = 1.49 (P = 0.14)

Fav. lower qualification   Fav. higher qualification

Fig. 6. Comparison lower vs. higher qualification — completed modules.

guidance) as well as the qualification of the e-coaches and the communication mode used (quality of guidance).

With regard to the dose–response relationship between guidance and outcome, our review focused on guidance time spent per intervention as the most common guidance intensity outcome, with no significant differences between the examined guidance levels in the only trial that examined this question experimentally (Klein et al., 2009). Thus, the hypothesis claimed by Titov (2011) in a narrative review on Internet-based depression interventions stating that increasing the dose is beneficial to a certain threshold (probably somewhere between 30 and 180 minute guidance per intervention), beyond which no further gain can be expected from a higher dose, remains unanswered.

Similar to pharmacological intervention, however, we should also ask when and how much of a dose we should apply. Usually, guidance follows the logic of the intervention providing guidance e.g. at the end of each module, with varying (non-evidence based) doses of guidance across trials. In this context, little is known as to whether a linear dosing scheme of guidance over the course of the intervention is the best practice in terms of efficacy and cost-effectiveness. One alternative approach might be spending more guidance at the beginning and transforming guidance to self-management over the course of the intervention. Providing guidance only each second or third module might also be sufficient, which would reduce time spent per intervention. Guidance on demand is another promising, user preference oriented approach which helps to reduce guidance time specifically in those cases where guidance is not desired by users (Berger et al., 2011a).

With regard to the quality of guidance, several quality indicators are conceivable. In our review, we focused on the most often examined quality aspect, the qualification of the e-coaches as well as the communication mode in terms of synchronous vs. asynchronous guidance. Content of guidance and guidance protocol adherence are other factors which might substantially impact the efficacy of IBIs (Andersson and Titov, 2014; Paxling et al., 2013). One of the most startling findings at first glance is that the level of qualification had no impact on treatment efficacy in all four included trials. Administrative staff performed as

successful as clinical staff and less experienced clinicians as successful as more experienced clinicians. These results need to be interpreted very carefully as the trials are from only two research groups and show substantial risk of bias. The main limitation thereby is the risk of e-coach contamination, i.e. the possible risk that e-coaches interacted with and learned from each other, given the close proximity of the e-coaches working partly in the same research unit and getting supervision from the same supervisor.

At a second glance, the null findings regarding qualification are less astonishing. Being less qualified could have been counter balanced by a higher motivation and more preparation time spent on each patient. Moreover and different from face-to-face psychotherapy, IBIs are often highly standardized interventions with guidance focusing almost exclusively on practical and supportive aspects instead of being therapeutically oriented (Andersson and Titov, 2014). Hence, e-coach qualification might be less important in an Internet-based than in a face-to-face intervention setting. This conclusion seems at least true for IBIs developed, provided and supervised by a research unit, while we should be cautious with translating this finding to guidance provided by a non-supervised, non-clinical staff member in a real world health care setting. Another hypothesis that would explain the present null findings is that the skills that need to be trained are different from those in conventional therapies. In this case, training e-coaches would be an important effect moderating factor and specific skills would need to be established by research in order to improve the qualification and the effectiveness of e-coaches.

With regard to all other guidance quality indicators, the evidence base is scarce as shown in the present review for communication mode. Accordingly, further dismantling studies are needed to establish the best way of providing guidance. Thereby, the focus should be on both efficacy and cost-effectiveness when examining the different aspects of guidance.

When interpreting the results, some inherent methodological limitations of studies examining guided and unguided IBIs as well as the specific limitations of the included trials as summarized in Table 2
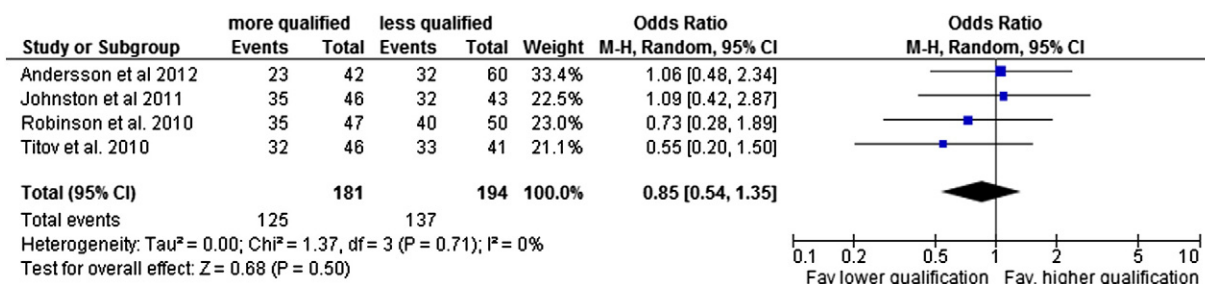
Study or Subgroup	more qualified		less qualified			Odds Ratio	Odds Ratio
	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	M-H, Random, 95% CI
Andersson et al 2012	23	42	32	60	33.4%	1.06 [0.48, 2.34]	
Johnston et al 2011	35	46	32	43	22.5%	1.09 [0.42, 2.87]	
Robinson et al. 2010	35	47	40	50	23.0%	0.73 [0.28, 1.89]	
Titov et al. 2010	32	46	33	41	21.1%	0.55 [0.20, 1.50]	
Total (95% CI)		181		194	100.0%	0.85 [0.54, 1.35]	
Total events	125		137				

Heterogeneity: Tau² = 0.00; Chi² = 1.37, df = 3 (P = 0.71); I² = 0%
Test for overall effect: Z = 0.68 (P = 0.50)

Fav lower qualification   Fav higher qualification

Fig. 7. Comparison lower vs. higher qualification — completer rate.

need to be considered, as methodological shortcomings of the primary studies can have a substantial impact on the review results. First, unguided interventions in a research context regularly comprise some contact with the study team to clarify eligibility, validate diagnoses or remind participants to undertake the research follow-up assessment. As a side effect of these research efforts, participants' intervention adherence might be facilitated, thus already using the mechanism of action of guidance to some degree. Hence, the effects of unguided interventions might be lower in clinical mental health care settings than in the present clinical trials. Second, as an inherent methodological limitation of most psychological intervention trials (Baumeister et al., 2011, 2012), blinding of participants and e-coaches is not possible, introducing risk of bias. Third, given that participants were not blind to their allocation, severity outcome assessment should (ideally) have been conducted by external assessors blinded to allocation and time of assessment (baseline, follow-up) to avoid systematic tendencies in answers (e.g. socially desirable response patterns). Fourth, most of the included trials were rather small and did not refer to an a-priori published protocol. Despite these limitations, however, reporting of the trials was on a high level, arguing for the overall methodological soundness of the included trials.

Some limitations of the present review need to be considered as well. In order to provide a broad overview on the impact of guidance on mental disorders, we included studies on a variety of mental disorders, which might have leveled out disorder-specific effects of guidance. Due to the number of trials available, subgroup analyses were only possible for depression and social phobia with regard to the comparison of guided and unguided interventions. Thus, results for mental disorders other than depression and social phobia might differ from what has been reported in the present review. The limited number of primary trials also limits the overall power of our meta-analyses. Hence, with new trials being conducted the present review should be updated to further increase the evidence on the impact of guidance. Due to restricting our literature search to English and German language articles, we might have missed trials eligible for inclusion. Similarly, we might have missed trials eligible for inclusion due to our search strategy with a first screening step conducted by only one assessor. However, contacting the authors of the included trials, who at the same time are leading experts in the field of IBIs, did not result in any additional study, arguing for a comprehensive overview on the topic. Finally, this systematic review is not based on a prospectively published protocol, diminishing the possibility to control for reviewer introduced bias (e.g. confirmation bias).

5. Conclusion

Guidance is an important feature of IBIs increasing their efficacy, however, to a lower degree than suggested before (Richards and Richardson, 2012; Johansson and Andersson, 2012). Still, given its superiority over unguided interventions, guidance should be an inherent part of IBIs whenever feasible and affordable. In this context, cost-effectiveness trials should inform us on the incremental cost-effectiveness ratio of guided and unguided interventions taking direct and indirect follow-up costs into account. Accordingly, an update of the present review should include cost-effectiveness as an outcome as well. Further outcomes of interest that have been beyond the scope of the present review are patient satisfaction as well as detection and handling of adverse events.

One of the most likely reasons for implementing unguided interventions, notwithstanding the higher efficacy of guided interventions, is their lower initial costs against the background of restricted resources of most health care systems. This might especially apply to very frequent subthreshold to mild disorders, where scaling-up of IBIs on a national level would result in substantially increased initial costs in case of providing guidance. Additionally, unguided interventions might play an important role in the increasing field of prevention of mental disorders.

Policymakers, however, should be aware, that a focus on minimizing initial costs might impede cost savings in the long term due to reduced health care utilization and work incapacity days following a more successful intervention.

Conflicts of interest

None.

Acknowledgments

Appendix 1. Search strategy for systematic database search

#	Medline, PsycINFO, PsycARTICLES und Psyndex	CENTRAL
	Search terms	Search terms
1	web*	web*
2	internet*	internet*
3	DE "Internet"	MeSH descriptor: [Internet] explode all trees
4	Online	Online
5	S1 OR S2 OR S3 OR S4	#1 OR #2 OR #3 OR #4
6	DE "Psychotherapy"	psychotherap*
7	psychotherap*	"cognitive therap*"
8	"cognitive therap*"	"cognitive behav*"
9	"cognitive behav*"	MeSH descriptor: [Psychotherapy] explode all trees and with qualifiers: [Methods — MT]
10	S6 OR S7 OR S8 OR S9	#6 OR #7 OR #8 OR #9
11	S5 AND S10	#5 AND #10
12	DE "Online Therapy"	MeSH descriptor: [Therapy, Computer-Assisted] this term only and with qualifiers: [Methods — MT]
13	DE "Telemedicine"	MeSH descriptor: [Remote Consultation] explode all trees and with qualifiers: [Methods — MT]
14	DE "Computer Assisted Therapy"	MeSH descriptor: [Telemedicine] this term only and with qualifiers: [Methods — MT]
15	S12 OR S13 OR S14	#12 OR #13 OR #14
16	S11 OR S15	#11 OR #15
17	AB randomized	
18	AB placebo	
19	AB randomly	
20	AB trial	
21	AB groups	
22	randomized controlled trial	
23	controlled clinical trial	
24	random*	
25	"randomized controlled trial"	
26	"controlled clinical trial"	
27	controll*	
28	S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27	
29	DE "Treatment Outcomes" OR DE "Psychotherapeutic Outcomes"	
30	DE "Clinical Trials"	
31	S29 OR S30	
32	S28 OR S31	
33	S16 AND S32	

Appendix 2. Pre- and post-intervention severity scores of included trials

Study	Disorder	Severity measure	Pre (MD; SD)	Post (MD; SD)	Pre (MD; SD)	Post (MD; SD)	Baseline imbalance[1]
Guidance			Guided	Guided	Unguided	Unguided	
Berger et al. (2011a)	Social phobia	SPS	34.5 (13.0)	18.2 (9.6)	35.2 (13.4)	19.0 (9.9)	No
Berger et al. (2011b)	Depression	BDI-II	28.8 (8.2)	17.3 (10.2)	29.8 (8.6)	20.8 (13.5)	No
Farrer et al. (2011)	Depression	CES-D	34.9 (10.1)	21.0 (12.4)	35.0 (10.8)	24.4 (13.6)	No
Lancee et al. (2013)	Insomnia	ISI	16.95 (4.10)	9.31 (5.66)	17.32 (4.11)	12.04 (5.54)	No
Low et al. (2006)	Eating disorders	WSC	33.8 (22.4)	32.2 (33.8)	29.5 (16.6)	28.5 (29.3)	No
Mohr et al. (2013)	Depression	PHQ-9	15.71 (4.78)	7.92 (5.48)	15.51 (4.79)	7.84 (5.03)	No
Titov et al. (2008)	Social phobia	SPS	34.71 (15.04)	18.65 (12.23)	32.87 (17.02)	28.27 (16.27)	No
Titov et al. (2009a)	Social phobia	SPS	34.27 (18.18)	19.62 (14.57)	33.16 (16.75)	21.87 (14.28)	No
Dose–response			Higher dose	Higher dose	Lower dose	Lower dose	
Klein et al. (2009)	Panic disorder	PDSS	14.96 (4.80)	11.13 (6.21)	14.14 (5.19)	10.60 (5.39)	No
Qualification			Higher	Higher	Lower	Lower	
Andersson et al. (2012)	Social phobia	LSAS-SR	67.95 (26.47)	42.30 (25.91)	68.42 (21.10)	44.80 (23.36)	No
Johnston et al. (2011)	Anxiety disorders	GAD-7	11.63 (5.96)	7.54 (5.70)	11.28 (5.18)	6.16 (4.59)	No
Robinson et al. (2010)	GAD	GAD-7	12.45 (4.14)	5.55 (4.73)	11.90 (3.38)	6.02 (3.43)	No
Titov et al. (2010)	Depression	BDI-II	28.96 (11.51)	14.59 (11.12)	27.15 (9.96)	15.29 (9.81)	No
Communication mode			Synchrony	Synchrony	Asynchrony	Asynchrony	
Titov et al. (2009b)	Social phobia	SPS	35.70 (13.24)	20.88 (12.61)	35.74 (10.15)	18.82 (12.14)	No

BDI-II = Beck Depression Inventory-II; CES-D = Center for Epidemiological Studies Depression Scale; GAD = general anxiety disorder; GAD-7 = Generalized Anxiety Disorder 7-Item Scale; ISI = Insomnia Severity Index; LSAS-SR = Liebowitz Social Anxiety Scale; PDSS = Panic Disorder Severity Scale; PHQ-9 = Patient Health Questionnaire 9-Item Scale; SPS = Social Phobia Scale; WSC = Weight and Shape Concerns Scale.
[1]Baseline imbalance = significant between trial arm differences at baseline regarding the respective severity measure (yes/no/no reported).

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