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Efficacy and acceptability of cognitive-behavioral therapy and serotonin reuptake inhibitors for pediatric obsessive-compulsive disorder: a network meta-analysis

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Background: Cognitive-behavioral therapy (CBT) and serotonin reuptake inhibitors (SRIs) are recommended treatments for pediatric obsessive-compulsive disorder (OCD), but their relative efficacy and acceptability have not been comprehensively examined. Further, it remains unclear whether the efficacy of in-person CBT is conserved when delivered in other formats, such as over telephone/webcam or as Internet-delivered CBT (ICBT). **Methods:** PubMed, PsycINFO, trial registries, and previous systematic reviews were searched for randomized controlled trials (RCTs) comparing CBT (in-person, webcam/telephone-delivered, or ICBT) or SRIs with control conditions or each other. Network meta-analyses were conducted to examine efficacy (post-treatment Children's Yale-Brown Obsessive Compulsive Scale) and acceptability (treatment discontinuation). Confidence in effect estimates was evaluated with CINeMA (Confidence in Network Meta-Analysis). **Results:** Thirty eligible RCTs and 35 contrasts comprising 2,057 youth with OCD were identified. In-person CBT was significantly more efficacious than ICBT, waitlist, relaxation training, and pill placebo (MD range: 3.95–11.10; CINeMA estimate of confidence: moderate) but did not differ significantly from CBT delivered via webcam/telephone (MD: 0.85 [−2.51, 4.21]; moderate), SRIs (MD: 3.07 [−0.07, 6.20]; low), or the combination of in-person CBT and SRIs (MD: −1.20 [−5.29, 2.91]; low). SRIs were significantly more efficacious than pill placebo (MD: 4.59 [2.70, 6.48]; low) and waitlist (MD: 8.03 [4.24, 11.82]; moderate). No significant differences for acceptability emerged, but confidence in estimates was low. **Conclusions:** In-person CBT and SRIs produce clear benefits compared to waitlist and pill placebo and should be integral parts of the clinical management of pediatric OCD, with in-person CBT overall having a stronger evidence base. The combination of in-person CBT and SRIs may be most efficacious, but few studies hinder firm conclusions. The efficacy of CBT appears conserved when delivered via webcam/telephone, while more trials evaluating ICBT are needed. **Keywords:** OCD; children; adolescents; efficacy; meta-analysis; CBT; pharmacotherapy; medication.

Introduction

Obsessive-compulsive disorder (OCD) affects 1%–2% of children and adolescents (Cervin, 2023) and is associated with poor quality of life (Piacentini, Bergman, Keller, & McCracken, 2003; Storch et al., 2018), school impairment (Perez-Vigil et al., 2017), and high societal costs (Kochar, Ip, Vardanega, Sireau, & Fineberg, 2023; Lenhard et al., 2021). Pediatric OCD can run a chronic course without effective treatment (Deepthi, Kommu, Smitha, & Reddy, 2018; Fineberg et al., 2019), making early intervention essential. Randomized controlled trials (RCTs) indicate that serotonin reuptake inhibitors (SRIs, e.g. clomipramine, fluoxetine, sertraline) and cognitive-behavioral therapy (CBT) are efficacious compared to various control conditions (Kotapati et al., 2019; Öst, Riise, Wergeland, Hansen, & Kvale, 2016; Uhre et al., 2020), but several questions about treatment efficacy and acceptability remain unanswered.

First, while the respective efficacy of CBT and SRIs has been confirmed in meta-analyses, different control conditions have been used (e.g. pill placebo in SRI trials and relaxation or waitlist controls in CBT trials), making direct comparisons of effects challenging. The common solution has been to pool different control conditions (McGuire et al., 2015; Öst et al., 2016; Rosa-Alcázar et al., 2015; Uhre et al., 2020), creating statistical heterogeneity and imprecision which may result in biased effect estimates and ultimately wrong conclusions (Michopoulos et al., 2021). Meta-analyses that fully account for different control conditions are therefore needed. Additionally, few RCTs have directly compared CBT and SRIs leading to uncertainty about their relative efficacy. Furthermore, combined treatment with CBT and SRIs has been

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examined in some trials (POTS, 2004; Storch et al., 2013), but it is unclear how the combination of CBT and SRIs performs against CBT and SRIs delivered as monotherapies. Taken together, the relative efficacy of the two recommended treatments for pediatric OCD is unclear, which complicates clinical decision making, information to patients about expected benefits and harms of available treatments, allocation of resources to training of practitioners, and recommendations in practice guidelines.

Second, the introduction of new technologies has meant that CBT is now available in different delivery formats. Therapist-administered CBT has been adapted to be delivered via telephone (Turner et al., 2014) or webcam (Hollmann et al., 2022; Storch et al., 2011), where a therapist provides the full CBT protocol but where most contact takes place remotely. In contrast, Internet-delivered CBT (ICBT; Aspvall et al., 2021; Lenhard et al., 2017) is a form of therapist-guided self-help that includes the same active ingredients as CBT (e.g. education, exposure and response prevention, relapse prevention) but requires no in-person therapist contact. Instead, the patient completes different treatment modules online that include both information and exercises and receives brief text message support from a therapist. New delivery formats have the potential to improve therapy access, which is important as most children and adolescents with OCD do not receive evidence-based treatment (Mancebo, Eisen, Sibrava, Dyck, & Rasmussen, 2011; Poppe et al., 2016; Schwartz, Schlegl, Kuelz, & Voderholzer, 2013). However, as this is an incipient area of research, there is uncertainty regarding efficacy compared to traditional in-person CBT, as well as to SRIs.

The objective of this study was to synthesize evidence from all RCTs examining CBT (including new formats of delivery) and SRIs for pediatric OCD. By conducting a network meta-analysis, relative efficacy/acceptability is estimated in a single statistical model that capitalizes on both direct (i.e. trials directly contrasting two or more conditions) and indirect evidence. The latter is made possible when an intervention has been compared to multiple interventions and control conditions across trials, as is the case in pediatric OCD. To our knowledge, network meta-analysis of the relative efficacy of CBT or SRIs in pediatric OCD has only been applied in two prior studies. In the first study, several trials currently available (the study included a total of 17 studies and 991 participants) were not included (Skapinakis et al., 2016). In the second study, only SRI trials were included and some studies did not evaluate treatment effects in individuals with OCD (Tao et al., 2022). Further, to our knowledge, the relative acceptability of SRIs and CBT for pediatric OCD has never been examined using network meta-analysis.

Methods

Identification and selection of studies

The study followed a prospectively registered protocol (PROSPERO, CRD42021264044). Inclusion criteria were established using the PICO (Population, Intervention, Comparison, Outcome) framework. The *population* was defined as children and adolescents (<18 years) meeting the Diagnostic and Statistical Manual of Mental Disorders (DSM) OCD criteria and having OCD as the principal/primary or most treatment-demanding disorder. The *intervention* was defined as SRIs (selective or non-selective SRIs) or CBT (in-person, therapist-administered CBT delivered remotely, or therapist-guided ICBT; 'third wave' CBT interventions [e.g. acceptance and commitment therapy and metacognitive therapy] were not included). The *comparison* was defined as pill placebo, relaxation training, waitlist, treatment-as-usual, SRIs, CBT, ICBT, or CBT + SRIs, but any control condition was accepted. The *outcome* was defined as post-treatment OCD symptom severity, quantified using the original clinician-rated Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS; Scahill et al., 1997). Building off of other meta-analytic work (Johnco, McGuire, Roper, & Storch, 2020), the decision to analyze discontinuation rates as a measure of treatment acceptability was made post hoc. Treatment non-responder trials (i.e. trials that only included participants who had not responded to an initial intervention, e.g. SRIs or CBT) were not included.

In August 2021, PubMed, PsycINFO, clinical trial databases (ClinicalTrials.gov and the WHO International Clinical Trials Registry Platform), and previous meta-analyses were searched. The search strings are available in the Appendix S1 and at PROSPERO. Author MC performed the search and backward (articles cited by the identified record) and forward (articles citing the identified record) searches of relevant records were conducted. Full-text review of possibly eligible studies identified using title and abstract search was conducted by MC and a master's level psychology student, with both reviewing all records. All identified studies were discussed within the author group based on inclusion/exclusion criteria until no further studies were identified. We conducted independent searches and screened records separately for CBT and SRI trials to increase the chances of identifying all relevant studies. In December of 2022 and in September of 2023, updated searches were conducted.

The necessary information from eligible studies was extracted by author MC and cross-checked by author JMD and then rechecked again by MC. When relevant data were not identified, study authors were contacted, resulting in the inclusion of four studies (Geller et al., 2001, 2004; Hollmann et al., 2022; O'Neill et al., 2017). For one study (Himle, Van Etten-Lee, Fischer, & Muroff, 2003), information was retrieved from an earlier meta-analysis (Watson & Rees, 2008). Post-treatment CY-BOCS standard deviations were missing for two studies comparing SRIs and pill placebo (DeVeaugh-Geiss et al., 1992; March et al., 1998). Standard deviation scores were significantly associated with length of trial for SRIs and imputed using a linear regression model with length of trial as a predictor. For pill placebo, no significant associations emerged, and standard deviations were imputed using the mean standard deviation for other pill placebo conditions.

Risk of bias

Authors MC and JMD independently evaluated risk of bias (RoB) for each included comparison using the updated version of the Cochrane RoB tool (RoB 2; Sterne et al., 2019) following Cochrane guidelines and resources (e.g. signaling questions, algorithmic tool). The RoB 2 tool assesses five domains: the randomization process, deviations from the intended interventions, missing outcome data, measurement of the outcome,

and selection of the reported results. Each comparison was rated as Low RoB, Some Concerns, or High RoB. Inter-rater agreement was moderate (κ = .52), but poor for the missing outcome data domain (κ = .21). Excluding this domain resulted in substantial improvement in agreement (κ = .68)., This led us to follow the rationale for missing outcome data provided in Furukawa et al. (2016), where Low RoB is assigned if authors use adequate methods to account for missingness *or* total missingness is 20% or less and reasonably balanced between interventions, High RoB if missingness is unbalanced and accounted for by an inappropriate imputation method, and Some Concerns for all other comparisons. Disagreements between the raters were discussed until a consensus was reached. All comparisons could be evaluated for RoB except Himle et al. (2003), where detailed information about the study design could not be retrieved; this study included only 10 participants and the comparison from the study was noted as Some Concerns. RoB evaluations of discontinuation did not consider (1) the missing outcome data domain since by definition there is no missing data for discontinuation rates or (2) the selection of the reported results domain, as there is only one way to describe/report this outcome. Therefore, we based our RoB evaluation of discontinuation on the randomization process, deviations from the intended interventions, and measurement of the outcome (i.e. different time points, which could affect differences in discontinuation rates).

Rating confidence in estimates using CINeMA

The credibility of our effect estimates was evaluated using the Confidence in Network Meta-Analysis (CINeMA) approach in which six domains are considered: within-study bias (RoB according to RoB2), reporting/publication bias, indirectness (representativity of included samples), imprecision, heterogeneity, and incoherence (Nikolakopoulou et al., 2020). The online CINeMA tool was used (https://cinema.ispm.unibe.ch) and each comparison was rated as No Concerns, Some Concerns, or Major Concerns. For within-study bias, we used the average RoB for each intervention comparison as the guideline. For imprecision and heterogeneity, we used four points on the CY-BOCS as an indicator of a clinically important mean difference, which is in line with the most recent non-inferiority margin for pediatric OCD (Aspvall et al., 2021). For discontinuation, we used an odds ratio of 0.80/1.25 to indicate a clinically important difference. Publication bias and small-study effects were examined by evaluating asymmetry in a comparison-adjusted funnel plot, and interventions were ordered in accordance with the degree of active components (Waitlist, Pill Placebo, Relaxation Training, ICBT, Webcam/telephone CBT, In-person CBT, SRIs, CBT + SRIs), interchanging the positions of the last three interventions, and Egger's, Begg-Mazumdar's, and Thompson-Sharp's tests were used to statistically examine funnel plot asymmetry (Balduzzi, Rücker, & Schwarzer, 2019). Indirectness was deemed to be low because all participants met diagnostic criteria for OCD, had OCD as their principal or most treatment-demanding disorder, were below 18 years of age, and were not treatment-refractory. In line with CINeMA guidelines, we did not downgrade our overall confidence more than once for related domains (e.g. imprecision and heterogeneity; Nikolakopoulou et al., 2020).

Statistical analysis

For efficacy, post-treatment CY-BOCS scores were used. Mean differences for all comparisons and their standard errors were computed using the R package *metafor* (Viechtbauer, 2010). In line with guidelines, pre-intervention scores were not included (Higgins et al., 2019). We then performed a frequentist network meta-analysis using the R package *netmeta* (Balduzzi et al., 2023). A random-effects model was used because of differences within CBT and SRI protocols, participant ages, and initial symptom severity. Global (in)consistency was assessed using a full design-by-treatment interaction random effects model implemented in the *decomp.design* function in *netmeta* and local (in)consistency was evaluated using the *netsplit* function. Heterogeneity was assessed using the I^2 statistic and tau-squared. Discontinuation was analyzed using number of events (i.e. the number of participants who discontinued before the primary endpoint) and odds ratios. Because there were zero dropouts in some conditions, a +1/2 continuity correction was used. Two studies were double-zeros (i.e. zero dropouts in both conditions; Himle et al., 2003; Lewin et al., 2014) and were omitted.

Transitivity and balanced distribution of effect modifiers are assumptions of network meta-analysis and mean that study and participant characteristics that affect the effect of the interventions should be distributed homogeneously across comparisons (Salanti, 2012). We used three major approaches to protect against violating and examining these assumptions. First, we carefully defined each intervention node to represent a reasonably homogenous intervention. For example, control conditions (waitlist, psychological placebo, pill placebo), as well as different delivery formats of CBT (in-person, therapist-administered CBT delivered via webcam/telephone, ICBT), were separated into different nodes/interventions. Different kinds of SRIs were defined as a single SRI node based on evidence of negligible differences between them (Ivarsson et al., 2015), but clomipramine, a tricyclic antidepressant, was examined separately in a sensitivity analysis. Second, we examined between-study heterogeneity and global and local inconsistency in the network, but it is important to note that although transitivity is a common cause of incoherence, transitivity cannot be proven, only assumed. Third, although no effect modifiers with strong support in relation to efficacy outcomes of CBT or SRIs for pediatric OCD exist (McGuire et al., 2015), we used meta-regression to examine whether the following factors were associated with effects: mean age of participants, pre-intervention OCD severity, proportion of girls, year of publication, sample size, length of the intervention, RoB, and whether the study was industry-funded (only for SRIs and placebo). Meta-regression was used separately for each intervention node that included more than four within-study effects: in-person CBT (19 effects), SRIs (12 effects), pill placebo (nine effects), waitlist (nine effects), and relaxation training (five effects). Meta-regression was also conducted for study designs that included more than four comparisons: CBT versus waitlist (six comparisons), CBT versus relaxation training (five comparisons), and SRIs versus pill placebo (nine comparisons).

Results

Study selection and characteristics of included studies

We identified 4,198 unique records through database searches. All records were screened, and 245 articles were reviewed in full text. A PRISMA flowchart displaying each step of the search is in Figure 1. We identified 30 unique studies that met PICO criteria. These studies comprised 35 comparisons and 2,057 children and adolescents with OCD randomized to one of eight conditions: in-person CBT (20 comparisons; Asbahr et al., 2005; Aspvall et al., 2021; Barrett, Healy-Farrell, & March, 2004; Bolton et al., 2011; Bolton & Perrin, 2008; de Haan, Hoogduin, Buitelaar, & Keijsers, 1998; Fatori et al., 2018; Freeman et al., 2008, 2014; Himle

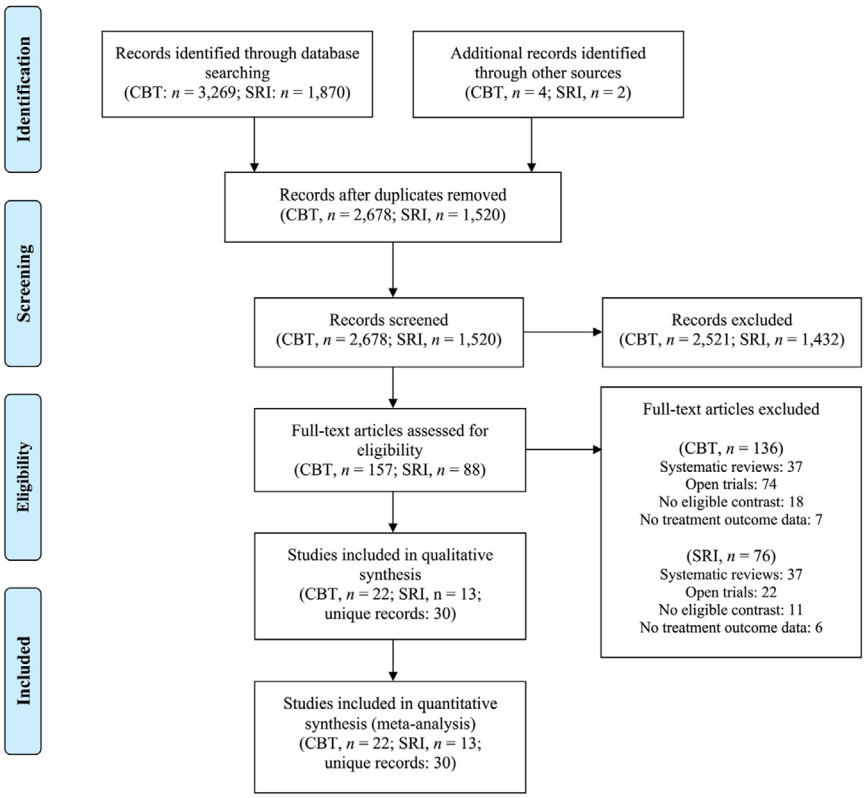

Figure 1 PRISMA flow-chart showing the study selection process for CBT and SRI studies, respectively. CBT, Cognitive-behavioral therapy; SRIs, Serotonin reuptake inhibitors

et al., 2003; Lewin et al., 2014; O'Neill et al., 2017; Piacentini et al., 2011; POTS, 2004; Russman Block et al., 2023; Storch et al., 2013; Williams et al., 2010), SRIs (14 comparisons; DeVeaugh-Geiss et al., 1992; Geller et al., 2001, 2004; Liebowitz et al., 2002; March et al., 1998; March, Johnston, Jefferson, Kobak, & Greist, 1990; POTS, 2004; Riddle et al., 1992, 2001), in-person CBT + SRIs (five comparisons; POTS, 2004; Storch et al., 2013) CBT delivered via webcam/telephone (four comparisons; Comer et al., 2017; Hollmann et al., 2022; Storch et al., 2011; Turner et al., 2014), ICBT (two comparisons; Aspvall et al., 2021; Lenhard et al., 2017), pill placebo (nine comparisons; DeVeaugh-Geiss et al., 1992; Geller et al., 2001, 2004; Liebowitz et al., 2002; March et al., 1990, 1998; POTS, 2004; Riddle et al., 1992, 2001), relaxation training (five comparisons; Freeman et al., 2008, 2014; Himle et al., 2003; Piacentini et al., 2011; Russman Block et al., 2023), and waitlist (eight comparisons; Barrett et al., 2004; Bolton et al., 2011; Bolton & Perrin, 2008; Hollmann et al., 2022; Lenhard et al., 2017; Lewin et al., 2014; O'Neill et al., 2017; Williams et al., 2010). Data collection for one trial of interest was marked as completed on ClinicalTrials.gov, but the authors were not able to share outcome data (NCT03595098). Within-study in-person CBT arms (group vs. individual & brief vs. full; Barrett et al., 2004; Bolton et al., 2011) and SRI arms (regular vs. slow titrating of sertraline), which did not differ significantly from each other in efficacy in the reported studies, were pooled. However, sensitivity analyses were conducted where group CBT and brief CBT were coded as separate intervention nodes. One study (Lewin et al., 2014) used treatment-as-usual as a comparison condition, but only 14% of participants received evidence-based interventions and treatment response was minimal. To facilitate interpretation, this comparison was coded as waitlist, but a sensitivity analysis was conducted where it was coded as treatment-as-usual.

Nineteen studies were conducted in the United States, four in the United Kingdom, two in Sweden, two in Brazil, one in Australia, one in the Netherlands, and one in Germany. Study characteristics are presented in Table 1 and aggregated statistics on the intervention level in Table S1. The mean number of participants across interventions was 33.2 (*SD* = 25.19), with a mean age of 12.06 years (*SD* = 2.48). Most participants were boys (53%) and the mean intervention length was 11.90 weeks (*SD* = 2.82). Of the 12 studies evaluating SRIs, six (50%) were industry-funded, one was industry plus not-for-profit funded and for one study, funding information could not be retrieved (de Haan et al., 1998); the remaining SRI studies were not industry-funded. Except for Himle et al. (2003), where funding information could not be retrieved, all non-SRI studies were funded by not-for-profit organizations. The mean pre-treatment CY-BOCS

Table 1 Description of study characteristics

Study	Country	Design and number of participants	Age, *M* (*SD*)	Girls %	Ethnicity/race %	Discontinuation rate	CY-BOCS, pre/post *M* (*SD*)
Geller et al. (2001)	United States	Fluoxetine: 71 Pill placebo: 32	F/P: 11.4 (3.0)/11.4 (2.8)	F/P: 52%/53%	F/P White: 87%/84% Hispanic: 6%/9% African descent: 3%/0% Asian descent: 0%/3% Other: 4%/3%	Fluoxetine: 31% Pill placebo: 38%	Fluoxetine: 24.50 (5.10)/15.00 (9.60) Pill placebo: 26.30 (4.60)/21.10 (8.40)
Geller et al. (2004)	United States	Paroxetine: 98 Pill placebo: 105	11.3 (3.00)	42%	White: 88.2% Other: 11.8%	Paroxetine: 34% Pill placebo: 24%	Paroxetine: 24.40 (4.95)/15.62 (8.62) Pill placebo: 25.30 (5.05)/19.96 (8.21)
Liebowitz et al. (2002)	United States	Fluoxetine: 21 Pill placebo: 22	F/P: 13.00 (2.65)/12.32 (2.64)	F/P: 48%/36%	F/P African American: 10%/5% Asian: 4.8/0 Hispanic: 10%/0% Indian: 5%/0% White: 67%/96% Other: 5%/0%	Fluoxetine: 5% Pill placebo: 18%	Fluoxetine: 22.50 (4.16)/14.71 (8.73) Pill placebo: 23.82 (5.77)/18.55 (11.44)
March et al. (1998)	United States	Sertraline: 92 Pill placebo: 95	Not reported	Not reported	Not reported	Sertraline: 20% Pill placebo: 14%	Sertraline: 23.40 (4.60)/16.60 (8.01) Pill placebo: 22.20 (6.20)/18.80 (7.20)
Riddle et al. (2001)	United States	Fluvoxamine: 57 Pill placebo: 63	F/P: 13.4/12.7	F/P: 49%/44%	F/P White: 97%/95%	Fluvoxamine: 33% Pill placebo: 43%	Fluvoxamine: 24.20 (4.40)/18.20 (8.60) Pill placebo: 24.20 (4.80)/20.90 (8.50)
Riddle et al. (1992)	United States	Fluoxetine: 7 Pill placebo: 7	11.8 (2.3)	57%	White: 93% Biracial: 7%	Fluoxetine: 14% Pill placebo: 14%	Fluoxetine: 24.30 (4.20) /13.60 (5.70) Pill placebo: 20.20 (7.70)/14.80 (7.00)
DeVeaugh-Geiss et al. (1992)	United States	Clomipramine: 31 Pill placebo: 29	C/P: 14.5/ 14.0	C/P: 26%/45%	C/P White: 100%/97%	Clomipramine: 13% Pill placebo: 7%	Clomipr.: 27.10 (4.59)/17.10 (8.01) Pill placebo: 28.40 (4.67)/26.10 (7.20)
March et al. (1990)	United States	Clomipramine: 8 Pill placebo: 8	15.0 (2.2)	31%	Not reported	Clomipramine: 25% Pill placebo: 0%	Clomipr.: 24.50 (3.60)/19.30 (8.60) Pill placebo: 27.40 (3.40)/25.60 (2.40)

(continues)

Table 1 (continued)

Study	Country	Design and number of participants	Age, *M* (*SD*)	Girls %	Ethnicity/race %	Discontinuation rate	CY-BOCS, pre/post *M* (*SD*)
POTS (2004)	United States	Sertraline: 28 In-person CBT: 28 In-person CBT+Sertraline: 28 Pill placebo: 28	11.7 (2.7)	50%	White: 92% African American: 4% Hispanic: 3% Asian: 1%	Sertraline: 7% In-person CBT: 7% In-person CBT+Sertraline: 4% Pill placebo: 21%	Sertraline: 23.50 (4.70)/16.50 (9.10) In-person CBT: 26.00 (4.60)/14.00 (9.50) In-person CBT+Sertraline: 23.80 (3.00)/11.20 (8.60) Pill placebo: 25.20 (3.30)/21.50 (5.40)
Storch et al. (2013)	United States	In-person CBT/ Sertraline, Regular: 14 In-person CBT+Sertraline, Slow: 17 In-person CBT+pill placebo: 16	Reg/Slow/CBT 11.57 (3.06)/ 11.47 (3.68)/ 12.63 (3.63)	Reg/Slow/CBT 50%/35%/ 31%	'the sample was primarily Caucasian'	In-person CBT/ Sertraline, Regular: 43% In-person CBT/ Sertraline, Slow: 29% In-person CBT: 19%	In-person CBT/ Sertraline, Regular: 23.64 (4.48)/15.43 (9.72) In-person CBT/ Sertraline, Slow: 26.65 (5.68)/17.18 (7.60) In-person CBT: 25.06 (4.01)/15.56 (6.62)
de Haan et al. (1998)	The Netherlands	Clomipramine: 10 In-person CBT: 13	C/CBT: 13.25/ 14.3	C/CBT: 50%/50%	Not reported	Clomipramine: 0% In-person CBT: 8%	Clomipramine: 21.50 (5.90)/9.10 (9.10) In-person CBT: 23.80 (7.20)/17.60 (11.80)
Asbahr et al. (2005)	Brazil	Sertraline: 20 In-person CBT: 20	S/CBT 12.4 (2.8)/ 13.7 (2.3)	S/CBT 55%/75%	Not reported	Sertraline: 5% In-person CBT: 0%	Sertraline: 27.00 (6.65)/16.04 (9.62) In-person CBT: 26.30 (4.90)/13.59 (7.08)
Fatori et al. (2018)	Brazil	Fluoxetine: 43 In-person CBT: 40	F/CBT 12.1 (3.1)/ 11.4 (3.2)	F/CBT 58%/45%	F/CBT White: 93%/90% Black: 2%/0% Asian: 2%/0% Mixed: 2%/10%	Fluoxetine: 16% In-person CBT: 13%	Fluoxetine: 26.51 (5.18)/16.43 (10.71) In-person CBT: 27.49 (4.34)/15.83 (9.33)
Barrett et al. (2004)	Australia	In-person CBT, Individual: 24 In-person CBT, Group: 29 Waitlist: 24	Ind/Group/WL 10.8 (2.5)/12.9 (2.3)/ 11.8 (3.1)	Ind/Group/WL 50%/55%/ 46%	Not reported	In-person CBT, Individual: 4% In-person CBT, Group: 3% Waitlist: 4%	In-person CBT, Individual: 23.64 (4.30)/8.36 (6.93) In-person CBT, Group: 21.38 (5.62)/8.28 (7.33) Waitlist:22.95 (5.49)/24.04 (4.14)

(continues)

Table 1 (continued)

Study	Country	Design and number of participants	Age, *M* (*SD*)	Girls %	Ethnicity/race %	Discontinuation rate	CY-BOCS, pre/post *M* (*SD*)
Bolton et al. (2011)	United Kingdom	In-person CBT, Brief: 36 In-person CBT, Full: 36 Waitlist: 24	Brief/Full/WL 14.4 (2.4)/15.0 (2.6)/ 14.0 (2.2)	Brief/Full/WL 64%/58%/ 54%	Not reported	In-person CBT, Brief: 6% In-person CBT, Full: 6% Waitlist: 13%	In-person CBT, Brief: 22.00 (6.90)/13.00 (9.60) In-person CBT, Full: 22.30 (5.00)/9.50 (8.00) Waitlist: 24.20 (5.00)/23.30 (8.30)
O'Neill et al. (2017)	United States	In-person CBT: 24 Waitlist: 24	CBT/WL 12.2 (2.9)/ 12.1 (2.9)	CBT/WL 33%/56%	Not reported	In-person CBT: 4% Waitlist: 4%	In-person CBT: 23.20 (4.10)/11.10 (2.80) Waitlist: 24.50 (3.50) 22.60 (4.80)
Williams et al. (2010)	United Kingdom	In-person CBT: 11 Waitlist: 10	13.6	38%	Not reported	In-person CBT: 9% Waitlist: 10%	In-person CBT: 23.09 (4.05)/12.09 (7.46) Waitlist: 21.05 (5.82)/19.60 (6.42)
Bolton and Perrin (2008)	United Kingdom	In-person CBT: 10 Waitlist: 10	CBT/WL 13.0/13.4	CBT/WL 40%/20%	65% White British 10% Turkish British 10% Asian British 5% Greek British 5% African British 5% Arab British	In-person CBT: 20% Waitlist: 0%	In-person CBT: 24.00 (4.78)/13.90 (10.74) Waitlist: 22.00 (8.25)/21.10 (5.90)
Lewin et al. (2014)	United States	In-person CBT: 17 Waitlist: 14	CBT/WL 5.8 (1.5)/ 5.9 (1.7)	CBT/WL 29%/29%	CBT/WL White: 88%/86% Asian/Pacific Islander: 6%/0% Latino/Latina: 12%/14% African American: 6%/0%	In-person CBT: 0% Waitlist: 0%	In-person CBT: 24.47 (5.80)/12.29 (8.61) Waitlist: 24.50 (5.68)/24.00 (4.35)
Himle et al. (2003)	United States	In-person CBT: 5 Relaxation: 5	Not retrieved	Not retrieved	Not retrieved	Not retrieved	In-person CBT: 24.10 (2.66)/14.40 (3.56) Relaxation: 22.20 (4.15)/17.40 (5.98)
Freeman et al. (2008)	United States	In-person CBT: 22 Relaxation: 20	7.1 (1.3)	57%	White: 80% Hispanic: 2% Asian/Pacific Islander: 2% Native American: 2% Multiracial: 2% No response/ unknown: 12%	In-person CBT: 23% Relaxation: 20%	In-person CBT: 22.95 (3.84)/14.45 (8.16) Relaxation: 21.70 (4.52)/17.10 (7.57)

(continues)

Table 1 (continued)

Study	Country	Design and number of participants	Age, *M* (*SD*)	Girls %	Ethnicity/race %	Discontinuation rate	CY-BOCS, pre/post *M* (*SD*)
Freeman et al. (2014)	United States	In-person CBT: 63 Relaxation:64	CBT/ Relaxation 7.4 (1.2)/ 7.0 (1.2)	CBT/ Relaxation 62%/44%	CBT/Relaxation White: 94%/86% Black: 2%/2% Asian: 0%/5% Mixed: 2%/5% Not reported: 3%/3%	In-person CBT: 13% Relaxation: 27%	In-person CBT: 25.13 (4.46)/12.30 (5.36) Relaxation: 25.97 (3.98)/19.67 (5.44)
Piacentini et al. (2011)	United States	In-person CBT: 49 Relaxation: 22	CBT/ Relaxation 12.4 (2.6)/ 11.6 (2.0)	CBT/ Relaxation 59%/73%	CBT/Relaxation White: 78%/77% Latino: 10%/9% Asian: 4%/4% African American: 2%/5% Other/Mixed: 6%/5%	In-person CBT: 18% Relaxation: 23%	In-person CBT: 24.70 (4.53)/13.30 (8.13) Relaxation: 25.30 (4.28)/17.20 (8.17)
Comer et al. (2017)	United States	Webcam/ telephone CBT: 11 In-person CBT: 11	6.7 (1.3)	41%	Caucasian/Non-Hispanic/ Latino: 91% Hispanic/Latino: 5% Biracial: 5%	Webcam/ telephone CBT: 9% In-person CBT: 9%	Webcam/ telephone CBT: 22.90 (4.10)/14.90 (7.30) In-person CBT: 23.20 (3.20)/14.20 (7.80)
Storch et al. (2011)	United States	Webcam/ telephone CBT: 16 Waitlist: 15	CBT/WL 11.0 (2.5)/ 11.2 (2.8)	CBT/WL 37%/40%	Caucasian: 74% Hispanic: 3% Asian: 7% African American: 3% Other/biracial: 13%	Webcam/ telephone CBT: 13% Waitlist: 0%	Webcam/ telephone CBT: 25.38 (3.61)/11.13 (10.53) Waitlist: 21.27 (2.74)/18.53 (8.11)
Turner et al. (2014)	United Kingdom	In-person CBT: 36 Webcam/ telephone CBT: 36	In-person CBT/ Webcam/ telephone CBT 14.5 (2.2)/ 14.2 (2.1)	In-person CBT/ Webcam/ telephone CBT 47%/44%	Not reported	In-person CBT: 8% Webcam/ telephone CBT: 8%	In-person CBT: 24.11 (4.02)/11.72 (6.60) Webcam/ telephone CBT: 25.64 (3.86)/12.99 (8.56)
Lenhard et al. (2017)	Sweden	Internet-delivered CBT: 33 Waitlist: 34	ICBT/WL 14.2 (1.7)/ 15.0 (1.7)	ICBT/WL 52%/41%	Country of birth, ICBT/WL Sweden: 97%/88% Other European country: 3%/6% Asian: 0%/6%	ICBT: 3% Waitlist: 3%	ICBT: 23.00 (4.31)/16.97 (6.29) Waitlist:22.12 (3.91)/20.64 (4.11)
Aspvall et al. (2021)	Sweden	In-person CBT: 78 Internet-delivered CBT: 74	CBT/ICBT 13.4 (2.5)/ 13.4 (2.6)	CBT/ICBT 62%/62%	Not reported	In-person CBT: 1% ICBT: 0%	In-person CBT: 23.00 (3.70)/12.80 (7.10) ICBT: 23.90 (3.60)/13.60 (5.90)
Russman Block et al. (2023)	United States	In-person CBT: 30 Relaxation: 28	CBT/ Relaxation 15.77 (1.53)/ 15.43 (1.69)	CBT/ Relaxation 70%/68%	CBT/Relaxation Minority race: 19%/4% Hispanic: 15%/4%	In-person CBT: 10% Relaxation: 7%	In-person CBT: 26.28 (5.54)/13.46 (9.62) Relaxation: 27.80 (5.00)/21.73 (8.49)
Hollmann et al. (2022)	Germany	Webcam/ telephone CBT: 30 Waitlist: 30	CBT/waitlist 12.60 (2.88)/ 13.87 (2.68)	CBT/waitlist 40%/40%	CBT/waitlist Migration background: 17%/17%	In-person CBT: 7% Waitlist: 30%	In-person CBT: 24.03 (2.54)/10.52 (9.15) Waitlist: 25.07 (2.07)/22.74 (5.32)

score was 24.23 (*SD* = 1.77) and ranged from 23.07 for waitlist to 24.78 for pill placebo. Mean RoB (1 = low risk, 2 = some concerns, 3 = high risk) ranged from 1.0 for ICBT to 2.0 for SRIs, pill placebo, CBT + SRIs, and waitlist.

Treatment efficacy

The network of included efficacy comparisons is depicted in Figure 2. RoB ratings for all contrasts and the RoB contributions to each contrast are shown in Table S2 and Figure S1. A comparison-adjusted funnel plot is in Figure S2. For funnel plot asymmetry, none of the statistical tests were statistically significant. Estimates alongside confidence ratings based on the CINeMA framework are in Table 2, with the justification of each confidence rating being presented in Table S3. The within-design heterogeneity was moderate and statistically significant (tau-squared = 4.58, I^2 = 54.9% [29.8%, 71.0%], p = .03). The between-design inconsistency was statistically significant (p < .001), but the full design-by-treatment interaction random effects model was not (Q[5] = 7.15, p = .21, tau-squared = 2.77). Local incoherence (i.e. difference between direct and indirect evidence) was present for ICBT versus in-person CBT (p = .04) and ICBT versus waitlist (p = .04). A net heat plot indicated that the in-person CBT/ICBT/waitlist comparisons contributed to network inconsistency.

A sensitivity analysis with Lewin et al. (2014) coded as treatment-as-usual showed that the CBT versus treatment-as-usual contrast (MD: 11.71 [5.34, 18.09]) was very similar to the CBT versus waitlist contrast (MD: 11.01 [8.69, 13.32]) and that the treatment-as-usual versus waitlist contrast showed a negligible difference (MD: −0.71 [−7.49, 6.08]), supporting our initial decision to code Lewin et al. (2014) as waitlist. A sensitivity analysis with group CBT (three trials) coded as a separate intervention indicated a negligible difference between group and individual formats of CBT (MD: 0.52 [−3.33, 4.36]). Brief CBT (two trials) yielded a smaller effect than regular CBT (MD: −2.99 [−7.66, 1.68]), but the difference was not statistically significant. When splitting SRIs into clomipramine (three trials) and selective SRIs, clomipramine yielded a larger effect than selective SRIs, but the difference was not statistically significant (MD: 2.37 [−2.08, 6.82]).

Fifty-four *post hoc* meta-regression models identified 6 statistically significant associations. For the within pill placebo (pre-to-post) effect, a higher mean age (in years) was associated with a lower effect (estimate = −0.93, p = .01) and later year of publication was associated with a better effect

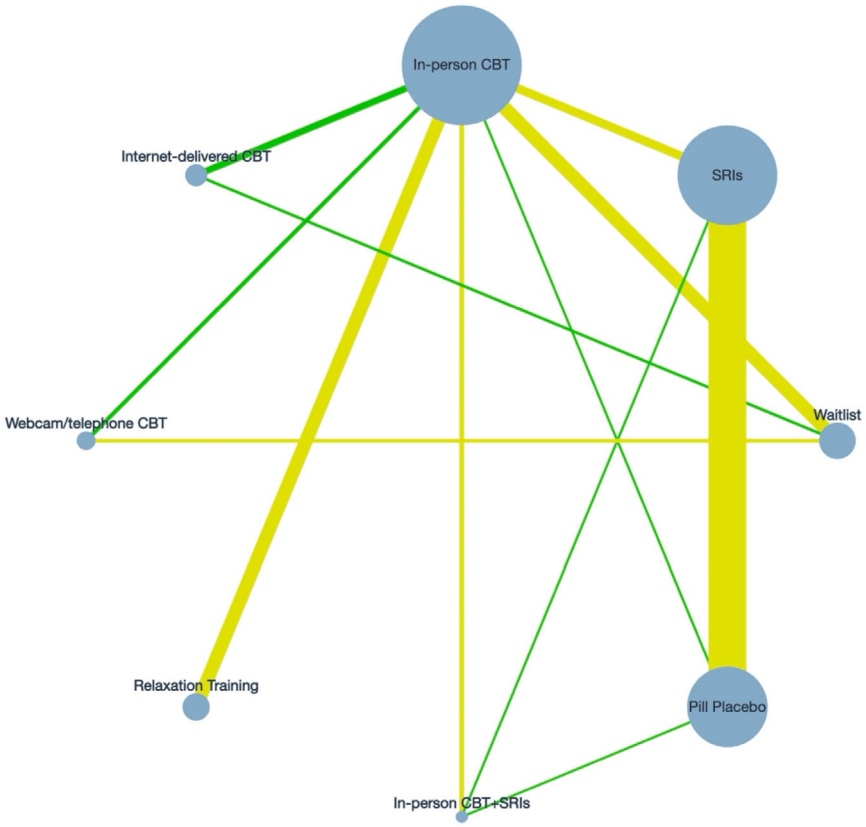

Figure 2 Network structure of included comparisons; the size of nodes and edges in the network represent the number of participants and the color of edges indicates mean risk-of-bias (green = low, yellow = moderate)

Table 2 League table showing the mean difference on CY-BOCS at post-intervention from the network meta-analysis of treatment efficacy

In-person CBT							
−1.20 + (−5.29, 2.91)	**In-person CBT+SRIs**						
3.95 ++ (0.42, 7.49)	5.15 + (−0.26, 10.56)	**Internet-delivered CBT**					
7.66 ++ (4.25, 11.06)	**8.85 +++ (4.48, 13.23)**	3.71 ++ (−1.20, 8.61)	**Pill Placebo**				
5.49 ++ (2.82, 8.16)	**6.68 + (1.79, 11.57)**	1.53 ++ (−2.90, 5.96)	−2.17 + (−6.50, 2.15)	**Relaxation Training**			
3.07 + (−0.07, 6.20)	4.26 + (−0.04, 8.56)	−0.89 ++ (−5.61, 3.84)	**−4.59 + (−6.48, −2.70)**	−2.42 + (−6.54, 1.70)	**SRIs**		
11.10 ++ (8.97, 13.23)	**12.29 ++ (7.67, 16.92)**	**7.15 ++ (3.58, 10.71)**	3.44 + (−0.58, 7.46)	**5.61 + (2.20, 9.03)**	**8.03 ++ (4.24, 11.82)**	**Waitlist**	
0.85 ++ (−2.51, 4.21)	2.05 + (−3.25, 7.35)	−3.10 ++ (−7.76, 1.56)	**−6.81 ++ (−11.59, −2.02)**	**−4.63 ++ (−8.92, −0.34)**	−2.21 + (−6.81, 2.38)	**−10.25 ++ (−13.64, −6.85)**	**Webcam/telephone CBT**

Confidence ratings are based on the CINeMA and a downgrading of one level for some concerns and two levels for major concerns. A positive value indicates that the condition to the lower right is associated with a higher post-intervention CY-BOCS score (i.e. worse outcome) than the condition at the upper left. Statistically significant differences are highlighted in bold.
+++ High confidence. ++ Moderate confidence in estimate. + Low confidence in estimate.
CINeMA, Confidence in Network Meta-Analysis; CY-BOCS, Children's Yale-Brown Obsessive-Compulsive Scale.

(estimate = 0.20, p = .03). For the within SRIs effect, a higher mean pre-intervention severity on CY-BOCS was associated with a better effect (estimate = 0.92, p = .002). For SRIs versus pill placebo, a higher mean pre-intervention CY-BOCS score was associated with a better effect of SRIs (estimate = 1.15, p = .001). For the in-person CBT versus relaxation comparison, a higher mean pre-intervention CY-BOCS score was associated with a better effect of CBT (estimate = 1.44, p = .02). For CBT versus relaxation training, later year of publication was associated with a better effect of CBT (estimate = 0.39, p = .04). Because pre-intervention severity emerged as an effect modifier in some analyses, we compared pre-treatment severity for CBT and SRI studies. The difference was small and not statistically significant (t[26] = −0.22, p = .83, Cohen's d = 0.09).

Because confidence for most estimates was downgraded because of RoB, we conducted a new network meta-analysis where high RoB trials were excluded. Comparisons of efficacy with and without high RoB trials for in-person CBT and SRIs, respectively, are in Figure S3. Estimates were similar but both in-person CBT and SRIs became marginally weaker in comparison with in-person CBT + SRIs and CBT marginally weaker in comparison with SRIs.

Acceptability

RoB ratings for acceptability (i.e. discontinuation) are available in the supporting information (Table S4). Meta-analytic estimates of discontinuation were 6.1% for in-person CBT (prediction interval: −0.01% to 13.3%; I^2 = 48.9%), 15.3% for SRIs (prediction interval: −3.9% to 34.5%; I^2 = 74.2%), 18.9% for in-person-CBT + SRIs (only two studies; prediction interval: −34.0% to 71.2%; I^2 = 91.5%), 20.4% for pill placebo (prediction interval: −2.3% to 43.1%; I^2 = 76.8%), 7.3% for waitlist (prediction interval: −3.1% to 17.7%; I^2 = 41.0%), 18.2% for relaxation training (prediction interval: 2.4%–34.0%; I^2 = 49.3%), 8.3% for CBT delivered via webcam/telephone (prediction interval: 2.7%–13.8%; I^2 = 0.0%), and 1.6% for ICBT (only two studies; prediction interval: −0.0% to 3.9%; I^2 = 0.0%). In the network meta-analysis, the full design-by-treatment interaction random effects model was not significant (Q[5] = 5.61, p = .35) but there was evidence of local incoherence for the in-person CBT versus SRIs comparison (lower risk of dropout for in-person CBT based on indirect evidence). Results showed that the odds of discontinuing increased in all conditions compared to the three different versions of CBT, while the odds decreased in all conditions compared to SRIs. However, no statistically significant differences emerged. Table S5 shows all comparisons and the confidence in each estimate, which was low to very low for all estimates, mostly because of imprecision, with confidence intervals for

comparisons extending into clinically important effects in both directions.

Discussion

The current network meta-analysis of the relative efficacy of different interventions for pediatric OCD showed that CBT, SRIs, and their combination produce clear benefits in comparison with control conditions where little active intervention is provided (i.e. waitlist and pill placebo). The benefit of different formats of CBT (in-person, ICBT, via webcam/telephone) as well as SRIs compared to these control conditions exceeded our 4-point margin of a clinically important difference. For in-person CBT and the combination of in-person CBT and SRIs, our confidence in all effect estimates was moderate to high, indicating the estimated effects are probably close to the true effects (Balshem et al., 2011). For SRIs, however, our confidence in the pill placebo comparison was low, indicating that the true effect may be substantially different (Balshem et al., 2011). In-person CBT also showed a significantly better effect than ICBT and relaxation training. Again, the differences indicated clinically important differences, and our confidence in the estimates was moderate. Nevertheless, we interpret the comparison to ICBT with some caution as the inclusion of ICBT may have contributed to network incoherence. Only two ICBT studies, from the same geographic region and team, have been published (Aspvall et al., 2021; Lenhard et al., 2017) and the most recent study (Aspvall et al., 2021) showed a much better effect than the first study (Lenhard et al., 2017). Thus, more studies are needed to better understand the efficacy of ICBT for pediatric OCD. Future ICBT studies can also help examine whether the very low dropout rates in the two ICBT trials replicate.

The condition that yielded the strongest effect was the combination of in-person CBT and SRIs but our confidence in the estimates where it was compared to in-person CBT and SRIs as monotherapies was low and confidence intervals included zero. Only two studies have evaluated this treatment combination (POTS, 2004; Storch et al., 2013), making its precise efficacy uncertain. Thus, it is still an open question whether the combination of CBT and SRIs is the most efficacious treatment of pediatric OCD and for whom it is indicated. Some guidelines recommend combined treatment for youth with OCD with more severe symptoms (Geller & March, 2012), but to our knowledge, there is currently no empirical evidence supporting (or contradicting) this recommendation. Around 10% of all individuals with OCD experience severe symptoms (Cervin et al., 2022), and as higher pre-treatment severity consistently predicts higher post-treatment severity in pediatric OCD (Turner, O'Gorman, Nair, & O'Kearney, 2018), future trials are warranted that center on youth with more severe OCD.

There have been few comprehensive attempts to estimate the relative efficacy of CBT and SRIs for pediatric OCD. Using all available evidence, we showed that in-person CBT may yield around a 3-point lower post-treatment CY-BOCS score than SRIs. However, our confidence in this estimate was low and the confidence interval included zero. It is worth noting that comparing double-blind (SRIs) and single-blind (CBT) studies is complicated, as the risk of performance bias is increased for the latter. In RCTs, blinding of both participants and personnel is ideal. Complete blinding is theoretically possible in medication trials, although hard to achieve in practice (Kaptchuk, 2001), but near-impossible in psychotherapy trials (Mataix-Cols & Andersson, 2021). The RoB2 tool includes a section about intervention integrity (deviations from the intended intervention), addressing aspects of performance bias, but not the full range of potential bias arising from non-blinding of study participants and personnel, such as balanced treatment expectations (Munder & Barth, 2018). To reach more clarity on the relative efficacy of in-person CBT and SRIs, large, high-quality trials are needed. However, it is uncertain if such trials are necessary given that our estimate of a 3-point difference may be reasonably accurate, which indicates that the difference is of limited clinical relevance. Other factors than efficacy, much less studied in the field of pediatric OCD, appear more crucial for the in-person CBT versus SRI contrast, such as treatment resistance to the initial intervention, for whom combination treatment is indicated, acceptability, patient preference, long-term sustainability of improvement, risks and burdens, and outcomes other than symptom severity (e.g. peer and family functioning, quality of life). Regarding acceptability, our findings showed that the different formats of CBT had the lowest and SRIs the highest rates of discontinuation. However, no statistically significant differences emerged, and discontinuation varied substantially across trials.

Regarding SRIs, research on adults with OCD suggests that treatment should continue for at least 1 year to prevent relapse (Bloch & Storch, 2015). One study with youth with OCD showed that continued treatment with sertraline during 1 year showed sustained and improved effects (Wagner, Cook, Chung, & Messig, 2003), but we know of no study examining the risk of relapse when discontinuing SRIs. However, the current evidence indicates that treatment gains of CBT are sustained over time even after treatment is completed (Melin et al., 2020). Alongside the known side effects of SRIs for children and adolescents (Offidani, Fava, Tomba, & Baldessarini, 2013), this suggests that CBT should be considered the first-line treatment for pediatric OCD. In the present review, our overall confidence in superiority over control conditions was also higher for CBT than for SRIs, substantiating CBT as a first-line intervention based on a more solid evidence base.

Regarding CBT, an area that needs attention is whether the effect of CBT in RCTs, often conducted in specialized research clinics, is conserved when delivered in routine care. A recent review indicated that CBT for adults with OCD is at least as effective when delivered in routine care as in RCTs, but confidence in the conclusion was low as most studies were of high RoB (Öst et al., 2022). Some open studies have examined the effectiveness of CBT for pediatric OCD in routine care (Farrell, Schlup, & Boschen, 2010; Storch et al., 2010; Valderhaug, Larsson, Götestam, & Piacentini, 2007), but methodological limitations (e.g. potential bias in the selection of patients, missing outcome data) hinder firm conclusions. Further, a large effectiveness study (Torp et al., 2015) as well as RCTs that include in-person CBT but evaluate other components (D-cycloserine; Farrell et al., 2022; Storch et al., 2016) have shown similar effects of in-person CBT (pre-post) to those evidenced in this review. While this is reassuring, it is possible that the fidelity to the CBT protocols in the above studies was higher than what is common in routine clinical care.

The effect of CBT delivered via webcam/telephone did not differ significantly from in-person CBT, and our confidence in the estimate was moderate. This is promising and suggests that it may not be necessary to be in the same room to achieve comparable efficacy. Relaxation training was introduced into the pediatric OCD literature as a more viable comparator to CBT than waitlist. Reassuringly, in-person CBT produced a clinically relevant benefit compared to this condition, and our confidence was moderate. However, the high dropout rates for relaxation training compared to the different formats of CBT warrant caution and could indicate differences in credibility and expectancy. Further, although relaxation training may be more credible than waitlist, it is not a bona fide treatment for OCD.

Missing outcome data was a limitation in several trials, which is a signal to future trialists to strive to collect outcome data even when participants terminate prematurely. This strategy has been used in trials examining SRIs for pediatric OCD (Franklin et al., 2011) and recent trials have been successful in limiting missing outcome data (Aspvall et al., 2021; Lenhard et al., 2017). More and better data on adverse events/effects in CBT trials and reasons for discontinuation in all trials can inform the field about the relative benefits and harms of available treatments and can be used to calculate the likelihood of being helped or harmed ratio, which would be of importance to clinical decision making and guideline recommendations (Andrade, 2017).

A strength of the current study is the classification of conditions into fairly homogeneous groups. A recent meta-analysis concluded that CBT for pediatric OCD was probably more efficacious than no intervention and may be comparable to selective SRIs, but the authors were very uncertain about their effect estimates (Uhre et al., 2020). This prior meta-analysis pooled waitlist and relaxation training into a 'no intervention' control category and included the first ICBT trial in the CBT category. Our findings show that these methodological considerations may have affected results because (i) waitlist and relaxation training yield differences in efficacy that are statistically significant and of clear clinical relevance and (ii) efficacy in the first ICBT trial was inferior to the efficacy of traditional in-person CBT. Thus, this prior meta-analysis inflated heterogeneity and imprecision by not accounting for properties of included conditions, which highlights the careful considerations needed to draw valid conclusions, and the benefits of our network meta-analysis framework.

We also note that our review of RoB resulted in a much more tempered view of the quality of the current evidence than several previous reviews evaluating the same RoB domains (Öst et al., 2016; Skapinakis et al., 2016; Skarphedinsson et al., 2015). Limitations often overlooked are missing outcome data (imputation or last observation carried forward is not a satisfactory solution to this problem according to RoB-2), failing to identify that outcome raters were not blinded, and outcome assessments being carried out at different time points across conditions. Confidence in almost all comparisons in the present review was downgraded because of within-study RoB. Reassuringly, in our meta-regression analyses, RoB did not appear to modify effects, but few trials overall make the influence of RoB difficult to evaluate.

Although no meta-analyses of similar scope have been published for pediatric OCD, a somewhat similar study has been conducted for adult OCD (Skapinakis et al., 2016). Findings showed that all pharmacological (clomipramine and selective SRIs) and psychotherapeutic interventions (CBT, behavior therapy, cognitive therapy) were more efficacious than pill placebo and that psychotherapeutic interventions may be more efficacious than pharmacological interventions. Thus, similar results have now emerged for pediatric and adult OCD.

Despite the analytic rigor and careful considerations detailed above, some limitations merit mention. First, methodological weaknesses were present in several RCTs. Future trials are advised to use strategies to limit and handle missing outcome data (Little et al., 2012), use more robust blinding procedures (Mataix-Cols & Andersson, 2021), and carefully report the methodological characteristics of the trial. Second, neither CINeMA nor RoB-2 include potential sources of bias arising from conflicts of interest and researcher allegiance. The effects of researcher allegiance have been demonstrated for adult OCD but have never been addressed in the pediatric OCD literature (Reid et al., 2021). Lastly, a vast majority of studies were conducted in the United States with predominantly white samples.

Future studies should include samples more representative of the broader population of youth with OCD.

By conducting the most comprehensive synthesis of available RCT data on the treatment of pediatric OCD to date, we conclude that there is a range of interventions that produce clinically relevant and statistically significant benefits when waitlist and pill placebo are used as reference conditions. In-person CBT may be the most efficacious standalone treatment, supported by evidence of mostly moderate quality, and SRIs show superiority over control interventions (i.e. pill placebo and waitlist). CBT delivered via telehealth (i.e. webcam/telephone) is potentially non-inferior to in-person CBT and can improve accessibility to this evidence-based treatment. While ICBT represents a promising treatment that requires only minimal therapist support, more research is needed. Last, the combination of in-person CBT and SRIs may constitute the most efficacious intervention for pediatric OCD, but the limited number of head-to-head comparisons encourages further research in this domain as well.

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Key points

- CBT and SRIs are well-established treatments for pediatric OCD but their relative efficacy is uncertain.
- New ways to deliver CBT have been developed but efficacy compared to traditional in-person CBT is unknown.
- We synthesized all results from RCTs of CBT and/or SRIs for pediatric OCD using network meta-analyses.
- In-person CBT and SRIs produced clear benefits compared to waitlist and pill placebo.
- Efficacy of CBT was conserved when delivered via webcam/telephone.

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