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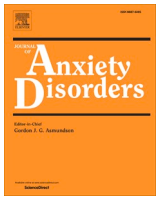

Review

Remote cognitive behaviour therapy for social anxiety disorder: A meta-analysis

Halaina R. Winter [a], Alice R. Norton [a,b], Jade L. Burley [a], Bethany M. Wootton [a,*]

[a] Discipline of Clinical Psychology, Graduate School of Health, University of Technology Sydney, Ultimo, NSW 2007, Australia
[b] Clinical Psychology Unit, School of Psychology, The University of Sydney, Camperdown, NSW 2006, Australia

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ABSTRACT

Remote cognitive behaviour therapy (CBT) for social anxiety disorder (SAD) has the potential to improve access to treatment by reducing economic, geographic, and psychological barriers. The aim of this study was to use a meta-analytic approach to examine the efficacy of the different remote CBT methods for treating SAD. A systematic electronic database search was used to identify 31 studies (n = 2905; mean age range: 24.73–41.65 years; mean female representation = 60.2 %). Pooled within-group analyses indicated large effect sizes from pre-treatment to post-treatment (Hedges' g = 1.06; 95 % CI: 0.96–1.16) and pre-treatment to follow up (g = 1.18; 95 % CI: 1.03–1.33) for remote CBT. Internet-delivered CBT (g = 1.08; 95 % CI: 0.98–1.19) and application-delivered CBT (g = 1.19; 95 % CI: 0.75–1.64) produced large within-group effect sizes. Bibliotherapy-delivered CBT (g = 0.79; 95 % CI: 0.45–1.13) produced medium within-group effect sizes. Pooled between-group findings indicate that remote CBT treatments were more effective than passive control (g = 0.87; 95 % CI: 0.70–1.03) and non-CBT remote treatments (g = 0.41; 95 % CI: 0.17–0.66), and were at least as effective, or slightly more effective, than face-to-face CBT treatments (g = 0.34; 95 % CI: 0.14–0.54). These findings have important implications for the dissemination of remote and stepped-care treatments for SAD.

1. Introduction

Social anxiety disorder (SAD) is characterised by a fear of social or performance situations, which are consequently avoided or endured with intense distress (American Psychiatric Association, 2013). SAD is a common anxiety disorder with an estimated lifetime prevalence of 4 % and a 12-month prevalence of 2.4 % (Stein et al., 2017). The median age of onset is 13 years (Andrews et al., 2018) and 80 % of SAD cases will manifest by 20 years of age (Stein & Stein, 2008). Despite the high prevalence of SAD, only approximately one-quarter (22.8 %) of lifetime cases report receiving treatment for their SAD symptoms specifically (Bruffaerts et al., 2022). Left untreated, SAD has a chronic and debilitating course (Stein et al., 2017).

1.1. Cognitive behaviour therapy for social anxiety disorder

Cognitive behaviour therapy (CBT) is a first-line treatment for SAD (Australian Psychological Society, 2018; National Institute for Health and Care Excellence (NICE), 2013). CBT for SAD typically includes strategies such as in-vivo exposure to address avoidance behaviours and cognitive strategies to address maladaptive automatic thoughts and core beliefs (Hofmann & Otto, 2018; Rodebaugh et al., 2004). Multiple meta-analyses demonstrate the efficacy of this treatment approach in a face-to-face settings, with medium to large between-group effect sizes (Cohen's d ranging from.61 to 1.19) found when CBT is compared to control or waitlist condition (Acarturk et al., 2009; Barkowski et al., 2016; Cuijpers et al., 2016; Hofmann et al., 2012; Mayo-Wilson et al., 2014; Rodebaugh et al., 2004). These effects appear to be durable (Hedges' g ranging from.34 to.60 at follow up) however few studies have examined the durability of treatment effects beyond 12-months (van Dis et al., 2020).

1.2. Barriers to accessing evidence-based treatment

While face-to-face CBT is known to be efficacious, consumers face numerous logistical and psychological barriers to accessing treatment. Logistical barriers include clinician shortages, long waitlists, financial barriers, and access to childcare (Shim et al., 2017). Psychological

* Correspondence to: Discipline of Clinical Psychology, Graduate School of Health, University of Technology Sydney, PO Box 123 Broadway, Ultimo, NSW 2007, Australia.
E-mail address: Bethany.Wootton@uts.edu.au (B.M. Wootton).

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barriers reduce willingness to seek treatment due to the anxiety of in-person interactions that result in fear, shame and social stigma (Olfson et al., 2000). Providing CBT remotely offers possible solutions to these barriers as it minimizes exposure to intensely anxiety-provoking experiences such as the necessary interactions that occur when attending a clinical service.

1.3. Remote delivery of cognitive-behavioural therapy

Remotely delivered CBT has the potential to improve access to evidence-based treatment for SAD. It provides patients with the same CBT interventions that are used in face-to-face treatment, however, uses technology to deliver the treatment. Remote CBT can be provided in either high-intensity or low-intensity formats.

1.3.1. High intensity remote cognitive behavioural therapy

High-intensity remote CBT uses technology to administer treatment in real-time and the treatment is generally delivered via internet-videoconferencing or telephone. In many ways, high-intensity CBT is analogous to face-to-face interventions in utilising the same amount of clinician contact (i.e., 60–90 min) and the clinician-contact is synchronous. There are currently no randomized controlled trials (RCTs) evaluating the efficacy of high-intensity remote CBT for SAD, however this treatment approach has been demonstrated to be efficacious in RCTs for other anxiety and related disorders such as generalized anxiety disorder, panic disorder and obsessive-compulsive disorder (e.g., Rees & Maclaine, 2015; Stubbings et al., 2013; Varker et al., 2019). A recent pilot study ($n = 10$) yielded promising reductions in SAD symptoms, with large effect sizes following 16 sessions of videoconferencing-delivered CBT (vCBT), however no moderator analyses were reported (Matsumoto et al., 2020). No research has yet investigated the efficacy of telephone-delivered CBT (tCBT) for SAD.

1.3.2. Low intensity remote cognitive behavioural therapy

Low-intensity remote CBT involves the patient working through predominantly self-help information (Carlbring et al., 2018a, 2018b). Patients completing low-intensity CBT may be supported by a clinician as they work through the materials (clinician-guided) or may complete the intervention without any clinician support (self-guided). Clinician-guidance in low intensity remote CBT is asynchronous and typically provided via email, telephone, or secure messaging services (Lattie et al., 2022). The clinician-support provided to patients in low intensity remote CBT is generally marginal compared to face-to-face or high-intensity remote CBT, often equating to approximately 10 min or less per week (Nordgreen et al., 2016). Low-intensity remote CBT is generally delivered as either internet-delivered CBT (iCBT) (e.g., Andersson et al., 2012; Kampmann et al., 2016; Lindner et al., 2013; Mayo-Wilson et al., 2014; Shim et al., 2017), bibliotherapy-delivered CBT (bCBT) (e.g., Furmark et al., 2009), or application-based CBT (aCBT) (e.g., Lindner et al., 2013). While early studies demonstrated that clinician-guided treatments were more efficacious than self-guided treatments (Rapee et al., 2007), more recent research that use self-guided interventions that incorporate automated and regular prompts and reminders as part of the self-guided treatment, have indicated that the outcomes from self-guided treatments may be non-inferior (Dear et al., 2016).

iCBT involves the delivery of structured CBT lessons or modules via the internet. To date, iCBT is the most well-established low-intensity CBT treatment delivery format. Numerous RCTs have investigated the efficacy of iCBT for SAD (e.g., Nordmo et al., 2015; Schulz et al., 2016; Tulbure et al., 2015) and these results have been pooled in several meta-analyses (Andersson et al., 2019; Carlbring et al., 2018a, 2018b; Guo et al., 2020; pp, 2528). For example, Guo et al., (2020, pp. 2528) conducted a meta-analysis of 20 iCBT studies ($n = 1743$) and found that both self-guided and clinician-guided iCBT resulted in significant reductions in symptoms of SAD with between-group effect sizes ranging from − 0.57 to − 0.86 (Hedges's g) compared to a waitlist condition (Guo et al., 2020, pp. 2528). Other moderators in this study included experience of the therapist delivering the guidance, method of feedback (e.g., online or through telephone) and whether the intervention did or did not include a discussion forum. None of these moderator analyses resulted in significant differences. Importantly, a meta-analysis of iCBT compared to face-to-face CBT across a range of psychiatric and somatic disorders found both treatments produced equivalent effects in the three studies of SAD (pooled between-group effect size Hedges's $g = -.16$) (Carlbring et al., 2018a, 2018b). This study examined quality of studies as a moderator but did not explore further moderators.

bCBT provides CBT information via printed material (e.g., self-help workbook) and is an extremely cost-effective way to deliver remote CBT (Rapee et al., 2007). To date, two studies have demonstrated bCBT to be an efficacious treatment for SAD, with small to large effect sizes of 0.44 – 1.42 (Cohen's d) (Furmark et al., 2009; Rapee et al., 2007). bCBT has also been combined with application-based CBT (aCBT) in mixed-methods studies with significantly reduced social anxiety following treatment compared to the waitlist control condition ($d = 0.81$) and maintained symptom reduction throughout the 4-month and 12-month follow-up period (Boettcher et al., 2018). This study included moderators such as participant compliance with the intervention whereby higher completion of challenges predicted significantly improved social anxiety symptoms, and pre-treatment scores as a predictor of change in social fears indicating that those with more severe symptoms benefitted more from treatment.

aCBT uses a smartphone application to deliver the CBT intervention, providing a more transportable and private mode of remote therapy. aCBT extends the reach of psychotherapeutic interventions to real-life situations and provides opportunities for patients to perform and record exercises in-vivo (Bjork et al., 2013). To date there have been two RCTs examining the efficacy of aCBT for SAD with promising outcomes (Dagöö et al., 2014; Stolz et al., 2018). For instance, Stolz et al. (2018) compared both an aCBT condition and iCBT condition to a waitlist control. This study concluded no significant between-group differences in treatment effectiveness in the two active conditions (aCBT and iCBT) with slightly more favourable effect sizes in the aCBT condition than the iCBT condition (aCBT vs WL: $d = 0.89$; iCBT vs WL: $d = 0.74$). Moreover, Dagöö et al. (2014) compared aCBT to application-based delivery of interpersonal psychotherapy with a larger proportion of the aCBT group classified as responders post treatment (55.6 % versus 8.0 %) and a between group Cohen's $d = 0.64$ in favour of aCBT. Moderator analyses were not included in this study.

While a number of systematic reviews and meta-analyses exist examining the pooled efficacy of specific types of remote treatment for SAD, such as iCBT (i.e., (i.e., Carlbring et al., 2018a, 2018b; Guo et al., 2020, pp. 2528), there are currently none examining the efficacy of remote CBT for SAD more broadly. Additionally, to date none of these reviews have compared the efficacy of various types of remote CBT for SAD (e.g., vCBT, iCBT, bCBT), nor have they compared the efficacy of different intensities of remote CBT (low vs high intensity) for SAD. There has also been significant variance in the treatment duration of remote treatments, ranging from 1 week (Jain et al., 2021) to 16 weeks (Matsumoto et al., 2020). However, to date this has not been examined as a moderator in existing meta-analyses. Hence, the aim of this review is to examine the efficacy of the full spectrum of remote CBT for SAD and examine moderators of treatment outcome using a meta-analytic approach. Important moderators to be examined included type of remote CBT, treatment intensity, low intensity treatment with and without guidance, treatment duration and type of control group. This study has important implications for the dissemination of stepped care delivery of treatment for SAD.

2. Method

2.1. Registration

The protocol for the meta-analysis was preregistered on the International Prospective Register of Systematic Reviews (PROSPERO) (CRD42022315186) on 06 April 2022. The meta-analysis was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Page et al., 2021) statement.

2.2. Search strategy

Relevant studies were identified through systematic searches in Medline, Scopus, PsychInfo, CINAHL, Pubmed and Web of Science through to 16 October 2022. The databases were searched using Boolean operators to link the search terms 'social anxiety' OR 'SAD' OR 'social phobia' AND 'cognitive therapy' OR 'behav* therapy' OR 'cognitive-behav* therapy' OR 'CBT' AND 'trial' OR 'RCT' OR 'randomi*ed' AND 'Internet' OR 'ICBT' OR 'tele*' OR 'videoconferenc*' OR 'bibliotherapy' OR 'computeri*' OR 'app*' OR 'distance' OR 'remote' OR 'self-help' OR 'DVD' OR 'CD'. The search terms involved searching title, abstract and keyword for each search term. No date restrictions were applied to the search. Database searches were supplemented by manually searching reference lists of included studies, as well as previous meta-analyses and systematic reviews on the topic.

2.3. Study selection

To be included in the meta-analysis studies were required to 1) include participants aged 18 years or older; 2) include participants with a primary diagnosis of SAD, diagnosed with a structured diagnostic interview; 3) target SAD symptoms as primary; 4) evaluate a remote CBT intervention as a monotherapy in a controlled or uncontrolled trial; 5) be published in English; 6) be published in a peer reviewed journal; 7) supply original data and data that is amenable to meta-analysis; and 8) use a psychometrically valid measure of SAD symptoms.

2.4. Data search and extraction

The first author (HW) conducted the search and screened all studies at the title/abstract and full-text stage. Ten percent of entries were co-screened by the third author (JB) to ensure accuracy at the title/abstract stage and full-text stage. Data was extracted by the first author (HW) and the accuracy of all data extraction was checked by the final author (BW). Pre-treatment, post-treatment and follow-up data on the primary outcome measure was extracted for each study. Currently, there does not appear to be a single gold standard trait social anxiety self-report measure that should be used above all others (Modini et al., 2015). Therefore, in studies that did not specify a primary outcome measure or where multiple outcome measures were identified as primary, data from the clinician-administered Liebowitz Social Anxiety Scale (LSAS-CA; Liebowitz, 1987) were extracted where possible as it is a clinician-administered tool and a reliable single measure of social anxiety (Fresco et al., 2001). Where the clinician-administered LSAS was not available outcome measures were extracted in the following order and considered the primary outcome measure: self-report LSAS, Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998), Social Phobia Scale (SPS; Mattick & Clarke, 1998), Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983), Social Phobia Inventory (SPIN; Connor et al., 2000), and MINI-SPIN (Connor et al., 2001). The most conservative outcomes from each study were used, i.e., where possible intention to treat (ITT) data was extracted, followed by completer data.

2.5. Data analysis

All analyses were conducted using Comprehensive Meta-Analysis Version 3 (Borenstein et al., 2013). Random effects models were used to analyse both within-group and between-group effect sizes (Hedges' *g*). Hedges' *g* was interpreted as 0.2, small effect; 0.5, medium effect and 0.8 and greater, large effect (Cohen, 1988). Homogeneity of effect sizes was evaluated using the I^2 statistic. An I^2 value of 25 % is generally considered low heterogeneity among studies, 50 % as moderate and 75 % as substantial (Higgins et al., 2003). Where there was a moderate level of heterogeneity, moderator analyses were conducted where sample size allowed for it. Categorical moderators were examined by comparing group effect sizes and continuous moderators were examined using meta-regression. The 'one study removed' method was used as a sensitivity analysis to assess how the combination of studies impacted individual studies. This was analysed by the overall effect size after the removal of each study. Publication bias was assessed using Duval and Tweedie's Trim and Fill method (Duval & Tweedie, 2000), which 'trims' the most extreme small studies from the analysis that lead to asymmetry and 'fills' these studies with a mirror image resulting in an unbiased estimate of the effect size (Boronstein et al., 2011).

Within-group effect sizes (Hedges' *g*) were calculated for remote CBT overall from pre-treatment to post-treatment and pre-treatment to longest follow up. As correlations between pre-treatment and post-treatment (or follow up) scores were not available, a conservative estimate of $r = .70$ was used, consistent with Rosenthal (1993) and previous meta-analyses (e.g., Winkler et al., 2013). A positive *g* value indicates a decrease in social anxiety disorder symptoms, with the size of the value indicating the extent of the effect. The following moderators of within-group effects were examined 1) type of remote treatment (i.e., vCBT, tCBT, iCBT, bCBT, aCBT); 2) treatment intensity (i.e., high [vCBT and tCBT] and low [iCBT, bCBT, and aCBT] intensity); 3) clinician guidance (self-guided or clinician guided); 4) treatment duration; and 5) amount of clinician contact.

Between-group analyses were conducted comparing the remote CBT intervention to an eligible control group at post-treatment and follow up, if available. For between-group comparisons a positive *g* value indicates a superiority in the remote treatment compared to control, and a negative *g* value indicates inferiority of the remote treatment. The following moderators of between-group effects were examined 1) remote CBT treatment vs. passive control condition; 2) remote CBT treatment vs. non-CBT remote control condition; 3) remote CBT treatment vs. face-to-face CBT control condition.

2.6. Quality assessment of the included studies

The Revised Cochrane Risk of Bias tool for randomized trials (RoB2) (Sterne et al., 2019) was used to assess risk of bias (RoB). Five dimensions of bias were evaluated, including: bias arising from the randomisation process, bias due to deviations from intended interventions, bias due to missing outcome data, bias in measure of the outcome, and bias in selection of the reported result (Sterne, 2019). Each domain included signalling questions aimed to elicit the information relevant to an assessment of risk of bias, which fed into algorithms to produce a domain-level and overall judgement about risk of bias (Sterne, 2019). Two authors (HW and AN) independently completed the RoB assessment for each study and any discrepancies were resolved via discussion.

3. Results

3.1. Study selection

A PRISMA flow diagram in Fig. 1 outlines the number of studies screened and excluded during the screening process. Systematic searches resulted in a total of 2269 studies, with an additional two studies yielded from a reference list search ($N = 2271$). Following removal of duplicates, titles and abstracts of the remaining 1145 studies were reviewed ($n = 973$ excluded). Full texts of all remaining studies ($n = 172$) were reviewed by the first author to determine eligibility for

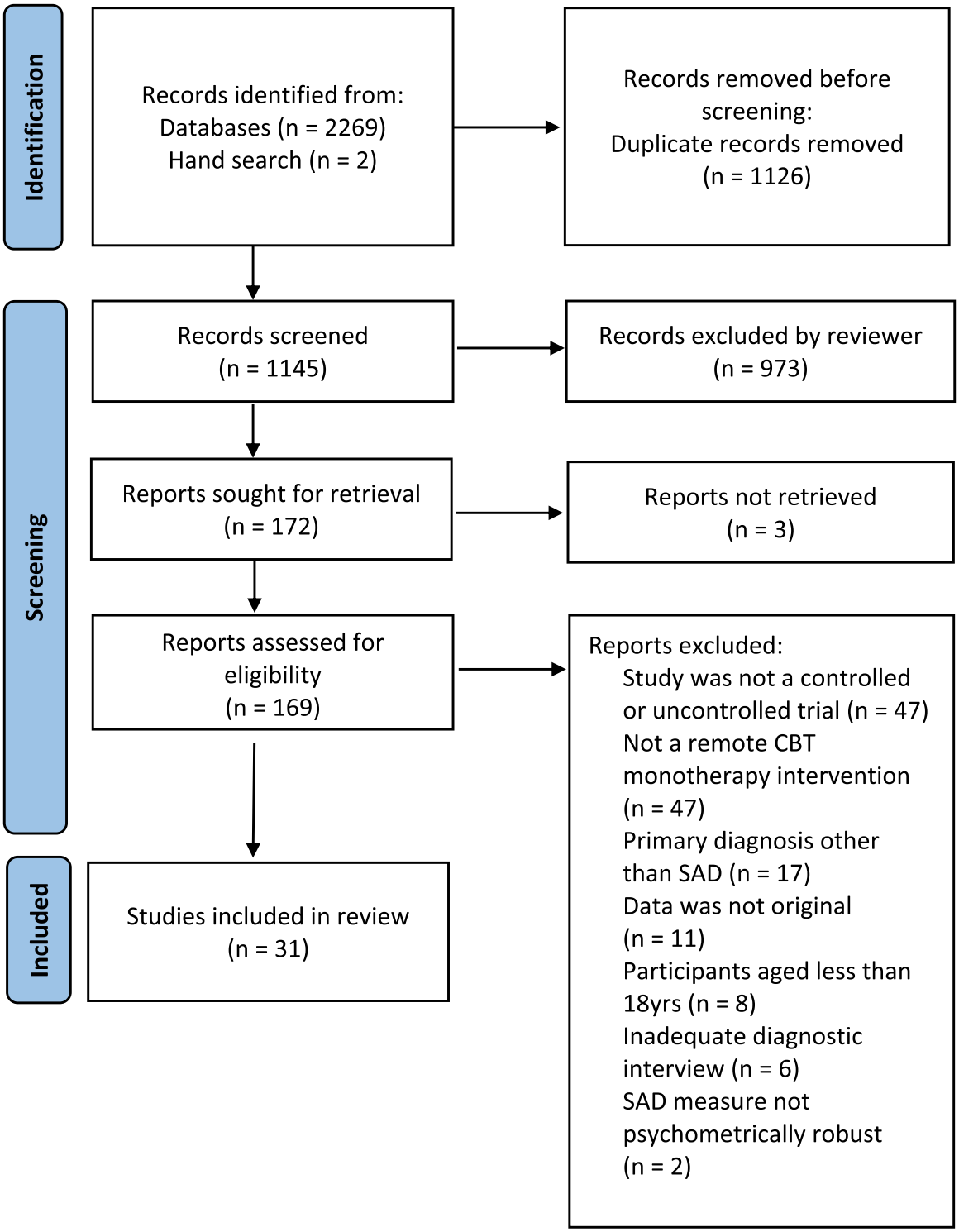

Fig. 1. PRISMA flowchart for selection of studies.

inclusion ($n = 138$ excluded; $n = 3$ unable to be retrieved).

3.2. Study characteristics

Table 1 provides an overview of all study characteristics. Across the 31 studies, 43 remote treatment conditions were examined and 2905 individuals ($n = 1861$ in treatment conditions, $n = 1044$ in control conditions) were included in the analysis. The mean age range was 24.73 – 41.65 years and female representation range was 37.5 – 78.9 %. The majority of studies were RCTs (25/31; 80.6 %) and six were open trials (6/31; 19.4 %). Of the studies included, 29 control condition comparisons were made. Active control conditions included face-to-face CBT delivered as group therapy (4/29; 13.8 %), and remote non-CBT treatment utilising a different modality such as applied relaxation (5/29; 17.2 %), and 20 comparisons utilised a passive (i.e., waitlist) control group (20/29; 69.0 %).

Of the 43 treatment intervention comparisons, 29 utilised guided iCBT (29/43; 67.4 %), seven utilised unguided iCBT (7/43; 16.3 %), four

Table 1
Characteristics of included studies.

Study	Country	Study type	Remote CBT type	Treatment Intensity	Guidance	Treatment duration (weeks)	Clinician contact time (min)	*n*	Mean age (SD)	% Female	Diagnostic interview used
Andersson et al. (2012)	SE	RCT	iCBT	Low	Guided	9	135	102	38.10 (11.30)	77.50	SCID-I
Bell et al. (2012)	NZ	RCT	iCBT	Low	Guided	12	30	13	NR	73	SCID-I
Berger et al. (2009)	CH	RCT	iCBT	Low	Guided	10	NR	31	28.10 (5.40)	58.10	SCID-I
Berger et al. (2011)	SE	RCT	iCBT	Low	Unguided	10	0	27	37.30 (11.10)	55.60	SCID-I
			iCBT	Low	Guided	10	NR	27	36.89 (11.60)	48.10	SCID-I
			iCBT	Low	Guided	10	NR	27	37.44 (11.40)	55.60	SCID-I
Berger et al. (2014)	CH	RCT	iCBT	Low	Guided	8	NR	44	34.40 (11.60)	54.50	SCID-I
Boettcher et al. (2018)	SE	RCT	iCBT	Low	Unguided	7	0	64	35.86 (14.11)	70	MINI
Botella et al. (2010)	ES	RCT	iCBT	Low	Unguided	8	0	30	24.90 (6.41)	76.70	ADIS-IV
Carlbring et al. (2007)	SE	RCT	iCBT	Low	Guided	9	198	29	32.40 (9.10)	59	SCID-I
Clark et al. (2022)	UK	RCT	iCBT	Low	Unguided	14	0	46	NR	NR	ADIS-IV
Dagoo et al. (2014)	SE	RCT	aCBT	Low	Guided	9	135	27	34.70 (11.20)	48.10	SCID-I
Dear et al. (2016)	AU	RCT	iCBT	Low	Mixed	8	80	106	41.65 (10.80)	61	MINI
Furmark et al. (2009a)	SE	RCT	iCBT	Low	Guided	9	135	40	35.00 (10.20)	78	SCID-I
			bCBT	Low	Unguided	9	0	40	37.70 (10.30)	60	SCID-I
Furmark et al. (2009b)	SE	RCT	iCBT	Low	Guided	9	135	29	34.90 (8.40)	66	SCID-I
			bCBT	Low	Unguided	9	0	29	32.50 (8.50)	66	SCID-I
			bCBT	Low	Unguided	9	0	28	35.00 (10.40)	64	SCID-I
Hedman et al. (2011)	SE	RCT	iCBT	Low	Guided	15	82.5	64	35.20 (11.10)	37.50	SCID-I
Jain et al. (2021)	AU	OT	iCBT	Low	Guided	1	26	16	40.34 (10.55)	56.30	ADIS-5
Lindegaard et al. (2020)	SE	OT	iCBT	Low	Guided	10	135	13	41.40 (12.00)	62	MINI
Matsumoto et al. (2018)	JP	OT	vCBT	High	-	16	800	10	29.70 (8.70)	60	MINI
Nordgreen et al. (2018)	NO	OT	iCBT	Low	Guided	14	210	169	NR	56.80	MINI
Nordmo et al. (2015)	NO	RCT	iCBT	Low	Guided	9	90	20	27.30 (8.10)	45.50	MINI
Rapee et al. (2007)	AU	RCT	bCBT	Low	Unguided	12	0	56	36.50 (10.10)	50	ADIS-IV
Schulz et al. (2016)	Mixed	RCT	iCBT	Low	Guided	12	204	60	36.05 (11.12)	55	SCID-I
			iCBT	Low	Guided	12	60	60	35.82 (11.42)	50	SCID-I
Stolz et al. (2018)	CH	RCT	iCBT	Low	Guided	12	NR	60	34.60 (12.00)	58.30	SCID-I
			aCBT	Low	Guided	12	NR	60	34.70 (9.90)	58.30	SCID-I
Stott et al. (2013)	UK	OT	iCBT	Low	Guided	13.7	232	11	33.10 (5.90)	45	ADIS-IV
Thew et al. (2019)	HK	OT	iCBT	Low	Guided	14	NR	6	31.30 (NR)	50	ADIS-5
Tillfors et al. (2008)	SE	RCT	iCBT	Low	Guided	9	315	19	32.30 (9.70)	78.90	SCID-I
Titov et al. (2008a)	AU	RCT	iCBT	Low	Guided	10	125	50	37.58 (11.89)	56	CIDI.3.0
Titov et al. (2008b)	AU	RCT	iCBT	Low	Guided	10	126.76	41	37.80 (10.71)	58.50	CIDI 3.0
Titov et al. (2008c)	AU	RCT	iCBT	Low	Guided	10	168	31	39.71 (9.50)	54.80	MINI
			iCBT	Low	Unguided	10	0	30	36.86 (10.78)	76.70	MINI

(*continued on next page*)

Table 1 (*continued*)

Study	Country	Study type	Remote CBT type	Treatment Intensity	Guidance	Treatment duration (weeks)	Clinician contact time (min)	*n*	Mean age (SD)	% Female	Diagnostic interview used
Titov et al. (2009a)	AU	RCT	iCBT	Low	Guided	8	38.01	43	NR	NR	MINI
			iCBT	Low	Guided	8	36.92	39	NR	NR	MINI
Titov et al. (2009b)	AU	RCT	iCBT	Low	Guided	8	38.7	81	NR	NR	MINI
			iCBT	Low	Unguided	8	0	82	NR	NR	MINI
Titov et al. (2010)	AU	RCT	iCBT	Low	Unguided	11	0	55	NR	NR	MINI
Wang et al. (2020)	CN	RCT	iCBT	Low	Unguided	8	0	47	25.91 (4.25)	72	MINI
			iCBT	Low	Guided	8	120	33	24.73 (5.40)	67	MINI

Note. RCT = randomised controlled trial; CT = controlled trial; OT = open trial; iCBT = internet administered CBT; bCBT = bibliotherapy administered CBT; aCBT = application (app) administered CBT; vCBT = videoconferencing administered CBT; *n* = number of participants used in pre-post analysis; NR = not reported; ADIS = anxiety and related disorders interview schedule; SCID-I = structured clinical interview for the DSM-IV axis I disorders; CIDI = composite international diagnostic interview; MINI = mini international neuropsychiatric interview

utilised unguided bCBT (4/43; 9.3 %), two utilised guided aCBT (2/43; 4.7 %), and one utilised vCBT (1/43; 2.3 %). Treatment length ranged from one to 16 weeks (M = 10.10 weeks). The amount of clinician guidance in low intensity guided remote treatments was reported in 24 comparisons (24/32; 73.0 %). In studies where clinician time was reported, time ranged from 26 to 287 min (M = 135.12 min) across the entire treatment.

3.3. Quality assessment

Risk of bias was assessed across the five domains with each domain rated as either 'low', 'high' or 'some concerns'. The RoB assessment is outlined in Figs. 2 and 3. The quality of the studies varied: 22 studies (22/31; 70.9 %) met four or five quality criteria, another six studies (6/31; 19.4 %) met three criteria, and the remaining three studies (3/31; 9.7 %) met two of the criteria. Overall, 'low' risk was estimated in 13 studies (13/31; 41.9 %), 'some concerns' were estimated in 15 studies (15/31; 48.4 %), and 'high' risk was estimated in three studies (3/31; 9.7 %).

3.4. Within-group analyses

Table 2 outlines the pre-treatment to post-treatment within-group effect sizes for each of the studies. The pooled within-group effect size was large across all remote treatments from pre-treatment to post-treatment (k = 43; g = 1.06; 95 % CI: 0.96–1.16). A high level of heterogeneity was found (I^2 = 79.51) indicating significant variability across effect sizes. The Trim and Fill method indicated that six studies were missing from the analysis (adjusted g = 0.99; 95 % CI: 0.89–1.09). Using the one study removed method effect sizes remained unchanged (g = 1.06; 95 % CI: 0.96–1.16).

Table 3 outlines the pre-treatment to longest follow-up within group effect size for each of the studies. From pre-treatment to longest follow-up, the pooled within-group effect size remained durable across all available studies (k = 28; g = 1.18; 95 % CI: 1.03–1.33). A high level of heterogeneity was also found from pre-treatment to follow-up (I^2 = 79.91). The Trim and Fill method indicated that three studies were missing (adjusted g = 1.12; 95 % CI: 0.97–1.27). Using the one study removed method effect sizes remained large (g = 1.18; 95 % CI: 1.03–1.33).

3.4.1. Within-group moderators

3.4.1.1. Type of remote CBT. As outlined in Table 4 each type of remote CBT produced medium to large within-group pooled effect sizes from pre-treatment to post-treatment (g = 0.79–1.19) and pre-treatment to follow-up (g = 0.66–1.28). Type of remote treatment did not moderate outcome from pre-treatment to post-treatment (Q_3 = 2.95, p = .40), however did significantly moderate outcome from pre-treatment to follow-up (Q_3 = 9.13, p = .03), whereby iCBT (g = 1.28) produced a significantly larger effect size than bCBT (g = 0.82), however all other effect sizes were not significantly different [aCBT (g = 1.15); vCBT (g = 0.66)].

3.4.1.2. Treatment intensity. As outlined in Table 4 both low and high intensity treatments produced large pooled within-group effect sizes from pre-treatment to post-treatment (g = 1.06–1.08). From pre-treatment to follow up high intensity treatments produced a medium effect size (g = 0.66) and low intensity treatments produced a large effect size (g = 1.20). Intensity of treatment did not moderate outcome from pre-treatment to post-treatment (Q_1 = 0.01, p = .95) or pre-treatment to follow-up (Q_1 = 3.19, p = .07). However, it is important to note that only one high intensity study was included in the analysis.

3.4.1.3. Guidance in low intensity studies. As outlined in Table 4 both guided and unguided treatments produced large within-group pooled effect sizes from pre-treatment to post-treatment (g = 0.81–1.16) and pre-treatment to follow-up (g = 0.98–1.26). Guided treatments produced a significantly larger pre-treatment to post-treatment within-group effect size (Q_1 = 9.23, p < .01), however this was no longer significant when comparing pre-treatment to follow-up within group effect sizes (Q_1 = 2.75, p = .10). Meta-regression indicated that the amount of clinician time provided did not moderate effect sizes from pre-treatment to post-treatment (Q_1 = 0.57, p = .45, I^2 = 71.63) or pre-treatment to follow-up (Q_1 = 3.06, p = .08, I^2 = 69.96).

3.4.1.4. Treatment duration. Meta-regression indicated that the number of treatment weeks did not significantly impact effect size from pre-treatment to post-treatment (Q_1 = 0.25, p = .62, I^2 = 80.82) or pre-treatment to follow up (Q_1 = 0.19, p = .66, I^2 = 79.61).

3.5. Between-group analyses

A total of 18 studies (29 comparisons) compared a remote CBT intervention to an eligible control condition at post-treatment. All between-group comparisons were studies of low-intensity remote CBT interventions. Table 5 outlines the between-group effect sizes at post-treatment and follow-up for each of the studies. Between-group analyses indicated a medium pooled effect size at post-treatment (k = 29; g = 0.71; 95 % CI: 0.57–0.86) favouring remote CBT. Heterogeneity was moderate (I^2 = 62.14), suggesting some variance in outcomes across studies. The Trim and Fill procedure indicated no evidence of

Fig. 2. Estimated risk of bias in the included studies. *Note.* Randomisation process = risk of bias arising from the randomisation process and allocation concealment that may impact baseline differences; deviations from the intended interventions = risk of bias due to interventions that are inconsistent with the trial protocol, or non-adherence by trial participants to their assigned interventions; missing outcome data = risk of bias in the intervention effect estimate due to large dropouts during the study; measurement of the outcome = risk of bias due to measurement error including whether the method of measuring the outcome is appropriate, whether the assessor is blinded to intervention assignment or whether the assessment of outcome is likely to be influenced by knowledge of the intervention received; selection of the reported result = risk of bias that arises when deviations from the pre-specified data analysis are made, usually on the basis of results.

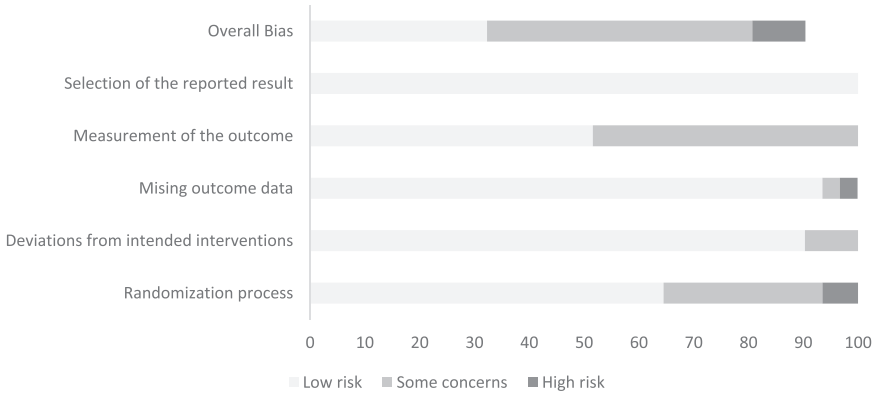

Fig. 3. Estimated risk of bias in the included studies as percentage.

Table 2
Within group effect sizes from pre-treatment to post-treatment.

Study	Type of remote treatment	Guidance	Pre-treatment to post-treatment		Weight of included study	Analysis	Outcome measure used
			Hedge's *g*	95 % CI			
Andersson et al. (2012)	iCBT	Guided	1.02	0.83 – 1.20	2.84	ITT	LSAS-SR
Bell et al. (2012)	iCBT	Guided	0.53	0.10 – 0.95	2.00	NR	LSAS-SR
Berger et al. (2009)	iCBT	Guided	0.77	0.46 – 1.07	2.43	ITT	LSAS-SR
Berger et al. (2011)	iCBT	Unguided	1.44	1.03 – 1.85	2.05	ITT	LSAS-SR
	iCBT	Guided	1.36	0.96 – 1.76	2.09	ITT	LSAS-SR
	iCBT	Guided	1.43	1.02 – 1.84	2.06	ITT	LSAS-SR
Berger et al. (2014)	iCBT	Guided	1.01	0.73 – 1.28	2.53	ITT	SIAS
Boettcher et al. (2018)	iCBT	Unguided	0.76	0.55 – 0.98	2.75	Completer	LSAS-SR
Botella et al. (2010)	iCBT	Unguided	0.28	0.00 – 0.55	2.54	NR	BFNE
Carlbring et al. (2007)	iCBT	Guided	1.11	0.76 – 1.47	2.26	ITT	LSAS-SR
Clark et al. (2022)	iCBT	Guided	1.97	1.53 – 2.41	1.94	ITT	SIAS
Dagoo et al. (2014)	aCBT	Guided	0.95	0.61 – 1.30	2.28	ITT	LSAS-SR
Dear et al. (2016)	iCBT	Mixed	1.14	0.95 – 1.32	2.83	ITT	MINI-SPIN
Furmark et al. (2009a)	iCBT	Guided	0.91	0.63 – 1.19	2.51	ITT	LSAS-SR
	bCBT	Unguided	0.76	0.49 – 1.03	2.56	ITT	LSAS-SR
Furmark et al. (2009b)	iCBT	Guided	1.31	0.93 – 1.68	2.17	ITT	LSAS-SR
	bCBT	Unguided	0.69	0.38 – 0.99	2.42	ITT	LSAS-SR
	bCBT	Unguided	1.38	0.98 – 1.77	2.11	ITT	LSAS-SR
Hedman et al. (2011)	iCBT	Guided	1.40	1.13 – 1.66	2.57	ITT	LSAS-SR
Jain et al. (2021)	iCBT	Guided	1.28	0.78 – 1.77	1.77	ITT	SIAS
Lindegaard et al. (2020)	iCBT	Guided	0.48	0.06 – 0.90	2.02	ITT	LSAS-SR
Matsumoto et al. (2020)	vCBT	Guided	1.08	0.45 – 1.71	1.40	ITT	LSAS-SR
Nordgreen et al. (2018)	iCBT	Guided	0.96	0.82 – 1.10	2.96	ITT	SPS
Nordmo et al. (2015)	iCBT	Guided	0.72	0.36 – 1.09	2.20	ITT	SIAS
Rapee et al. (2007)	bCBT	Unguided	0.45	0.24 – 0.66	2.76	ITT	Composite
Schulz et al. (2016)	iCBT	Guided	1.02	0.78 – 1.26	2.66	ITT	SIAS
	iCBT	Guided	0.94	0.70 – 1.17	2.68	ITT	SIAS
Stolz et al. (2018)	aCBT	Guided	1.41	1.13 – 1.68	2.54	ITT	LSAS-SR
	iCBT	Guided	1.12	0.87 – 1.37	2.63	ITT	LSAS-SR
Stott et al. (2013)	iCBT	Guided	1.32	0.72 – 1.92	1.47	Completer	LSAS-SR
Thew et al. (2019)	iCBT	Guided	1.62	0.74 – 2.50	0.91	NR	LSAS-SR
Tillfors et al. (2008)	iCBT	Unguided	0.96	0.56 – 1.37	2.06	ITT	LSAS-SR
Titov et al. (2008a)	iCBT	Guided	1.18	0.88 – 1.49	2.52	ITT	SIAS
Titov et al. (2008b)	iCBT	Guided	1.22	0.94 – 1.50	2.43	ITT	SIAS
Titov et al. (2008c)	iCBT	Guided	1.38	1.00 – 1.75	2.17	ITT	SIAS
	iCBT	Unguided	0.35	0.07 – 0.63	2.53	ITT	SIAS
Titov et al. (2009a)	iCBT	Guided	1.44	1.11 – 1.76	2.67	ITT	SIAS
	iCBT	Guided	1.52	1.17 – 1.87	2.79	ITT	SIAS
Titov et al. (2009b)	iCBT	Guided	1.39	1.16 – 1.63	2.35	ITT	SIAS
	iCBT	Unguided	0.95	0.75 – 1.16	2.25	ITT	SIAS
Titov et al. (2010)	iCBT	Unguided	1.14	0.88 – 1.40	2.59	ITT	SIAS
Wang et al. (2020)	iCBT	Unguided	1.56	1.17 – 1.94	2.13	Completer	SIAS
	iCBT	Guided	0.92	0.66 – 1.18	2.59	Completer	SIAS
Pooled Overall			**1.04**	**0.95 – 1.14**			

Note. iCBT = internet administered CBT; bCBT = bibliotherapy administered CBT; aCBT = application (app) administered CBT; vCBT = videoconferencing administered CBT; CI = Confidence interval; ITT = Intention to Treat; NR = not reported; BFNE = brief fear of negative evaluation scale; LSAS-SR = Liebowitz social anxiety scale – self report; MINI-SPIN = mini-social phobia inventory; SIAS = social interaction anxiety scale; SPS = social phobia scale; Composite = Clinician administered ADIS-IV, and five self-report measures (SPS, SIAS, APPQ social phobia subscale, SCS social anxiety subscale, BFNE)

Table 3
Within group effect sizes from pre-treatment to follow-up.

Study	Type of remote treatment	Guidance	Pre-treatment to follow-up		Weight of included study	Longest follow up period (weeks)	Analysis	Outcome measure used
			Hedge's *g*	95 % CI				
Andersson et al. (2012)	iCBT	Guided	-	-	-	-	ITT	LSAS-SR
Bell et al. (2012)	iCBT	Guided	0.76	0.29 – 1.23	3.16	12	NR	LSAS-SR
Berger et al. (2011)	iCBT	Unguided	1.32	0.92 – 1.71	3.52	24	ITT	LSAS-SR
	iCBT	Guided	1.46	1.04 – 1.87	3.42	24	ITT	LSAS-SR
	iCBT	Guided	1.59	1.16 – 2.03	3.33	24	ITT	LSAS-SR
Berger et al. (2014)	iCBT	Guided	1.04	0.76 – 1.32	4.02	24	ITT	SIAS
Botella et al. (2010)	iCBT	Unguided	0.97	0.57 – 1.37	3.48	52	NR	BFNE
Carlbring et al. (2007)	iCBT	Guided	1.23	0.87 – 1.60	3.63	52	ITT	LSAS-SR
Clark et al. (2022)	iCBT	Guided	2.05	1.66 – 2.43	3.56	52	Completer	SIAS
Dagoo et al. (2014)	aCBT	Guided	0.86	0.50 – 1.21	3.69	12	Completer	LSAS-SR
Dear et al. (2016)	iCBT	Mixed	1.50	1.29 – 1.72	4.28	104	ITT	MINI-SPIN
Furmark et al. (2009a)	iCBT	Guided	1.40	0.98 – 1.77	3.78	52	ITT	LSAS-SR
	bCBT	Unguided	0.90	0.62 – 1.18	4.02	52	ITT	LSAS-SR
Furmark et al. (2009b)	iCBT	Guided	1.33	0.97 – 1.76	3.57	52	ITT	LSAS-SR
	bCBT	Unguided	0.66	0.37 – 0.99	3.91	52	ITT	LSAS-SR
	bCBT	Unguided	1.38	1.01 – 1.82	3.51	52	ITT	LSAS-SR
Hedman et al. (2011)	iCBT	Guided	1.62	1.33 – 1.90	3.99	24	ITT	LSAS-SR
Jain et al. (2021)	iCBT	Guided	1.85	1.24 – 2.47	2.57	4	ITT	SIAS
Lindegaard et al. (2020)	iCBT	Guided	0.67	0.23 – 1.11	3.29	24	ITT	LSAS-SR
Matsumoto et al. (2020)	vCBT	Guided	0.66	0.09 – 1.23	2.76	52	ITT	LSAS-SR
Nordmo et al. (2015)	iCBT	Guided	0.94	0.54 – 1.33	3.50	24	ITT	SIAS
Rapee et al. (2007)	bCBT	Unguided	0.45	0.24 – 0.66	4.30	12	ITT	Composite
Schulz et al. (2016)	iCBT	Guided	1.18	0.84 – 1.53	3.74	24	Completer	SIAS
	iCBT	Guided	1.06	0.73 – 1.40	3.78	24	Completer	SIAS
Stolz et al. (2018)	aCBT	Guided	1.42	1.15 – 1.70	4.04	12	ITT	LSAS-SR
	iCBT	Guided	1.16	0.91 – 1.41	4.14	12	ITT	LSAS-SR
Thew et al. (2019)	iCBT	Guided	1.71	0.80 – 2.63	1.65	12	NR	LSAS-SR
Tillfors et al. (2008)	iCBT	Unguided	1.22	0.78 – 1.67	3.26	52	ITT	LSAS-SR
Titov et al. (2010)	iCBT	Unguided	1.10	0.84 – 1.36	4.12	12	ITT	SIAS
Pooled Overall			**1.18**	**1.03 – 1.33**				

Note. iCBT = internet administered CBT; bCBT = bibliotherapy administered CBT; aCBT = application (app) administered CBT; vCBT = videoconferencing administered CBT; CI = Confidence interval; ITT = Intention to Treat; NR = not reported; BFNE = brief fear of negative evaluation scale; LSAS-SR = Liebowitz social anxiety scale – self report; MINI-SPIN = mini-social phobia inventory; SIAS = social interaction anxiety scale; SPS = social phobia scale; Composite = Clinician administered ADIS-IV, and five self-report measures (SPS, SIAS, APPQ social phobia subscale, SCS social anxiety subscale, BFNE)

publication bias and the values remained unchanged. Using the one study removed method effect sizes remained large (g = 0.71; 95 % CI: 0.57–0.86). At follow-up between-group analyses indicated a small, pooled effect size at post-treatment (k = 7; g = 0.41; 95 % CI: 0.25–0.58) across all pooled conditions favouring remote CBT. The Trim and Fill procedure indicated no evidence of publication bias. Using the one study removed method effect sizes remained small (g = 0.41; 95 % CI: 0.25–0.58).

Table 4
Within-group subgroup analyses at pre- to post-treatment and pre-treatment to follow up.

Subgroup	Pre-treatment to post-treatment				Pre-treatment to follow-up			
	k	Hedge's *g*	95 % CI	I^2	*k*	Hedge's *g*	95 % CI	I^2
Type of remote CBT								
iCBT	36	1.08	0.98 – 1.19	77.69	21	1.28	1.14 – 1.41	65.13
aCBT	2	1.19	0.75 – 1.64	75.70	2	1.15	0.60 – 1.70	83.42
bCBT	4	0.79	0.45 – 1.13	82.27	4	0.82	0.46 – 1.41	83.90
vCBT	1	1.08	0.45 – 1.71	0.00	1	0.66	0.09 – 1.23	0.00
Treatment intensity								
High Intensity	1	1.08	0.45 – 1.71	0.00	1	0.66	0.09 – 1.23	0.00
Low Intensity	42	1.06	0.96 – 1.16	80.00	27	1.20	1.05 – 1.34	80.23
Guidance (low intensity studies only)								
Guided	30	1.16	1.05 – 1.26	67.54	19	1.26	1.11 – 1.40	66.09
Unguided	11	0.81	0.61 – 1.01	83.76	7	0.98	0.69 – 1.27	83.98

Note. iCBT = internet administered CBT; bCBT = bibliotherapy administered CBT; aCBT = application (app) administered CBT; vCBT = videoconferencing administered CBT; *K* = Number of treatment groups, CI = Confidence Interval, I^2 = Heterogeneity

Table 5
Between-group effect sizes comparing remote CBT to waitlist control or other treatment.

Study	Type of remote treatment and comparison	Post -treatment		Weight of included study	Follow-up		Weight of included study
		Hedge's *g*	95 % CI		Hedge's *g*	95 % CI	
Bell et al. (2012)	iCBT guided v WLC	0.70	0.00 – 1.40	2.39	0.76	0.03 – 1.49	5.07
Berger et al. (2009)	iCBT guided v WLC	0.88	0.31 – 1.45	2.97	-	-	-
Berger et al. (2014)	iCBT guided v WLC	1.11	0.66 – 1.55	3.65	-	-	-
Boettcher et al. (2018)	iCBT unguided v WLC	0.58	0.24 – 0.93	4.26	-	-	-
Botella et al. (2010)	iCBT unguided v CBT	0.03	-0.51 – 0.57	3.12	-	-	-
	iCBT unguided v WLC	0.54	0.01 – 1.08	3.16	-	-	-
Carlbring et al. (2007)	iCBT unguided v WLC	1.29	0.73 – 1.86	3.00	-	-	-
Clark et al. (2022)	iCBT guided v CBT	0.31	-0.09 – 0.71	3.93	0.31	-0.09 – 0.71	16.88
	iCBT guided v WLC	2.18	1.62 – 2.73	3.05	-	-	-
Dagoo et al. (2014)	aCBT guided v IPT	0.63	0.08 – 1.18	3.08	-	-	-
Furmark et al. (2009)	iCBT guided v WLC	0.78	0.33 – 1.23	3.62	-	-	-
	bCBT unguided v WLC	0.79	0.34 – 1.24	3.62	-	-	-
	iCBT guided v iAR	0.35	-0.16 – 0.86	3.28	0.33	-0.18 – 0.84	10.29
	bCBT unguided v iAR	0.36	-0.15 – 0.87	3.27	0.26	-0.25 – 0.77	10.35
	bCBT unguided v iAR	0.36	-0.16 – 0.88	3.25	0.32	-0.20 – 0.84	10.12
Hedman et al. (2011)	iCBT guided v CBGT	0.40	0.05 – 0.75	4.23	0.37	0.02 – 0.72	21.96
Lindegaard et al. (2020)	iCBT guided v iPDT	0.38	-0.29 – 1.05	2.51	0.45	-0.22 – 1.12	5.94
Rapee et al. (2007)	bCBT unguided v CBGT	0.45	0.09 – 0.82	4.12	0.64	0.25 – 0.58	19.39
	bCBT unguided v WLC	0.32	-0.05 – 0.70	4.06	-	-	-
Schulz et al. (2016)	iCBT guided v WLC	0.81	0.35 – 1.26	3.59	-	-	-
	iCBT guided v WLC	0.68	0.23 – 1.13	3.62	-	-	-
Stolz et al. (2018)	aCBT guided v WLC	0.80	0.35 – 1.25	3.62	-	-	-
	iCBT guided v WLC	0.78	0.33 – 1.23	3.63	-	-	-
Titov et al. (2008a)	iCBT guided v WLC	0.85	0.45 – 1.46	3.87			
Titov et al. (2008b)	iCBT guided v WLC	1.28	0.80 – 1.75	3.48	-	-	-
Titov et al. (2008c)	iCBT guided v WLC	0.96	0.45 – 1.26	3.87	-	-	-
	iCBT unguided v WLC	0.34	-0.15 – 0.82	3.42	-	-	-
Wang et al. (2020)	iCBT guided v WLC	1.15	0.66 – 1.64	3.41	-	-	-
	iCBT unguided v WLC	0.87	0.39 – 1.34	3.47	-	-	-
Pooled between-group		**0.71**	**0.57 – 0.86**		**0.41**	**0.25 – 0.58**	

Note. iCBT = internet administered CBT; bCBT = bibliotherapy administered CBT; aCBT = application (app) administered CBT; vCBT = videoconferencing administered CBT; CBT = face-to-face cognitive behaviour therapy; CBGT = face-to-face cognitive behaviour group therapy; iAR = internet applied relaxation; iPDT = internet psychodynamic therapy; IPT = interpersonal therapy; WLC = waitlist control

3.5.1. *Between-group moderators*

3.5.1.1. Remote treatment vs passive control. Moderator analyses were conducted comparing post-treatment outcomes of remote CBT to passive control conditions (i.e., waitlist control). This analysis yielded a large between-group effect size in favour of remote CBT ($k = 20$; $g = 0.87$; 95 % CI: 0.70–1.03). Only one study with a passive control condition was available for analysis at follow-up, indicating a medium effect size in favour of remote CBT ($k = 1$; $g = 0.76$; 95 % CI: 0.03–1.49).

3.5.1.2. Remote CBT vs non-CBT remote treatment. Remote CBT was compared to active controls that utilised a non-CBT remote treatment.

Comparison arms included internet-delivered applied relaxation (3/5; 60 %), internet-delivered psychodynamic therapy (1/5; 20 %) and internet-delivered interpersonal therapy (1/5; 20 %). At post-treatment a small between-group effect size was found ($k = 5$; $g = 0.41$; 95 % CI: 0.17–0.66) in favour of remote CBT. A small effect size was also found at follow-up ($k = 4$; $g = 0.33$; 95 % CI: 0.06–0.60) favouring remote CBT.

3.5.1.3. Remote treatment vs face-to-face CBT. Remote CBT was also compared to active controls that utilised a face-to-face group CBT (2/4; 50 %) or individual CBT (2/4; 50 %). A small between-group effect size was found in favour of remote treatment at both post-treatment ($k = 4$; $g = 0.34$; 95 % CI: 0.14–0.54) and follow up ($k = 3$; $g = 0.44$; 95 % CI: 0.23–0.65).

4. Discussion

The aim of this study was to examine the efficacy of remote CBT for SAD across the full spectrum of available remote CBT modalities. Overall, the results indicate that remote CBT for SAD is efficacious with large within-group effect sizes when all remote treatment types are pooled together ($g = 1.06$). This is consistent with meta-analyses for remote treatment of other anxiety disorders and related disorders including panic disorder (Efron & Wootton, 2021; g = 1.18), generalised anxiety disorder (Basile et al., 2022; g = 1.30), and obsessive-compulsive disorder (Wootton, 2016; g = 1.17). This large pooled within-group effect size is also within the same range as meta-analyses of face-to-face CBT for SAD (NICE, 2013; Cohen's d = −1.02), and meta-analyses for SAD that have investigated a single remote treatment type such as iCBT in clinical and sub-clinical presentations of SAD (e.g., Guo et al., 2020, pp. 2528; g = −0.86).

The pooled within-group effect sizes across each of the remote CBT modalities from pre-treatment to post-treatment were fairly similar. This indicates that remote CBT can be delivered with good effect based on the preference of the user as long as the core cognitive and behavioural interventions for SAD are integrated. However, results indicated the pooled within-group effect sizes from pre-treatment to post-treatment were significantly different with digital remote CBT such as iCBT ($g = 1.08$) and aCBT ($g = 1.19$) being potentially more effective than bCBT ($g = 0.79$). This is potentially due to technological features such as prompts and reminders that may enhance patient engagement and treatment adherence (Andersson et al., 2008; Lattie et al., 2022). However, it is also important to point out that the bCBT studies included in the present review were all self-guided in nature, whereas the iCBT and aCBT interventions were largely guided. The present study also found some significant differences between the treatment modalities at follow up with iCBT performing better than bCBT. However, as mentioned above the bCBT studies were primarily of a self-guided nature, and only one vCBT study was included in the review, thus findings should be considered preliminary and interpreted with caution. Studies examining the efficacy of vCBT for anxiety disorders more broadly have indicated the potential of this approach (Efron & Wootton, 2021; Yuen et al., 2013), thus studies specifically exploring the efficacy of vCBT for SAD are urgently needed.

Both high and low intensity remote CBT produced large pooled within-group effect sizes from pre-treatment to post-treatment with no significant differences in outcomes. Although the effect size for low intensity remote CBT was almost twice as large as that of high intensity remote CBT, it is important to interpret this finding with caution given there was only one high intensity study included in the current study. However, results from other meta-analyses have replicated the finding of similar effect sizes between low and high intensity treatment delivery. For example, moderator analyses in a meta-analysis of panic disorder found no significant differences between high and low intensity with three high intensity trials (Efron & Wootton, 2021), nor in a similar meta-analysis of obsessive-compulsive disorder that included six high intensity trials (Wootton, 2016). While replication specifically in SAD is required these results have important implications for stepped-care treatments where patients can be offered a low intensity and less costly intervention before progressing on to higher intensity and more costly treatment options if required. Successful implementation of stepped-care treatments has the potential to increase access to psychological support, minimise over-servicing patients, and reduce pressure on scarce psychological therapy resources (Richards et al., 2012).

When examining low intensity treatments only, those that were guided produced significantly larger within-group effect sizes than those that were unguided ($g = 1.16$ and $g = 0.81$, respectively). However, this difference was no longer significant at follow-up (guided $g = 1.26$; unguided $g = 0.98$). These results are consistent with previous meta-analyses that also examined post-treatment outcome differences between guided and unguided low intensity treatment for obsessive-compulsive disorder (Wootton, 2016), however follow-up comparisons are currently unavailable in the anxiety literature. The duration of treatment and amount of therapist contact provided in guided low intensity treatments did not moderate treatment outcomes, consistent with a Cochrane review examining iCBT for anxiety disorders (Olthuis et al., 2016). While our study examined therapist contact as a potential moderator of treatment outcome, it did not examine therapeutic alliance specifically, as measures of therapeutic alliance were inconsistently reported in the included studies. Therapist contact is the amount of time that the clinician and patient engage in communication. While therapeutic alliance is the relationship between clinician and patient that develops through empathic understanding, warmth, and manner of communicating and interpreting (Bordin, 1979). Taken together, the findings of this study suggest the existence of clinician contact (i.e., any amount of guidance) improves outcomes at post-treatment, but the impact of this contact is not sustained once the relationship has ceased (i.e., at follow up). Indeed, Zalaznik et al. (2021) proposed it is patient connection and resonance to the program content itself in remote treatments that leads to symptom improvement, thus reducing the importance of the therapeutic alliance specifically in remote treatment contexts (Andersson et al., 2012) and contact time required between patient and therapist. Alternatively, it may be that the content of the intervention (i.e., the cognitive and behavioural strategies) is the primary source of ongoing treatment benefits rather than alliance to the therapist or the program. This is not yet fully understood and further examination of the distinction between clinician contact, the development of therapeutic alliance, and alliance to the program in remote treatments should be an area of future research.

Between-group analyses indicated a medium between-group effect size at post-treatment favouring remote CBT when compared with all control groups (including waitlist, non-CBT remote treatment and face-to-face group CBT; $g = 0.71$). Subgroup analyses revealed large between-group effect sizes at post-treatment favouring remote CBT when compared to passive control groups ($g = 0.87$) and small effect sizes when compared to non-CBT remote treatments (e.g., interpersonal psychotherapy, psychodynamic therapy and applied relaxation; $g = 0.41$). These findings support the efficacy of remote CBT for SAD over and above other remote treatments.

Small between-group effect sizes were found at post-treatment when remote CBT was compared to face-to-face CBT (individual or group) in favour of remote CBT ($g = 0.34$). This finding suggests that remote CBT is at least as effective as face-to-face CBT for SAD. This finding is consistent with studies comparing remote CBT and face-to-face CBT in other anxiety and related disorders (e.g., Wootton, 2016). However, it is important to note that all of the remote CBT studies included in this analysis were iCBT studies thus further research is required to examine if other remote CBT modalities are as effective as face-to-face treatment. Regardless, this finding does have important implications for the dissemination of remote CBT for SAD, which is able to reduce barriers to treatment for patients. In particular, remote CBT has the potential to reduce the impact of anticipatory worry arising from attending

face-to-face sessions, which is a known negative predictor of SAD treatment adherence and outcomes (Mörtberg & Andersson, 2014).

4.1. Research limitations

The current study has a number of strengths including that it is the first meta-analysis to quantify the outcomes across the full spectrum of remote treatments for SAD, it provides a comparison of the various types of remote treatment for SAD, and compares guided and unguided low intensity treatments for SAD. However, it is important to consider the limitations of this study in the context of the findings. Firstly, this study included both RCTs and open trials in order to include data from the spectrum of remote CBT modalities, however, did not include grey literature (e.g., unpublished theses) as these studies have not been through the peer review process. As remote treatment for SAD continues to develop, a greater emphasis should be placed on RCTs which will allow future research to evaluate the efficacy of different remote CBT modalities more robustly. Future research may also wish to include the grey literature. Secondly, an overwhelming proportion of studies in this meta-analysis utilised iCBT, which limits the ability to synthesize results across studies. Third, while the current results are promising, they should be interpreted with caution given high levels of heterogeneity found in some analyses, limited follow-up data across the varying treatment types, variability in outcome measures used, and variability in the quality of studies indicated in a synthesis of risk of bias. In particular, the RoB tool (Sterne et al., 2019) revealed possibility of bias in the domain 'measurement of outcome'. Future research should emulate study protocols that consider the potential risk of bias as a result of participant self-report measures and use additional strategies such as clinician-administered measures conducted by blinded assessors. Overall, more rigorous research is needed in this field. Finally, some of the moderator analyses were underpowered, especially for those investigating vCBT or high intensity treatments, as only one study used this treatment methodology. It is important for the results of this study to be replicated as further studies emerge.

4.2. Conclusion

In conclusion, the current meta-analysis is the first study to demonstrate the efficacy of the full spectrum of available remote CBT modalities for SAD. Remote CBT treatments have the potential to improve the dissemination of CBT and to also enhance treatment choice for individuals with SAD reducing the burden of this disorder. However, further research is required to examine the efficacy of remote CBT modalities other than iCBT, as the evidence base is less developed than it is for iCBT. Additionally, studies that examine the durability of treatment effects beyond 12-months are required across all remote CBT modalities.

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Declaration of Competing Interest

None.

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