

Review article

Efficacy of remotely-delivered cognitive behavioural therapy for obsessive-compulsive disorder: An updated meta-analysis of randomised controlled trials

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ABSTRACT

Introduction: Despite remotely-delivered cognitive behavioural therapy (CBT) being an emerging field, the evidence of its efficacy in obsessive-compulsive disorder (OCD) is limited. We aimed to estimate the efficacy of remotely-delivered CBT for OCD, compared to face-to-face CBT and non-CBT control conditions.

Methods: Randomised clinical trials (RCTs) identified through a systematic literature search of PubMed, Ovid/PsychINFO and Web of Science until 21/06/2021. Eligible studies included individuals with OCD evaluating at least one form of remotely-delivered CBT versus a control condition. Random-effects meta-analyses, sub-analyses, meta-regressions, heterogeneity analyses, publication bias assessment and quality assessment.

Results: Twenty-two RCTs were included ($n = 1796$, mean age = 27.7 years, females = 59.1 %). Remotely-delivered CBT was more efficacious than non-CBT control conditions for OCD symptoms ($g = 0.936$ 95 % CI = 0.597–1.275, $p < .001$), depressive symptoms ($g = 0.358$, 95 % CI = 0.125–0.590, $p = .003$) and anxiety symptoms ($g = 0.468$, 95 % CI = 0.135–0.800, $p = .006$). There were no significant differences in efficacy between remotely-delivered CBT and face-to-face CBT for OCD symptoms ($g = -0.104$ 95 % CI = -0.391 – 0.184 , $p = .479$), depressive symptoms ($g = 0.138$, 95 % CI = -0.044 – 0.320 , $p = .138$), anxiety symptoms ($g = 0.166$, 95 % CI = -0.456 – 0.780 , $p = .601$) or quality of life ($g = 0.057$, 95 % CI = -0.178 – 0.292 , $p = .489$). Higher baseline severity of OCD symptoms was associated with a lower efficacy of remotely-delivered CBT compared to face-to-face CBT ($\beta = -0.092$, $p = .036$). The quality of the included studies was mostly identified as “low risk of bias” (45.5 %) or “some concerns” (45.5 %).

Limitations: Heterogeneity and limited evidence for some outcomes.

Conclusions: Remotely-delivered CBT appears efficacious in reducing OCD symptoms and other relevant outcomes and is therefore a viable option for increasing treatment access. Preliminary evidence suggests some individuals with severe OCD may benefit more from face-to-face than remotely-delivered CBT.

1. Introduction

Obsessive-compulsive disorder (OCD) is a common condition

characterised by unwanted, recurrent thoughts (obsessions) and time-consuming, repetitive behaviours (compulsions) which cause clinically significant distress and/or substantial functional impairment (American

Abbreviations: OCD, Obsessive compulsive disorder; CBT, Cognitive behavioural therapy.

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Psychiatric Association, 2013; World Health Organization, 2018). Cognitive behavioural therapy (CBT) is a well-established, first-line intervention for individuals with OCD (NICE, 2005). However, major barriers to accessing CBT for OCD sufferers have been identified. Only a minority of patients access CBT (Kohn et al., 2004), typically after very long delays (García-Soriano et al., 2014). Indeed, OCD is associated with greater delays in accessing treatment than many other psychiatric disorders, which is concerning, not least because illness duration is predictive of poorer outcomes (Albert et al., 2019; Micali et al., 2010; Zheng et al., 2021). Barriers to accessing CBT include inconvenience, geographical distance, financial costs and cultural beliefs (Kataoka et al., 2002; Marques et al., 2010), as well as service-related factors such as limited therapist availability and lack of adequate training/expertise (Keleher et al., 2020; Nair et al., 2015). The remote (e.g., online) delivery of CBT has the potential to significantly improve access to clinical care for patients with OCD for a wide range of reasons. For example, remotely-delivered CBT overcomes the burden of travelling to appointments and reduces family barriers. It may also be associated with less stigma than attending a mental health clinic. In addition, remotely-delivered CBT often incorporates self-help materials and involves less direct contact with therapists and fewer service resources than face-to-face CBT, making it more scalable. However, it may also be associated with significant costs and accessibility issues (for instance, with families without access to internet). Face-to-face CBT typically involves sharing a physical space with the therapist and is associated with increased clinician time (Andrews et al., 2018).

Over the last decade, there has been burgeoning interest in remotely-delivered CBT for OCD. Several reviews have been conducted in an attempt to synthesise the literature, including those summarizing outcomes from uncontrolled clinical trials (Wootton, 2016). To our knowledge, only two previous meta-analyses have focussed exclusively on randomised controlled trials (RCTs) of remotely-delivered CBT for OCD (Dèttore et al., 2015; Hoppen et al., 2021), which are more methodologically robust and have a lower risk of bias than uncontrolled trials. Both meta-analyses found that remotely-delivered CBT for OCD resulted in a significant decrease in OCD symptoms relative to control conditions, with large ($d = 0.82$) (Dèttore et al., 2015) and moderate ($g = 0.59$) (Hoppen et al., 2021) effect sizes, respectively. Moreover, neither study found statistically significant differences between remotely-delivered and face-to-face interventions, suggesting that on average the two modes of delivery are equivalent.

Despite the encouraging evidence for remotely-delivered CBT for OCD, there are several limitations of the previous meta-analyses that should be noted. First, across both meta-analyses, all but one of the RCTs that were included were based on adult samples. It cannot be assumed that findings would generalise to young people, given that there are potential differences in engaging and communicating with young people versus adults. Furthermore, CBT for OCD in young people often requires a high level of family involvement in order to optimise outcomes (McGrath and Abbott, 2019), which could be harder to achieve remotely. Second, the previous meta-analyses of RCTs have been relatively narrow in their scope, and included a small number of studies (Dèttore et al., 2015) or focussed exclusively on low intensity interventions and did not include high intensity remotely-delivered interventions (e.g. real-time CBT delivered via videoconferencing) (Hoppen et al., 2021). Also, they focussed mainly on OCD symptoms and not other relevant outcomes such as depressive symptoms, anxiety symptoms or quality of life (Hoppen et al., 2021). This is important because telephone and video CBT for OCD have become the main mode of delivery in many clinical services since the COVID-19 pandemic (Wheaton et al., 2021), and have been recommended when in person treatment is not possible (Fineberg et al., 2020; Jassi et al., 2020). Third, there is limited evidence on the efficacy for other outcomes including depressive symptoms, anxiety symptoms or quality of life. One of the previous meta-analyses found that remotely-delivered CBT was not efficacious for depressive symptoms in OCD (Dèttore et al., 2015) but

beyond this no secondary outcomes have been examined. Fourth, little attention has been given to the factors that predict response to remotely-delivered CBT (Dèttore et al., 2015; Hoppen et al., 2021). There is significant heterogeneity in outcomes following remotely-delivered CBT for OCD, and understanding the predictors of response to remotely-delivered CBT is crucial in order to inform clinical decision-making. For face-to-face CBT, a range of characteristics have been shown to predict outcomes in OCD including illness severity, functional impairment, poor insight, externalizing symptoms and family accommodation (García et al., 2010). Further research is needed to establish the factors that predict response to remotely-delivered CBT.

In summary, there is a need for an up-to-date synthesis of the literature on remotely-delivered CBT for OCD, especially given that a) this field is rapidly evolving, and b) there has been increasing reliance on this mode of delivery since the COVID-19 pandemic. The current meta-analysis aimed to provide a comprehensive evaluation of the efficacy and acceptability of remotely-delivered CBT for OCD symptoms and other secondary outcomes compared to both face-to-face CBT and non-CBT based control conditions. We further evaluated a wide range of predictors of response to interventions to disentangle any differences in efficacy observed.

2. Methods

The protocol for this study was registered on PROSPERO (CRD42021267447). This study was conducted in accordance with the PRISMA 2020 item checklist (Page et al., 2021) (eTable 1).

2.1. Literature search and selection criteria

A systematic search strategy was used to identify relevant articles, and a two-step literature search was implemented by two independent researchers (GSP, APS). PubMed, Ovid/PsychINFO and Web of Science database (all databases) were searched from inception until the 21st of June 2021. Web of Science database incorporates the Web of Science Core Collection, BIOSIS Citation Index, KCI-Korean Journal Database, MEDLINE, Russian Science Citation Index, and SciELO Citation Index. The following search terms were applied: (“Obsessive Compulsive Disorder” OR “obsessive-compulsive disorder” “OCD” OR “obsess*” OR “compuls*”) AND (“telehealth” OR “telepsychiatry” OR “telepsychology” OR “telemental” OR “teletherapy” OR “telemedicine” OR “internet” OR “telecommunication” OR “online therapy” OR “telephon*” OR “computer” OR “remote” OR “web based” OR “phone” OR “mobile” OR “email” OR “online” OR “videoconfer*” OR “bibliotherapy” OR “iCBT”). Articles identified were screened as abstracts, and after the exclusion of those which did not meet our inclusion criteria, the full texts of the remaining articles were assessed for eligibility and decisions were made regarding their inclusion in the review. We manually searched Cochrane Central Register of Reviews and OpenGrey for grey literature. We completed our search by reviewing the references of previously published articles and extracting any additional relevant titles.

Studies included were: a) randomised controlled clinical trials, b) including individuals with an established OCD diagnosis (any age), c) in which at least one of the treatment arms includes remotely-delivered CBT (e.g. internet- or telephone-delivered treatment), d) with at least one intervention and one control group (either i) face-to-face CBT or ii) other control conditions including treatment as usual, waitlist or others), e) evaluating the efficacy of the intervention group on mental health outcomes or acceptability (see below and in eMethods 1), f) providing either raw results on those outcomes for both groups or providing computed effect sizes on the difference between the groups, g) published in English. Exclusion criteria were: a) observational cohorts, reviews, qualitative studies, commentaries, clinical cases, or study protocols, b) open-label studies and observational studies, c) studies including individuals without established OCD according to DSM/ICD or equivalent criteria, d) studies without a comparison group, e) studies in another

language other than English, f) overlapping studies for the same outcome (several studies from the same cohort could be included if they provided complimentary data for several mental health outcomes). When overlap was found, the study with the largest sample size was selected to increase the statistical power of our analyses.

2.2. Data extraction

Two researchers (UP, APS) independently extracted data from all included studies, into a database. This database was cross-checked by a third author (GSP). Summary of variables included: first author and year of publication, country, continent, design, age (mean \pm SD and range), sex (% females), sample size for each group, intervention content, intervention duration, level of contact (see eMethods 2), content of the control group (face-to-face CBT or non-CBT control conditions including waitlist, treatment as usual or other interventions, see below), outcome, outcome measure/instrument, instrument content, intervention group, number of sessions, mode of administration (virtual/internet vs telephone), comparison group (waitlist vs treatment as usual vs other), parental involvement (reported vs not reported), therapy involvement (time per week), family history, concurrent psychoactive medication (% exposure to antidepressants, % exposure to antipsychotic medication), previous psychological intervention, outcomes (OCD symptoms, depressive symptoms, anxiety symptoms, functioning, quality of life) outcome results (mean \pm SD before and after the intervention for continuous variables, % at follow-up for categorical variables), attrition rate (% dropout), and quality assessment (see below).

2.3. Strategy for data synthesis

The primary meta-analytical outcome was the efficacy of remotely-delivered CBT for OCD symptoms, compared to control conditions (waitlist, treatment as usual, others) and face-to-face interventions. Secondary outcomes included the efficacy of remotely-delivered CBT for other mental health outcomes (depression, anxiety, quality of life) and acceptability defined as the dropout rates of remotely-delivered CBT compared to the control conditions (face-to-face CBT and other control conditions independently, as with the other outcomes). A threshold of three studies was established as the minimum to conduct a meta-analysis.

We calculated Hedges' g (95 % CI) as the primary effect size to evaluate the efficacy of the telehealth interventions compared to face-to-face interventions and other control conditions. We chose a pre-post correlation of 0.5 for our analyses. For the drop-out rates, the effect size was the % of attrition (95 % CI).

We carried out our subgroup meta-analyses and meta-regressions for OCD symptoms and attrition (both comparisons remotely-delivered CBT vs control conditions and remotely-delivered CBT vs face-to-face CBT). We conducted sensitivity analyses for a) continent (Europe vs Australasia vs North America), b) instrument (studies using Children's Yale-Brown Obsessive Compulsive Scale-CY-BOCS- vs other instruments), c) mode of administration (virtual/internet vs phone), d) comparison groups (waitlist group vs treatment as usual vs other), e) parental involvement (studies with parental involvement vs non-parental involvement/parental involvement not mentioned), f) age range (studies conducted in children and adolescents vs studies conducted in adults vs both/unclear). An additional sub-analysis g) was carried out according to the contact with the therapist in line with previous descriptions (see eMethods 2). Our meta-analytical regressions for variables reported in at least seven independent samples (Salazar de Pablo et al., 2022) evaluated the association between the efficacy of the intervention and (i) amount of therapist input/number of sessions, (ii) duration of the intervention, (iii) mean age, (iv) % of females, (v) quality of the study, (vi) exposure to antidepressant medication and (vii) baseline severity of OCD symptoms.

Since high heterogeneity was expected, random-effects meta-

analyses were conducted (DerSimonian and Laird, 1986). The presence of publication bias was assessed by inspecting the funnel plots and by conducting Egger's test (Egger et al., 1997). This was complemented by the "trim and fill" method to correct for the presence of missing studies if a risk of publication bias (i.e., small sample bias) was detected. Heterogeneity among study point estimates was assessed using Q statistics. The proportion of the total variability in the effect size estimates was evaluated with the I^2 index (Lipsey and Wilson, 2000). All p values reported in the meta-analysis were two-sided, and the level of significance was established at a $p < .05$. Comprehensive Meta-analysis (CMA) V3 (Borenstein et al., 2013) was used to perform the analyses.

2.4. Risk of bias (quality) assessment

The quality of studies was assessed using the "Cochrane Risk of Bias Tool" (RoB2) (Higgins et al., 2011). The overall quality was rated in three categories: low risk, some concerns or high risk according to the following items: randomisation process, deviations from intended interventions, measurement of the outcome and selection of the reported result. More details can be found in eMethods 3.

3. Results

3.1. Sample characteristics

The literature search yielded 6,744 citations, of which 100 full-text articles were assessed for eligibility. After excluding those not meeting the inclusion criteria, 22 studies from 19 samples were included in at least one of the individual analyses (Fig. 1). 36.8 % of the samples were conducted in children and adolescents. Study characteristics are shown in Table 1.

The overall database, considering all independent studies, comprised 1796 individuals (939 participants in the remote treatment conditions and 847 in the control condition, including patients receiving face-to-face CBT as well). Their mean age was 27.7 ± 5.3 years (range 5–80 years). 59.1 % were females. Most studies were carried out in Europe ($n = 11$, 57.9 %), followed by North America ($n = 5$, 26.3 %), Australia ($n = 2$, 10.5 %) and finally Asia ($n = 1$, 5.3 %). The weighted mean duration of the follow-up was 37.3 ± 26.6 months (range = 3–192 months). 36.1 % of the sample was exposed to antidepressant medication. The ratio of exposure to antidepressant medication between the remotely-delivered CBT group and the control groups was 1.1. In two samples, exposure to antipsychotic medication was an exclusion criterion, while in the rest the number of individuals exposed to antipsychotic medication was not specified. 56.2 % of the sample had received at least one psychological intervention (any) before the study. The ratio of exposure to psychological intervention between the remotely-delivered CBT group and the control group was 1.1.

3.2. Quality assessment and publication bias

The quality of the clinical trials ranged from low risk of bias to high risk of bias. Two studies (9.1 %) were rated as "high risk of bias" (Salemink et al., 2015; Tolin et al., 2007), 10 (45.5 %) were rated as with "some concerns" (Herbst et al., 2014; Hwang et al., 2021; Kenwright et al., 2005; Lovell et al., 2017a, 2017b; Lovell et al., 2006; Mahoney et al., 2014; McCrone et al., 2007; Schröder et al., 2020; Wootton et al., 2013) and 10 (45.5 %) were at "low risk of bias" (Andersson et al., 2012; Andersson et al., 2015; Aspvall et al., 2021; Comer et al., 2014; Greist et al., 2002; Lenhard et al., 2017; Storch et al., 2011; Tie et al., 2019; Turner et al., 2014; Vogel et al., 2014) (eTable 2, Fig. 2).

Asymmetry in the funnel plot was detected for the analysis comparing OCD symptoms in remotely-delivered interventions and control conditions (eFig. 1). Egger's test was also statistically significant ($t = 4.733$, $p = .001$). The trim and fill method did not provide adjusted values and maintained the same effect size. Publication bias was not

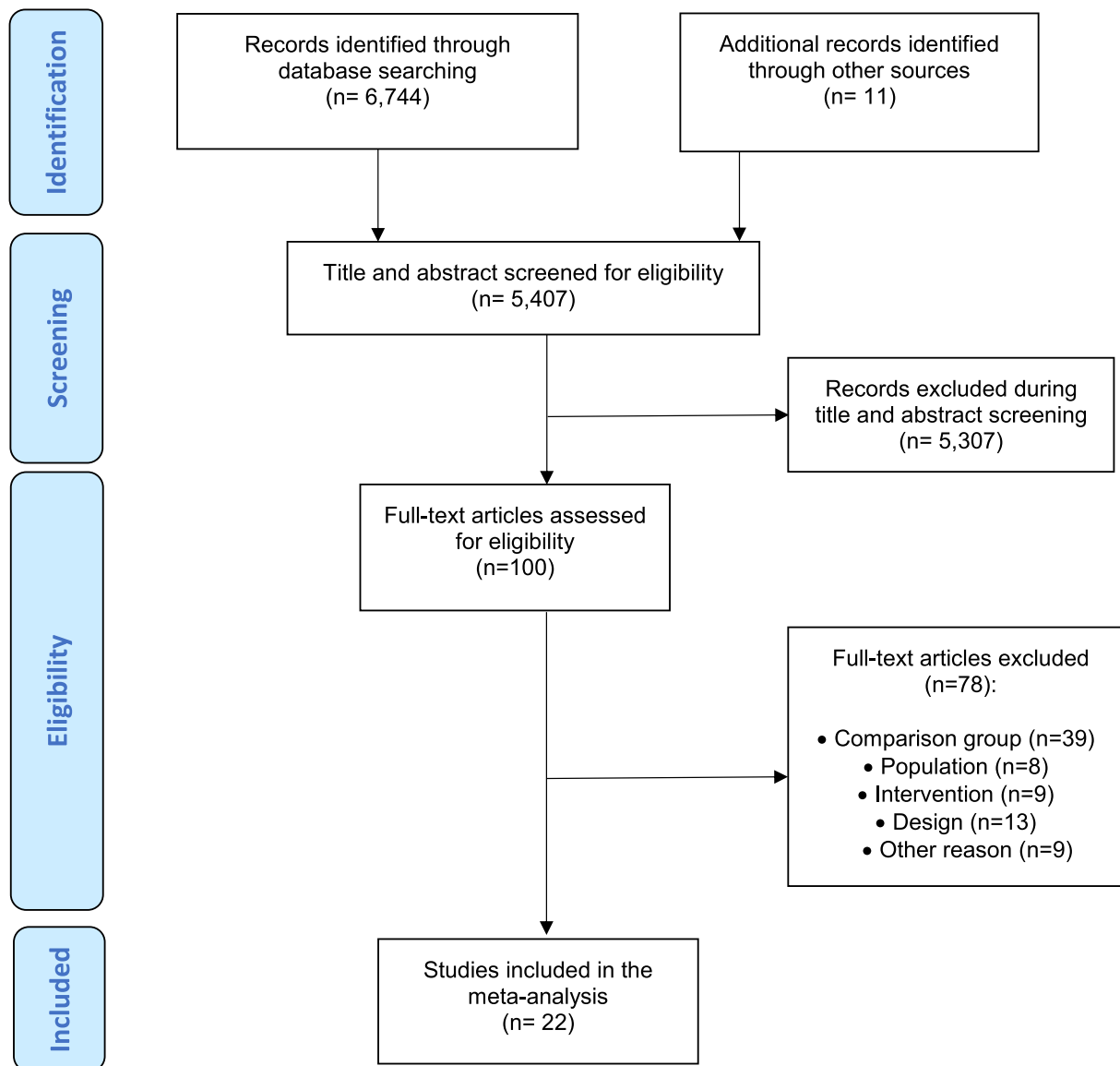


Fig. 1. Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) flowchart outlining study selection process.

detected in either the funnel plot inspection (eFigs. 1–2) or in the Egger's test (all $p > .05$) for any of the other evaluated comparisons (eTable 3).

3.3. Efficacy of remotely-delivered CBT compared to non-CBT control conditions

Efficacy of remotely-delivered CBT compared to control conditions is reported in Table 2, eTable 4, Fig. 3 and eFig. 3. Remotely-delivered CBT was more efficacious than control conditions for OCD symptoms, with a large effect size ($k = 10$, $n = 1,117$, Hedges' $g = 0.936$ 95 % CI = 0.597–1.275, $p < .001$). Similarly, remotely-delivered CBT was more efficacious than control conditions with respect to secondary outcomes, although with smaller effect sizes: depressive symptoms ($k = 9$, $n = 1,1063$, Hedges' $g = 0.358$, 95 % CI = 0.125–0.590, $p = .003$) and anxiety symptoms ($k = 3$, $n = 150$, Hedges' $g = 0.468$, 95 % CI = 0.135–0.800, $p = .006$). Acceptability, as indexed by lack of attrition, was higher in individuals receiving remotely-delivered CBT than control conditions ($k = 10$, $n = 117$, OR = 0.332, 95 % CI = 0.158–0.696, $p = .004$). Functioning and quality of life were not reported by enough studies to analyse. Heterogeneity across the included studies was statistically significant for OCD symptoms ($Q = 49.842$, $I^2 = 81.943$ % $p < .001$) and

depressive symptoms ($Q = 20.059$, $I^2 = 60.117$ % $p = .01$) but not for the other outcomes.

3.4. Efficacy of interventions compared to face-to-face CBT

Efficacy of remotely-delivered CBT compared to face-to-face CBT is reported in Table 2, eTable 4, Fig. 4 and eFig. 4. There were no statistically significant differences in efficacy between remotely-delivered CBT and face-to-face CBT for OCD symptoms ($k = 8$, $n = 530$, Hedges' $g = -0.104$ 95 % CI = -0.391 – 0.184 , $p = .479$), depressive symptoms ($k = 6$, $n = 467$, Hedges' $g = 0.138$, 95 % CI = -0.044 – 0.320 , $p = .138$), anxiety symptoms ($k = 3$, $n = 358$, Hedges' $g = 0.166$, 95 % CI = -0.456 – 0.780 , $p = .601$) or quality of life ($k = 3$, $n = 515$, Hedges' $g = 0.057$, 95 % CI = -0.178 – 0.292 , $p = .637$). There were no statistically significant differences in the drop-out rates between individuals receiving remotely-delivered CBT and face-to-face CBT ($k = 8$, $n = 530$, OR = 1.207, 95 % CI = 0.708–2.057, $p = .489$). Functional impairment was not reported by enough studies to analyse. Heterogeneity across the included studies was statistically significant for OCD symptoms ($Q = 16.389$, $I^2 = 57.289$ % $p = .022$) but not for the other outcomes ($p > .05$).

Table 1
Main characteristics of included studies.

First author and year of publication ^a	Country	Age: Mean ± SD (range)	% females	Intervention group				Control group	
				Content	N	Duration	Level of contact	Content	N
(Andersson et al., 2012)	Sweden	34 ± 13 (18–67)	66.3	Internet-delivered CBT	50	10 weeks	MC	Need-based/support intervention	51
(Andersson et al., 2015)	Sweden	34 ± 13 (18–67)	66.3	Internet-delivered CBT	50	10 weeks	MC	Need-based/support intervention	51
(Aspvall et al., 2021)	Sweden	13.4 ± 2.6 (8–17)	61.8	Internet-delivered CBT	74	16 weeks	PTA	In person CBT	78
(Comer et al., 2014)	USA	6.6 ± 1.3	40.9	Internet-delivered family-based CBT	11	14 weeks	PTA	In person CBT	11
(Greist et al., 2002)	USA, Canada	39 ± 12 (15–80)	42	Computerised CBT	74	10 weeks	PSH	Relaxation; in person CBT	75; 69
(Herbst et al., 2014)	Germany	35.6 ± 9.5	64.7	Internet-delivered CBT	16	8 weeks	MC	Waitlist	18
(Hwang et al., 2021)	Republic of Korea	25.3 ± 9.2	59.3	Mobile phone CBT application	12	6 weeks	MC	In person CBT	15
(Kenwright et al., 2005)	UK	40	57.5	Telephone-delivered CBT	22	17 weeks	MC	Need-based intervention	22
(Lenhard et al., 2017)	Sweden	14.6 ± 1.7	46	Internet-delivered CBT	33	12 weeks	PSH	Waitlist	34
(Lovell et al., 2006)	UK	31.9 ± 9.5 (16–65)	59.7	Telephone-delivered CBT	36	10 weeks	PTA	In person CBT	36
(Lovell et al., 2017b)	UK	32.7 (18–77)	60.3	Computerised CBT	315	12 weeks	SA	Waitlist	158
(Lovell et al., 2017a)	UK	32.7 (18–77)	60	Computerised CBT	314	12 weeks	MC	Waitlist	158
(Mahoney et al., 2014)	Australia	39.2 ± 13.3	74.6	Internet-delivered CBT	32	10 weeks	PSH	Waitlist	35
(McCrone et al., 2007)	USA, Canada	N.A.	N.A.	Computerised CBT	74	10 weeks	PSH	In person CBT or Relaxation	144
(Salemink et al., 2015)	The Netherlands	15.4 ± 2.3 (12–19)	62.5	Computerised CBT	9	11 days	SA	In person CBT	7
(Schröder et al., 2020)	Germany	40.3 ± 13.1	76.6	Internet-delivered CBT	64	8 weeks	PSH	In person CBT	64
(Storch et al., 2011)	USA	11.1 ± 2.6	39	Web-camera CBT	16	12 weeks	PTA	Waitlist	15
(Tie et al., 2019)	UK	14.2 (11–18)	54.2	Telephone-delivered CBT	36	17 weeks	PTA	In person CBT	36
(Tolin et al., 2007)	USA	37.1 ± 13.3	63.7	Bibliotherapy	20	6 weeks	PSH	In person CBT	21
(Turner et al., 2014)	UK	14.3 ± 2.1	45.8	Telephone-delivered CBT	36	17 weeks	PTA	In person CBT	36
(Vogel et al., 2014)	Norway	33.1 ± 11.6	60	Web-camera CBT	10	12 weeks	PTA	Waitlist	10
(Wootton et al., 2013)	Australia	38 + 11 (18–68)	75	Bibliotherapy or internet-delivered CBT	35	8 weeks	MC	Waitlist	17

CBT: cognitive behavioural therapy; CTRL: control; INT: intervention; MC: minimal-contact therapy; PSH: predominantly self-help; PTA: predominantly therapist-administered.

^a Overlapping studies contributed to the meta-analyses through different outcomes.

3.5. Heterogeneity, sub-analysis and meta-regressions

In the subgroup analyses, CBT delivered virtually or using internet was more efficacious than CBT delivered by book or phone in the comparison against face-to-face CBT ($Q = 5.206, p = .023$). There was no significant effect on the continent, instrument, mode of administration, comparison group, parental involvement, age range or levels of contact (all $p > .05$, eTable 4).

In the meta-regression analyses, female sex was found to be associated with higher drop-out rates for remotely-delivered CBT compared to control conditions ($\beta = 0.04, p = .04$) (eTable 5, eFig. 5). Higher baseline severity of OCD symptoms was associated with a lower efficacy of remotely-delivered CBT compared to face-to-face CBT ($\beta = -0.092, p = .036$) (Table 3, eFig. 6). No significant differences were found in any of the other meta-regressions (testing the moderating effect of the number of sessions, duration of the intervention, age, % females, % exposure to antidepressant medication and quality of the study) (all $p > .05$) (Table 3, eTable 5).

4. Discussion

To our knowledge, this is the largest meta-analysis of remotely-

delivered CBT for OCD to date. Furthermore, this is the first meta-analysis to examine the efficacy of remotely-delivered CBT for OCD on a range of secondary outcomes, and it represents the most comprehensive investigation of predictors of treatment response. Results indicated that, relative to non-CBT controls, remotely-delivered CBT for OCD is efficacious in reducing OCD symptoms, with a large effect size (Hedges' $g = 0.936$). Face-to-face CBT typically involves sharing a physical space with the therapist and is associated with moderate (Hoppen et al., 2021) to large (Dèttore et al., 2015) effect sizes. We also demonstrated that remotely-delivered CBT for OCD is associated with smaller but still significant reductions in depressive symptoms (Hedges' $g = 0.358$) and anxiety symptoms (Hedges' $g = 0.468$). Thus, remotely-delivered CBT for OCD appears to improve mental health across multiple domains.

Importantly, no differences in efficacy were found between remotely-delivered CBT and face-to-face CBT for OCD symptoms, depressive symptoms, anxiety symptoms or quality of life. This implies that for the average patient with OCD, the benefits of CBT are likely to be equivalent regardless of whether the treatment is delivered in person or remotely. This finding is supported by a previous meta-analysis (Dèttore et al., 2015) and a systematic review (Sucala et al., 2012) which found no differences in the patient-therapist relationship between remotely-delivered CBT and face-to-face therapy. This finding is particularly

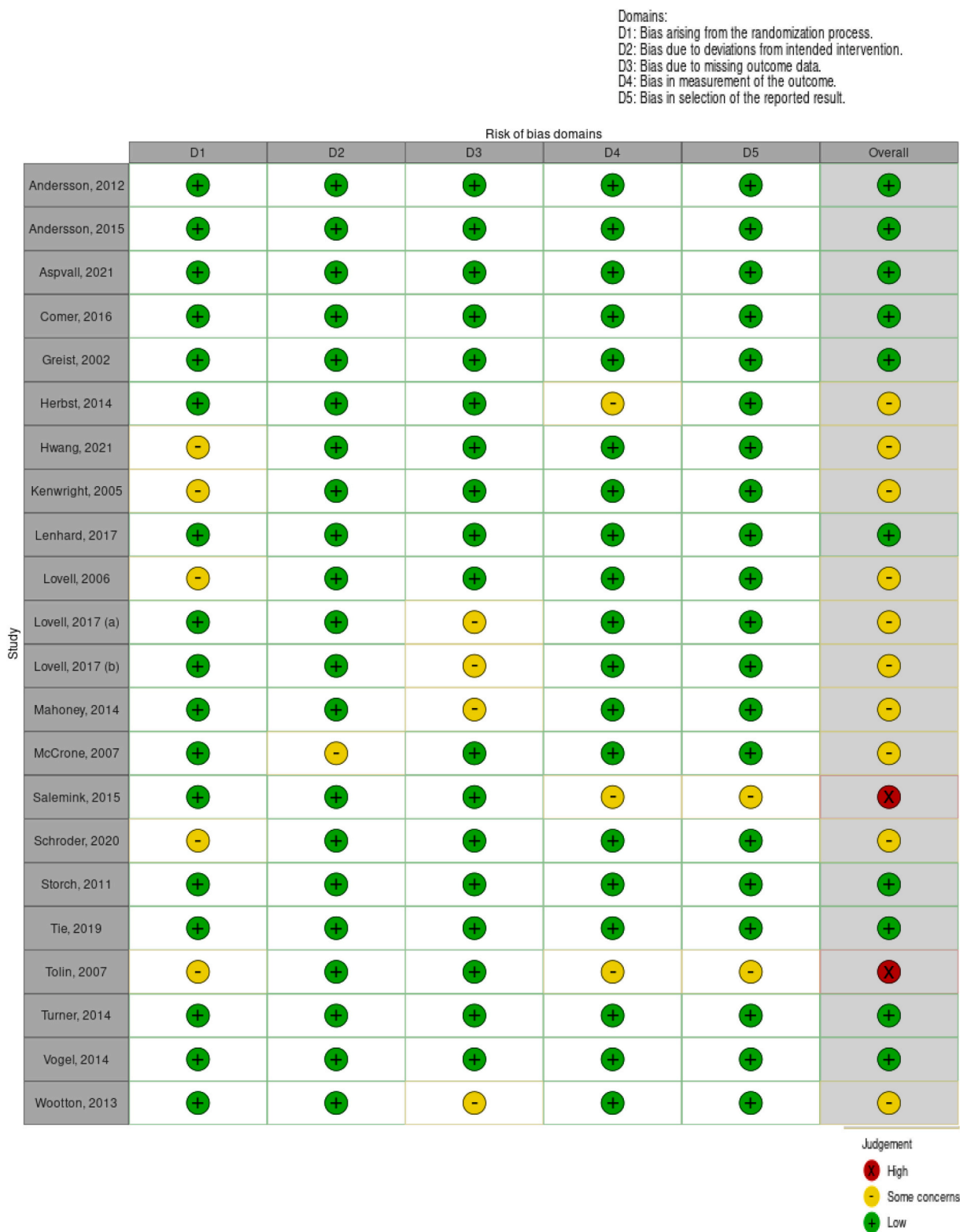


Fig. 2. Quality assessment.

important and encouraging in the context of the COVID-19 pandemic and the marked increased use of remotely-delivered interventions in order to prevent exposure to unnecessary human contact (Moazzami et al., 2020) while maintaining patient access to treatment (Panchal et al., 2021). In fact, the proportion of referrals to child and adolescent mental health services for OCD symptoms increased during the pandemic despite the overall number of referrals falling (Henein et al.,

2021). Furthermore, recent data suggest that for many patients with OCD, symptoms worsened during the pandemic period (Davide et al., 2020; Wheaton et al., 2021). In this context, our finding suggesting that remotely-delivered CBT for OCD is effective is highly relevant.

There has been extensive discussion of the advantages and disadvantages of remotely-delivered CBT in the literature. On the one hand, previous studies have shown that this mode of delivery is associated

Table 2
Efficacy of remotely-delivered CBT versus control condition or face-to-face CBT.

Remotely-delivered CBT vs control conditions											
Outcome	No. of studies	N INT	N CTRL	Hedges' g			z score	p	Test for heterogeneity		
				Mean	95 CI				Q	I ²	p
OCD symptoms	10	603	514	0.936	0.597	1.275	5.412	<.001	49.842	81.943	<.001
Depressive symptoms	9	581	482	0.358	0.125	0.590	3.016	.003	20.059	60.117	.010
Anxiety symptoms	3	84	66	0.468	0.135	0.800	2.760	.006	1.937	0.000	.380

Remotely-delivered CBT vs control conditions											
Outcome	No. of studies	N INT	N CTRL	Effect size			z score	p	Test for heterogeneity		
				OR	95 CI				Q	I ²	p
Attrition	10	603	514	0.332	0.158	0.696	-2.919	.004	13.058	46.395	.071

Remotely-delivered CBT vs face-to-face CBT											
Outcome	No. of studies	N INT	N CTRL	Hedges' g			z score	p	Test for heterogeneity		
				Mean	95 CI				Q	I ²	p
OCD symptoms	8	262	268	-0.104	-0.391	0.184	-0.707	.479	16.389	57.289	.022
Depression symptoms	6	231	236	0.138	-0.044	0.320	1.482	.138	3.893	0.000	.565
Anxiety symptoms	3	178	180	0.166	-0.456	0.789	0.523	.601	5.597	64.268	.061
Quality of life	3	257	258	0.057	-0.178	0.292	0.472	.637	3.138	36.273	.208

Remotely-delivered CBT vs face-to-face CBT											
Outcome	No. of studies	N INT	N CTRL	Effect size			z score	p	Test for heterogeneity		
				OR	95 CI				Q	I ²	p
Attrition	8	262	268	1.207	0.691	0.489	0.691	.489	4.430	0.000	.489

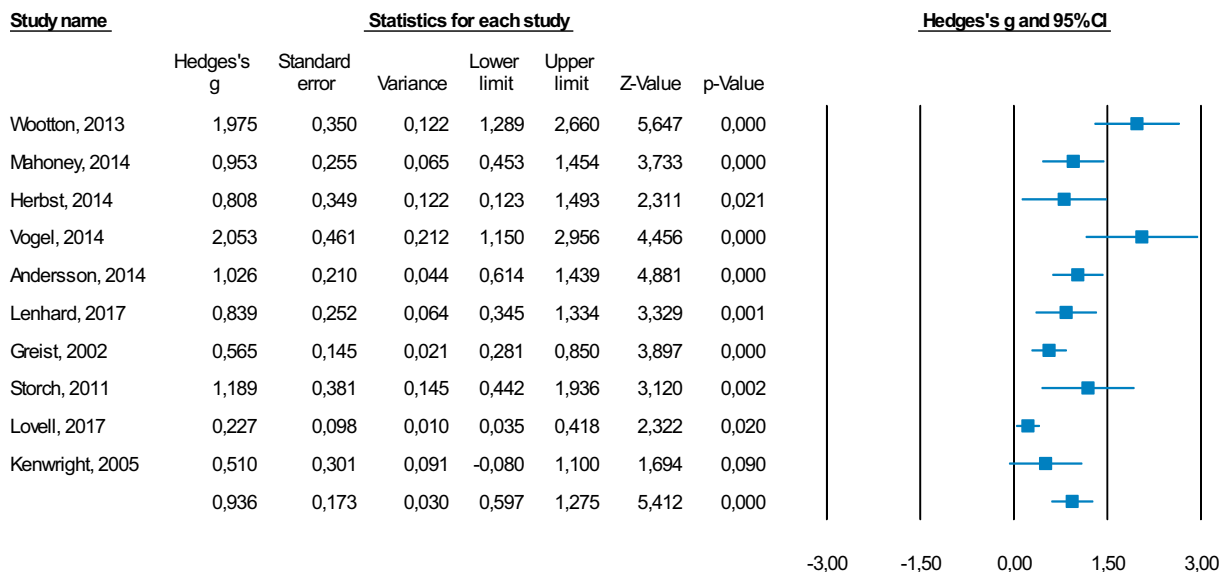


Fig. 3. Efficacy of remotely-delivered CBT versus control conditions for OCD symptoms.

with high levels of patient satisfaction, convenience and acceptance (Shanthanna et al., 2020). On the other hand, some have highlighted drawbacks, such as risk on confidentiality and data security or negative attitudes towards remote care (e.g. fear of having more difficulties when dealing with a crisis remotely or the lack of non-verbal cues during therapy) (Stoll et al., 2019). According to previous meta-analyses, 15.6 % of OCD patients refuse standard CBT, and a further 15.9 % of treatment starters drop out of treatment (Leeuwrik et al., 2019). According

to our results, drop-out rates were lower in individuals receiving remotely-delivered CBT than in non-CBT control conditions. No differences in drop-out were found between individuals receiving remotely-delivered CBT and face-to-face CBT, again providing support for remote treatment, especially in cases where remote delivering could reduce other barriers to access (e.g. travel costs, time to be implemented) (Patel et al., 2018). Both advantages and disadvantages should be considered when establishing clinical guidelines and

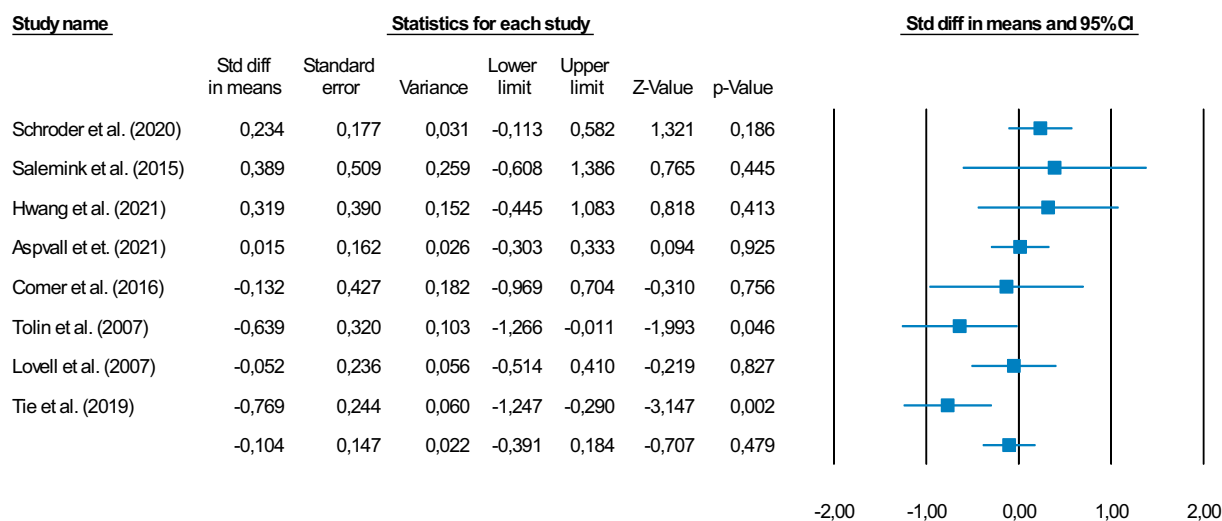


Fig. 4. Efficacy of remotely-delivered CBT versus face-to-face CBT for OCD symptoms.

Table 3

Meta-regressions.

	No. of studies	β coefficient	SE	95 % CI	Z-value	p value	
<i>A/ Meta-regressions OCD symptoms remotely-delivered CBT vs control conditions.</i>							
Number of sessions	10	-0.011	0.057	-0.123	0.101	-0.815	.854
Duration of the intervention	10	0.059	0.084	-0.105	0.224	0.704	.481
Age	10	-0.004	0.019	-0.041	0.033	-0.199	.842
% females	10	0.0141	0.015	-0.162	0.044	0.911	.382
Quality of the study	10	-0.842	0.562	-1.943	0.260	-1.498	.134
Baseline OCD severity	10	-0.0123	0.051	-0.113	0.089	-0.241	.810
<i>B/ Meta-regressions OCD symptoms remotely-delivered CBT vs face-to-face CBT</i>							
Number of sessions	8	-0.062	0.041	-0.143	0.018	-1.520	.128
Duration of the intervention	8	-0.057	0.026	-0.107	0.314	-0.157	.875
Age	8	0.005	0.013	-0.021	0.031	0.391	.696
% females	8	0.024	0.026	-0.027	0.075	0.920	.357
Quality of the study	8	-0.225	0.177	-0.571	0.123	-1.267	.205
Baseline OCD severity	8	-0.092	0.044	-0.179	-0.006	-2.091	.036

Bold value indicates p < 0.05 or statistically significant.

recommendations.

In the current study, we evaluated a wide range of predictors of response to remotely-delivered CBT. Higher baseline severity of OCD symptoms was associated with a lower efficacy of remotely-delivered CBT. Wiese et al. (2022) reported that providers disclosed that remotely-delivered exposure and response prevention was more feasible in individuals with OCD and lower symptom severity (Wiese et al., 2022). This is in line with our findings, which suggested that higher severity of OCD symptoms was associated with a lower efficacy of remotely-delivered CBT compared to face-to-face CBT. This is also in line with previous findings that recommend stepped-care treatment approaches for OCD (Aspvall et al., 2021; Lovell and Bee, 2008; Tolin et al., 2011), where remotely-delivered CBT is offered to mild-to-moderate cases whereas face-to-face CBT may be more appropriate for severe cases. Of course, many other individual factors (e.g. comorbidities such as autism spectrum disorder), as well as the preferences of patients with OCD and their families, need to be considered in order to provide the most appropriate intervention and advance in the implementation of precision psychiatry (Salazar de Pablo et al., 2021). In the current study, female sex was associated with higher drop-out rates for remotely-delivered CBT compared to face-to-face CBT. However, the statistical power of the analyses was small and replication is required before firm conclusions are drawn. Of note, previous studies have shown inconsistent results regarding to gender across several mental health

problems (El Alaoui et al., 2015; Treanor et al., 2021). Future studies should also evaluate the effect of concurrent psychoactive medication as well as the effects of prior history of pharmacological and psychological interventions.

Interestingly, baseline OCD severity and sex were the only patient characteristics that were significantly associated with treatment response in the current study (Aspvall et al., 2021; Lovell and Bee, 2008; Tolin et al., 2011). Thus, remotely-delivered CBT for OCD appears to be a robust treatment across a wide range of demographic and clinical features. In contrast to previous meta-analyses, we included studies of children and adolescents. We found no evidence for a difference in efficacy between children and adolescents and adults. However, considering that the presentation of OCD symptoms may be different in children and adolescents, age-sensitive guidelines should be established. Also, the importance of family involvement should be evaluated further, since it has been found to be important in young people for other mental health areas (Catalan et al., 2020). In fact, a pilot study addressing internet-delivered family-based CBT for children showed high levels of satisfaction and significant improvements in symptoms and family accommodation that were sustained (Comer et al., 2017).

In addition to patient characteristics, we tested whether features of the intervention itself were associated with efficacy. We found preliminary evidence that while internet-delivered CBT had equivalent efficacy to face-to-face CBT, telephone CBT and bibliotherapy were

associated with poorer outcomes. However, this finding should be viewed tentatively since only three RCTs of telephone CBT/bibliotherapy were included in this analysis, two of which found telephone CBT to be non-inferior to face-to-face CBT, at least in the short-term (Lovell et al., 2006; Turner et al., 2014), while the third found bibliotherapy to be less efficacious than face-to-face CBT. Additionally, it should be noted that telephone CBT and bibliotherapy have been demonstrated to be efficacious for OCD when compared against non-CBT control conditions, and therefore these remain evidence-based treatment modalities. In this study, we also examined the impact of the level of therapist input on the efficacy of remotely-delivered CBT. A previous meta-analysis evaluating self-help therapeutic interventions for OCD found larger effect sizes for minimal-contact self-help ($g = 0.91$) than for self-administered self-help ($g = 0.33$) (Pearcy et al., 2016). However, we did not replicate these results. Therapist guidance has generally been considered to enhance outcomes of internet-based interventions, although its effect has recently been reported to be smaller than previously thought when compared to unguided interventions (Baumeister et al., 2014), in line with our results.

A strength of the current meta-analysis is that we only included RCTs, which are considered the gold-standard individual study design to assess efficacy. However, this study also has several limitations that must be taken into account. First, the evidence was limited for some of the evaluated outcomes. For instance, only three studies compared the efficacy of remotely-delivered CBT and control conditions for anxiety symptoms, and other three studies compared the efficacy of remotely-delivered CBT and face-to-face CBT for anxiety symptoms and quality of life. Furthermore, other outcomes as functioning did not even reach our threshold of three studies to be evaluated meta-analytically. However, this is the most comprehensive meta-analytical evidence in the field to date, and the database was sufficiently large and powered to evaluate a wide range of outcomes. Second, there was high heterogeneity among the studies included for some of the evaluated outcomes; we accounted for it in meta-regression analyses, although other significant sources of heterogeneity may exist. Third, some of the meta-regressor factors were underpowered. For instance, for the meta-regressions on remotely-delivered CBT vs face-to-face CBT we only had eight studies available. Furthermore, most studies did not report the presence of some potentially relevant moderating factors, including family history, previous exposure to CBT or other non-pharmacological interventions, exposure to antipsychotic medication or exposure to antidepressant medication prior to the study. This is the meta-analysis that evaluated the influence of more moderating factors so far, both in our subgroup meta-analyses and meta-regressions. Fourth, it was not possible to ascertain the long-term efficacy of the interventions, which was infrequently reported. Fifth, the “inactive” control group included waitlist, other interventions (which included relaxation) and treatment as usual (which included need-based intervention). Our sub-analyses did not show any difference according to this. Finally, we did not meta-analytically evaluate the negative effects or the reason for attrition in the included studies, which were heterogeneously reported and were beyond the scope of the present work.

5. Conclusions

Remotely-delivered CBT is efficacious in reducing OCD symptoms and other relevant outcomes such as depressive symptoms and anxiety symptoms. Importantly, when compared to the standard face-to-face format of delivery, remotely-delivered CBT is generally associated with equivalent gains and comparable drop-out rates. However, according to our preliminary evidence individuals with severe OCD may benefit more from face-to-face treatment, suggesting that remotely-delivered CBT could form part of stepped-care models of service delivery.

Availability of data

Studies included can be found and accessed online through Google Scholar. The full text for some of the studies may not be available without a subscription.

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CRedit authorship contribution statement

Dr Salazar de Pablo had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis; Study concept and design: Dr Salazar de Pablo, Dr Krebs; Data selection and data collection: Dr Salazar de Pablo, Dr Pascual-Sánchez, Ms Panchal; Data analysis: Dr Salazar de Pablo; Drafting of the manuscript: Dr Salazar de Pablo, Dr Pascual-Sánchez, Dr Krebs; Critical revision of the manuscript for important intellectual content: all the authors.

Conflict of interest

Dr Salazar de Pablo has received honoraria from Janssen Cilag and Angelini.

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D.n.a.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jad.2022.11.007>.

References

- Albert, U., Barbaro, F., Bramante, S., Rosso, G., De Ronchi, D., Maina, G., 2019. Duration of untreated illness and response to Sri treatment in obsessive-compulsive disorder. *Eur. Psychiatry* 58, 19–26.
- American Psychiatric Association, 2013. *Diagnostic and Statistical Manual of Mental Disorders*, Washington DC.
- Andersson, E., Enander, J., Andrén, P., Hedman, E., Ljótsson, B., Hursti, T., Bergström, J., Kaldo, V., Lindefors, N., Andersson, G., Rück, C., 2012. Internet-based cognitive behaviour therapy for obsessive-compulsive disorder: a randomized controlled trial. *Psychol. Med.* 42, 2193–2203.
- Andersson, E., Ljótsson, B., Hedman, E., Hesser, H., Enander, J., Kaldo, V., Andersson, G., Lindefors, N., Rück, C., 2015. Testing the mediating effects of obsessive beliefs in internet-based cognitive behaviour therapy for obsessive-compulsive disorder: results from a randomized controlled trial. *Clin. Psychol. Psychother.* 22, 722–732.
- Andrews, G., Basu, A., Cuijpers, P., Craske, M.G., McEvoy, P., English, C.L., Newby, J.M., 2018. Computer therapy for the anxiety and depression disorders is effective, acceptable and practical health care: An updated meta-analysis. *J. Anxiety Disord.* 55, 70–78. <https://pubmed.ncbi.nlm.nih.gov/29422409/>.
- Aspvall, K., Andersson, E., Melin, K., Norlin, L., Eriksson, V., Vigerland, S., Jolstedt, M., Silverberg-Mörse, M., Wallin, L., Sampaio, F., Feldman, I., Bottai, M., Lenhard, F., Mataix-Cols, D., Serlachius, E., 2021. Effect of an internet-delivered stepped-care program vs in-person cognitive behavioral therapy on obsessive-compulsive disorder symptoms in children and adolescents: a randomized clinical trial. *JAMA* 325, 1863–1873.
- Baumeister, H., Reichler, L., Munzinger, M., Lin, J., 2014. The impact of guidance on Internet-based mental health interventions - a systematic review. *Internet Interv.* 1 (4), 205–215.
- Borenstein, M., Hedges, L., Higgins, J., Rothstein, H., 2013. *Comprehensive Meta-Analysis Version 3*. Biostat, Englewood, NJ.
- Catalan, A., Salazar de Pablo, G., Vaquerizo Serrano, J., Mosillo, P., Baldwin, H., Fernández-Rivas, A., Moreno, C., Arango, C., Correll, C.U., Bonoldi, I., Fusar-Poli, P., 2020. Annual research review: prevention of psychosis in adolescents - systematic

- review and meta-analysis of advances in detection, prognosis and intervention. *J. Child Psychol. Psychiatry* 62 (5), 657–673.
- Comer, J.S., Furr, J.M., Cooper-Vince, C.E., Kerns, C.E., Chan, P.T., Edson, A.L., Khanna, M., Franklin, M.E., Garcia, A.M., Freeman, J.B., 2014. Internet-delivered, family-based treatment for early-onset OCD: a preliminary case series. *J. Clin. Child Adolesc. Psychol.* 53 (43), 74–87.
- Comer, J.S., Furr, J.M., Kerns, C.E., Miguel, E., Cox, S., Elkins, R.M., Carpenter, A.L., Cornacchio, D., Cooper-Vince, C.E., DeSerisy, M., Chou, T., Sanchez, A.L., Khanna, M., Franklin, M.E., Garcia, A.M., Freeman, J.B., 2017. Internet-delivered, family-based treatment for early-onset OCD: a pilot randomized trial. *J. Consult. Clin. Psychol.* 85, 178–186.
- Davide, P., Andrea, P., Martina, O., Andrea, E., Davide, D., Mario, A., 2020. The impact of the COVID-19 pandemic on patients with OCD: effects of contamination symptoms and remission state before the quarantine in a preliminary naturalistic study. *Psychiatry Res.* 291, 113213.
- DerSimonian, R., Laird, N., 1986. Meta-analysis in clinical trials. *Control. Clin. Trials* 7, 177–188.
- Dèttore, D., Pozza, A., Andersson, G., 2015. Efficacy of technology-delivered cognitive behavioural therapy for OCD versus control conditions, and in comparison with therapist-administered CBT: meta-analysis of randomized controlled trials. *Cogn. Behav. Ther.* 44, 190–211.
- Egger, M., Davey Smith, G., Schneider, M., Minder, C., 1997. Bias in meta-analysis detected by a simple, graphical test. *BMJ (Clinical research ed.)* 315, 629–634.
- El Alaoui, S., Ljótsson, B., Hedman, E., Kaldo, V., Andersson, E., Rück, C., Andersson, G., Lindfors, N., 2015. Predictors of symptomatic change and adherence in internet-based cognitive behaviour therapy for social anxiety disorder in routine psychiatric care. *PLoS One* 10, e0124258.
- Fineberg, N.A., Van Ameringen, M., Drummond, L., Hollander, E., Stein, D.J., Geller, D., Walitza, S., Pallanti, S., Pellegrini, L., Zohar, J., Rodriguez, C.I., Menchon, J.M., Morgado, P., Mpavaenda, D., Fontenelle, L.F., Feusner, J.D., Grassi, G., Lochner, C., Veltman, D.J., Sireau, N., Carmi, L., Adam, D., Nicolini, H., Dell'Osso, B., 2020. How to manage obsessive-compulsive disorder (OCD) under COVID-19: a clinician's guide from the International College of Obsessive Compulsive Spectrum Disorders (ICOCS) and the obsessive-compulsive and related disorders research network (OCRN) of the European College of Neuropsychopharmacology. *Compr. Psychiatry* 100, 152174.
- Garcia, A.M., Sapyta, J.J., Moore, P.S., Freeman, J.B., Franklin, M.E., March, J.S., Foa, E. B., 2010. Predictors and moderators of treatment outcome in the Pediatric Obsessive Compulsive Treatment Study (POTS I). *J. Am. Acad. Child Adolesc. Psychiatry* 49, 1024–1033 quiz 1086.
- García-Soriano, G., Rufer, M., Delsignore, A., Weidt, S., 2014. Factors associated with non-treatment or delayed treatment seeking in OCD sufferers: a review of the literature. *Psychiatry Res.* 220, 1–10.
- Greist, J.H., Marks, I.M., Baer, L., Kobak, K.A., Wenzel, K.W., Hirsch, M.J., Mantle, J.M., Clary, C.M., 2002. Behavior therapy for obsessive-compulsive disorder guided by a computer or by a clinician compared with relaxation as a control. *J. Clin. Psychiatry* 63, 138–145.
- Henein, A., Pascual-Sanchez, A., Corciova, S., Hodes, M., 2021. Obsessive compulsive disorder in treatment seeking children & adolescents during the COVID-19 pandemic. *BJPsych Open* 7, S30-S30.
- Herbst, N., Voderholzer, U., Thiel, N., Schaub, R., Knaevelsrud, C., Stracke, S., Hertenstein, E., Nissen, C., Külz, A.K., 2014. No talking, just writing! Efficacy of an internet-based cognitive behavioral therapy with exposure and response prevention in obsessive compulsive disorder. *Psychother. Psychosom.* 83, 165–175.
- Higgins, Altman, D.G., Gøtzsche, P.C., Jüni, P., Moher, D., Oxman, A.D., Savovic, J., Schulz, K.F., Weeks, L., Sterne, J.A., <collab>Group, C.B.M.</collab>, <collab>Group, C.S.M.</collab>, 2011. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ* 343, d5928.
- Hoppen, L.M., Kuck, N., Bürkner, P.C., Karin, E., Wootton, B.M., Buhlmann, U., 2021. Low intensity technology-delivered cognitive behavioral therapy for obsessive-compulsive disorder: a meta-analysis. *BMC Psychiatry* 21, 322.
- Hwang, H., Bae, S., Hong, J.S., Han, D.H., 2021. Comparing effectiveness between a Mobile app program and traditional cognitive behavior therapy in obsessive-compulsive disorder: evaluation study, 8, e23778.
- Jassi, A., Shahriyarmolki, K., Taylor, T., Peile, L., Challacombe, F., Clark, B., Veale, D., 2020. OCD and COVID-19: a new frontier. *Cogn. Behav. Ther.* 13, e27.
- Kataoka, S.H., Zhang, L., Wells, K.B., 2002. Unmet need for mental health care among U. S. children: variation by ethnicity and insurance status. *Am. J. Psychiatry* 159, 1548–1555.
- Keleher, J., Jassi, A., Krebs, G., 2020. Clinician-reported barriers to using exposure with response prevention in the treatment of paediatric obsessive-compulsive disorder. *J. Obsessive Compuls Relat. Disord.* 24, 100498.
- Kenwright, M., Marks, I., Graham, C., Frances, A., Mataix-Cols, D., 2005. Brief scheduled phone support from a clinician to enhance computer-aided self-help for obsessive-compulsive disorder: randomized controlled trial. *J. Clin. Psychol.* 61, 1499–1508.
- Kohn, R., Saxenall, S., Levavill, I., Saraceno, B., 2004. The treatment gap in mental health care. *Bull. World Health Organ.* 82, 858–866.
- Leeuwrik, T., Cavanagh, K., Strauss, C., 2019. Patient adherence to cognitive behavioural therapy for obsessive-compulsive disorder: a systematic review and meta-analysis. *J. Anxiety Disord.* 68, 102135.
- Lenhard, F., Andersson, E., Mataix-Cols, D., Rück, C., Vigerland, S., Högström, J., Hillborg, M., Brander, G., Ljungström, M., Ljótsson, B., Serlachius, E., 2017. Therapist-guided, internet-delivered cognitive-behavioral therapy for adolescents with obsessive-compulsive disorder: a randomized controlled trial. *J. Am. Acad. Child Adolesc. Psychiatry* 56, 10–19.e12.
- Lipsley, M., Wilson, D., 2000. *Practical Meta-analysis*. Sage Publications, Thousand Oaks, CA.
- Lovell, K., Bee, P., 2008. Implementing the NICE OCD/BDD guidelines. *Psychol. Psychother.* 81, 365–376.
- Lovell, K., Bower, P., Gellatly, J., Byford, S., Bee, P., McMillan, D., Arundel, C., Gilbody, S., Gega, L., Hardy, G., Reynolds, S., Barkham, M., Mottram, P., Lidbetter, N., Pedley, R., Molle, J., Peckham, E., Knopp-Hoffer, J., Price, O., Connell, J., Heslin, M., Foley, C., Plummer, F., Roberts, C., 2017a. Clinical effectiveness, cost-effectiveness and acceptability of low-intensity interventions in the management of obsessive-compulsive disorder: the obsessive-compulsive treatment efficacy randomised controlled trial (OCTET). *Health Technol. Assess.* 21, 1–132.
- Lovell, K., Bower, P., Gellatly, J., Byford, S., Bee, P., McMillan, D., Arundel, C., Gilbody, S., Gega, L., Hardy, G., Reynolds, S., Barkham, M., Mottram, P., Lidbetter, N., Pedley, R., Molle, J., Peckham, E., Knopp-Hoffer, J., Price, O., Connell, J., Heslin, M., Foley, C., Plummer, F., Roberts, C., 2017b. Low-intensity cognitive-behaviour therapy interventions for obsessive-compulsive disorder compared to waiting list for therapist-led cognitive-behaviour therapy: 3-arm randomised controlled trial of clinical effectiveness. *PLoS Med.* 14, e1002337.
- Lovell, K., Cox, D., Haddock, G., Jones, C., Raines, D., Garvey, R., Roberts, C., Hadley, S., 2006. Telephone administered cognitive behaviour therapy for treatment of obsessive compulsive disorder: randomised controlled non-inferiority trial. *BMJ (Clinical research ed.)* 333, 883.
- Mahoney, A.E., Mackenzie, A., Williams, A.D., Smith, J., Andrews, G., 2014. Internet cognitive behavioural treatment for obsessive compulsive disorder: a randomised controlled trial. *Behav. Res. Ther.* 63, 99–106.
- Marques, L., LeBlanc, N.J., Weingarden, H.M., Timpano, K.R., Jenike, M., Wilhelm, S., 2010. Barriers to treatment and service utilization in an internet sample of individuals with obsessive-compulsive symptoms. *Depress. Anxiety* 27, 470–475.
- McCrone, P., Marks, I.M., Greist, J.H., Baer, L., Kobak, K.A., Wenzel, K.W., Hirsch, M.J., 2007. Cost-effectiveness of computer-aided behaviour therapy for obsessive-compulsive disorder. *Psychother. Psychosom.* 76, 249–250.
- McGrath, C.A., Abbott, M.J., 2019. Family-based psychological treatment for obsessive compulsive disorder in children and adolescents: a meta-analysis and systematic review. *Clin. Child. Fam. Psychol. Rev.* 22, 478–501.
- Micali, N., Heyman, I., Perez, M., Hilton, K., Nakatani, E., Turner, C., Mataix-Cols, D., 2010. Long-term outcomes of obsessive-compulsive disorder: follow-up of 142 children and adolescents. *Br. J. Psychiatry* 197, 128–134.
- Moazzami, B., Razavi-Khorasani, N., Dooghaie Moghadam, A., Farokhi, E., Rezaei, N., 2020. COVID-19 and telemedicine: immediate action required for maintaining healthcare providers well-being. *J. Clin. Virol.* 126, 104345-104345.
- Nair, A., Wong, Y.L., Barrow, F., Heyman, I., Clark, B., Krebs, G., 2015. Has the first-line management of paediatric OCD improved following the introduction of NICE guidelines? *Arch. Dis. Child.* 100, 416–417.
- NICE, 2005. *Obsessive-Compulsive Disorder: Core Interventions in the Treatment of Obsessive-Compulsive Disorder and Body Dysmorphic Disorder CG31*. NICE, London.
- Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., Chou, R., Glanville, J., Grimshaw, J.M., Hróbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., McDonald, S., McGuinness, L.A., Stewart, L.A., Thomas, J., Tricco, A.C., Welch, V.A., Whiting, P., Moher, D., 2021. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *PLoS Med.* 18, e1003583.
- Panchal, U., Salazar de Pablo, G., Franco, M., Moreno, C., Parellada, M., Arango, C., Fusar-Poli, P., 2021. The impact of COVID-19 lockdown on child and adolescent mental health: systematic review. *Eur. Child Adolesc. Psychiatry* 18, 1–27.
- Patel, S.R., Wheaton, M.G., Andersson, E., Rück, C., Schmidt, A.B., La Lima, C.N., Galfavy, H., Pascucci, O., Myers, R.W., Dixon, L.B., Simpson, H.B., 2018. Acceptability, feasibility, and effectiveness of internet-based cognitive-behavioral therapy for obsessive-compulsive disorder in New York. *Behav. Ther.* 49, 631–641.
- Pearcy, C.P., Anderson, R.A., Egan, S.J., Rees, C.S., 2016. A systematic review and meta-analysis of self-help therapeutic interventions for obsessive-compulsive disorder: is therapeutic contact key to overall improvement? *J. Behav. Ther. Exp. Psychiatry* 51, 74–83.
- Salazar de Pablo, G., Soardo, L., Cabras, A., Pereira, J., Kaur, S., Besana, F., Arienti, V., Coronelli, F., Shin, J.I., Solmi, M., Petros, N., Carvalho, A.F., McGuire, P., Fusar-Poli, P., 2022. Clinical outcomes in individuals at clinical high risk of psychosis who do not transition to psychosis: a meta-analysis. *Epidemiol. Psychiatr. Sci.* 31, e9.
- Salazar de Pablo, G., Studerus, E., Vaquerizo, J., Irving, J., Catalan, A., Oliver, D., Baldwin, H., Danese, A., Fazel, S., Steyerberg, E., Stahl, D., Fusar-Poli, P., 2021. Implementing precision psychiatry: a systematic review of individualised prediction models. *Schizophr. Bull.* 47 (2), 284–297.
- Salemink, E., Wolters, L., de Haan, E., 2015. Augmentation of treatment as usual with online cognitive bias modification of interpretation training in adolescents with obsessive compulsive disorder: a pilot study. *J. Behav. Ther. Exp. Psychiatry* 49, 112–119.
- Schröder, J., Werkle, N., Cludius, B., Jelinek, L., Moritz, S., Westermann, S., 2020. Unguided internet-based cognitive-behavioral therapy for obsessive-compulsive disorder: a randomized controlled trial. *Depress. Anxiety* 37, 1208–1220.
- Shanbhanna, H., Strand, N.H., Provenzano, D.A., Lobo, C.A., Eldabe, S., Bhatia, A., Wegener, J., Curtis, K., Cohen, S.P., Narouze, S., 2020. Caring for patients with pain during the COVID-19 pandemic: consensus recommendations from an international expert panel. *Anaesthesia* 75 (7), 935–944.
- Stoll, J., Müller, J.A., Trachsel, M., 2019. Ethical issues in online psychotherapy: a narrative review. *Front Psychiatry* 10, 993.
- Storch, E.A., Caporino, N.E., Morgan, J.R., Lewin, A.B., Rojas, A., Brauer, L., Larson, M. J., Murphy, T.K., 2011. Preliminary investigation of web-camera delivered

- cognitive-behavioral therapy for youth with obsessive-compulsive disorder. *Psychiatry Res.* 189, 407–412.
- Sucala, M., Schnur, J.B., Constantino, M.J., Miller, S.J., Brackman, E.H., Montgomery, G. H., 2012. The therapeutic relationship in e-therapy for mental health: a systematic review. *J. Med. Internet Res.* 14, e110.
- Tie, H., Krebs, G., Lang, K., Shearer, J., Turner, C., Mataix-Cols, D., Lovell, K., Heyman, I., Byford, S., 2019. Cost-effectiveness analysis of telephone cognitive-behaviour therapy for adolescents with obsessive-compulsive disorder. *BJPsych Open* 5, e7.
- Tolin, D.F., Diefenbach, G.J., Gilliam, C.M., 2011. Stepped care versus standard cognitive-behavioral therapy for obsessive-compulsive disorder: a preliminary study of efficacy and costs. *Depress. Anxiety* 28, 314–323.
- Tolin, D.F., Hannan, S., Maltby, N., Diefenbach, G.J., Worhunsky, P., Brady, R.E., 2007. A randomized controlled trial of self-directed versus therapist-directed cognitive-behavioral therapy for obsessive-compulsive disorder patients with prior medication trials. *Behav. Ther.* 38, 179–191.
- Treanor, C.J., Kouvonen, A., Lallukka, T., Donnelly, M., 2021. Acceptability of computerized cognitive behavioral therapy for adults: umbrella review. *JMIR Ment. Health* 8, e23091.
- Turner, C.M., Mataix-Cols, D., Lovell, K., Krebs, G., Lang, K., Byford, S., Heyman, I., 2014. Telephone cognitive-behavioral therapy for adolescents with obsessive-compulsive disorder: a randomized controlled non-inferiority trial. *J. Am. Acad. Child Adolesc. Psychiatry* 53, 1298–1307.e1292.
- Vogel, P.A., Solem, S., Hagen, K., Moen, E.M., Launes, G., Håland, Å.T., Hansen, B., Himle, J.A., 2014. A pilot randomized controlled trial of videoconference-assisted treatment for obsessive-compulsive disorder. *Behav. Res. Ther.* 63, 162–168.
- Wheaton, M.G., Ward, H.E., Silber, A., McIngvale, E., Björgvinsson, T., 2021. How is the COVID-19 pandemic affecting individuals with obsessive-compulsive disorder (OCD) symptoms? *J. Anxiety Disord.* 81, 102410.
- Wiese, A.D., Drummond, K.N., Fuselier, M.N., Sheu, J.C., Liu, G., Guzick, A.G., Goodman, W.K., Storch, E.A., 2022. Provider perceptions of telehealth and in-person exposure and response prevention for obsessive-compulsive disorder. *Psychiatry Res.* 313, 114610. <https://pubmed.ncbi.nlm.nih.gov/35567851/>.
- Wootton, B.M., 2016. Remote cognitive-behavior therapy for obsessive-compulsive symptoms: a meta-analysis. *Clin. Psychol. Rev.* 43, 103–113.
- Wootton, B.M., Dear, B.F., Johnston, L., Terides, M.D., Titov, N., 2013. Remote treatment of obsessive-compulsive disorder: a randomized controlled trial. *J. Obsessive Compulsive Relat. Disord.* 2, 375–384.
- World Health Organization, 2018. International classification of diseases for mortality and morbidity statistics (11th revision). Retrieved from. <https://icd.who.int/browse/11/1-m/en>.
- Zheng, H., Luo, G., Yao, S., Wang, S., Guo, G., Quan, D., Gao, J., 2021. Predictors for 12-month long-term outcome in patients with obsessive-compulsive disorder: the influence of duration of untreated illness and age at onset. *J. Psychiatr. Res.* 144, 202–207.