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Moderators of cognitive and behaviour therapies for prevention and treatment of anxiety disorders in children and adolescents: A systematic review and meta-analysis

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ABSTRACT

Previous studies have indicated wide variation in the effectiveness of cognitive and behaviour therapies (CBTs) for preventing and treating anxiety disorders in children and adolescents, indicating the presence of moderators influencing outcomes. This meta-analysis investigated whether sample characteristics (child age, child baseline anxiety levels, parental baseline anxiety levels) and intervention characteristics (intervention duration, facilitator contact time, facilitator background, delivery formats, parental involvement) moderate the effectiveness of CBTs for universal prevention, targeted prevention, and treatment of anxiety disorders in children and adolescents. We identified 86 eligible randomized controlled trials (RCTs) assessing the effectiveness of 98 CBTs versus non-active controls. Effect sizes were the post-intervention standardized mean difference of children's broad anxiety symptoms between CBT and non-active controls. Moderation analyses were conducted separately on child- and parent-reported outcomes using meta-regression and subgroup analyses. We found some evidence for (1) a moderating role of child age, facilitator background, and parental involvement on the effectiveness of CBTs for universal prevention; (2) a moderating role of child age and intervention duration on the effectiveness of CBTs for targeted prevention; (3) a moderating role of child age, facilitator contact time, and delivery formats on the effectiveness of CBTs for treatment. There was no evidence for a moderating role of child baseline anxiety levels on the effectiveness of CBTs for universal/targeted prevention or treatment. The moderating role of parental baseline anxiety levels and its potential interaction with parental involvement was not tested given the limited available data. Although these findings provide insights into the question of what works for whom, they should be interpreted cautiously given the limited available data, wide variation in outcomes, potential confounders, and discrepancies between child- and parent-reported outcomes.

1. Introduction

Anxiety disorders are the most common mental health problems experienced in childhood.

and adolescence, with a prevalence rate of 6.5 % (Polanczyk, Salum, Sugaya, Caye, & Rohde, 2015). A recent study by Solmi et al. (2021) showed that 73.3 % of all anxiety disorders begin by the age of 25 years, with a median age of onset of 17 years and a peak age of onset of 5.5 years. Anxiety disorders in childhood and adolescence disrupt later social, emotional, and academic development and increase the risk of other mental health problems (Bittner et al., 2007). Cognitive and behaviour therapies (CBTs) are the most extensively supported approach for the prevention and treatment of anxiety disorders in children and adolescents (James, Reardon, Soler, James, & Creswell, 2020; Lawrence, Rooke, & Creswell, 2017). However, not all randomized controlled trials (RCTs) of CBTs for anxiety disorders in children and adolescents report positives outcomes and where positives effects are reported, effect sizes vary (Bodden et al., 2008). Such inconsistent outcomes of CBTs for anxiety disorders in children and adolescents highlight the need to extend the focus of outcome research from the overall effect of an intervention (i.e., 'what works in general') to understanding which factors (moderators) are associated with the intervention being particularly effective or ineffective (i.e., 'what works for whom') (Kraemer, Wilson, Fairburn, & Agras, 2002).

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In clinical practice, CBTs are typically used for *universal prevention*, *targeted prevention*, and *treatment* of anxiety disorders in children and adolescents. *Universal prevention* aims at preventing anxiety disorders in children and adolescents from the whole populations who have not been identified based on any particular risk factors. *Targeted prevention* targets children and adolescents who are at risk of developing anxiety disorders (e.g., elevated anxiety symptoms, behavioural inhibition, parental anxiety). *Treatment* targets children and adolescents who have been diagnosed with at least an anxiety disorder. Several reviews have investigated the moderators of CBTs for anxiety *treatment* in children and adolescents (e.g., James, Reardon, Soler, James, & Creswell, 2020), but few reviews have investigated the moderators of CBTs for universal/targeted anxiety *prevention* in children and adolescents. Due to different intervention purposes and targeted populations, CBTs for *universal prevention*, *targeted prevention*, and *treatment* of child and adolescent anxiety disorders may differ in sample and intervention characteristics and have different moderators. Identifying the potential shared or distinct factors influencing their effectiveness can help researchers and clinicians optimize CBT outcomes for children and adolescents at different developmental stages of anxiety disorders.

2. Sample characteristics

2.1. Child age

It is commonly assumed that CBT is effective only after a child reaches a certain level of cognitive development when the child can identify and evaluate a thought or belief against the notion of a 'rational standard' and understand that a thought or belief is related to feelings and behaviors (Kendall, 1993). However, there is also evidence that adolescents may benefit less from CBTs than pre-adolescents because fear expression and extinction may be temporarily impaired during adolescence, making it more difficult to retain new, non-fearful, inhibitory information (Ganella & Kim, 2014; Waters, Theresiana, Neumann, & Craske, 2017). Furthermore, adolescence may be accompanied by more severe anxiety symptoms, more frequent comorbid depression, and difficulties attending school, which may influence CBT outcomes (Baker, Lawrence, Karalus, Creswell, & Waite, 2021; Bodden et al., 2008).

Some reviews have examined the moderating role of child age on the effectiveness of anxiety *prevention* in children and adolescents (Fisak, Richard, & Mann, 2011; Lawrence et al., 2017; Teubert & Prinquart, 2011) but none of these reviews specifically focused on the CBT approach. However, some reviews have examined the relationship between child age and outcomes of CBT *treatment* for child and adolescent anxiety disorders (Bennett et al., 2013; James, Reardon, Soler, James, & Creswell, 2020). For example, James, Reardon, Soler, James, & Creswell, 2020 found no difference in treatment outcomes across CBT trials for children $\leq$12 years, adolescents $\geq$12 years, and mixed age groups including children and adolescents $<$12 years and $>$ 12 years. However, the lack of trials specifically focused on younger children (e.g., $\leq$ 8 years) limited conclusions regarding outcomes in this age group.

2.2. Child baseline anxiety levels

Some CBT trials for both anxiety *prevention and treatment* in children and adolescents have indicated that participants with higher baseline anxiety levels tended to show greater anxiety reduction after the intervention. This may not be surprising as those with higher baseline anxiety levels will have greater "room for improvement" (Miller et al., 2011; Wergeland et al., 2016). However, when the focus is shifted from the pre-post anxiety reduction within the intervention group to the post-intervention difference in anxiety severity between intervention and non-active control groups, the results are less consistent. Some CBT trials for anxiety *prevention* in children and adolescents have indicated that higher baseline anxiety levels are associated with greater post-intervention between-group difference (Ginsburg, Drake, Tein, Teetsel, & Riddle, 2015; van Starrenburg, Kuijpers, Kleinjan, Hutschemaekers, & Engels, 2017). However, some CBT trials for anxiety *treatment* in children and adolescents have indicated that higher baseline anxiety levels are associated with smaller post-intervention between-group difference (e.g., Compton et al., 2014; Knight, McLellan, Jones, & Hudson, 2014; Kunas, Lautenbacher, Lueken, & Hilbert, 2021; Liber et al., 2010; Lundkvist-Houndoumadi, Hougaard, & Thastum, 2014; Southam-Gerow, Kendall, & Weersing, 2001). This inconsistency indicates that the moderating role of child baseline anxiety levels on CBT outcomes may vary across intervention purposes (i.e., *prevention/treatment*). This deserves further investigation.

2.3. Parental baseline anxiety levels

Some studies have indicated that parental anxiety might have a detrimental impact on the treatment outcomes of CBTs for child and adolescent anxiety disorders (Kunas et al., 2021); however, this conclusion is not consistently supported across CBT for anxiety prevention and treatment (Ginsburg et al., 2015; Knight et al., 2014; Lundkvist-Houndoumadi et al., 2014; Simon, Bogels, & Voncken, 2011). For example, Ginsburg et al. (2015) found that parental trait anxiety level at baseline did not moderate child anxiety symptom outcomes of a CBT intervention for preventing anxiety disorders in children of anxious parents. Furthermore, Legerstee et al. (2008) found that maternal lifetime anxiety disorders were *positively* associated with the outcome of a CBT treatment for anxiety-disordered adolescents, which, according to authors, could be attributed to the incorporation of parent-training sessions that may help parents deal with their own anxiety problems so that they do not impede child treatment outcomes and/or improve their parenting practices. This finding indicates a potential interaction between parental baseline anxiety and parental involvement on CBT outcomes which deserves further investigation.

3. Intervention characteristics

CBT interventions for anxiety *prevention* and *treatment* in children and adolescents vary in intervention characteristics such as duration, amount of facilitator contact time, facilitator background (e.g., mental health professionals or school staff), delivery formats (e.g., face-to-face individual/group or remote), and the form of parent involvement (e.g., child-only/parent-only/child-parent CBT) (Higa-McMillan, Francis, Rith-Najarian, & Chorpita, 2016). Some meta-analytic reviews have examined the moderating role of some intervention characteristics on the effectiveness of CBTs for anxiety *treatment* in children and adolescents (e.g., James, Reardon, Soler, James, & Creswell, 2020; Lawrence et al., 2017; McKinnon et al., 2018; Podina, Mogoase, David, Szentagotai, & Dobrean, 2016; Waite, Cocks, Creswell, & Cardy, 2020). However, few reviews have examined the moderating role of intervention characteristics on the effectiveness of CBTs for universal and targeted anxiety *prevention*.

When considering the association between intervention characteristics and child outcomes, it is important to note that, in clinical practice, intervention characteristics may vary in response to particular sample characteristics. For example, a meta-analysis by James, Reardon, Soler, James, & Creswell, 2020 compared the effectiveness of child-only CBTs, parent-only CBTs, and CBTs involving both children and parents for anxiety treatment in children and adolescents. However, most parent-only CBTs included in that meta-analysis were for younger children, making it difficult to disentangle the influence of parent involvement and child age. This finding highlights the need to test the moderating role of parental involvement on the effectiveness of CBTs for *universal prevention*, *targeted prevention* and *treatment* of anxiety disorders in different age groups to minimize the potential confounding effect of child age. This approach would also enable us to understand which forms of parental involvement are more effective for different age groups of children and adolescents.

4. This review

This review aims to answer the following questions:

1. Do child age and baseline anxiety level moderate the effect of CBTs for universal prevention, targeted prevention, and treatment of anxiety disorders compared to non-active controls (e.g., waitlist group, no intervention group) in children and adolescents?
2. Does parental baseline anxiety level moderate the effect of CBTs for universal prevention, targeted prevention, and treatment of anxiety disorders compared to non-active controls in children and adolescents? Does its moderating effect differ across CBTs with or without content specifically for parents?
3. Do intervention characteristics (intervention duration, amount of facilitator contact time, facilitator background and delivery formats) moderate the effect of CBTs for universal prevention, targeted prevention, and treatment of anxiety disorders compared to non-active controls in children and adolescents?
4. Does the form of parental involvement moderate the effect of CBTs for universal prevention, targeted prevention, and treatment of anxiety disorders compared to non-active controls in different age subgroups?

5. Method

5.1. Study search

We searched Cochrane Central Register of Controlled Trials (CENTRAL), Ovid MEDLINE, Ovid Embase and Ovid PsycINFO *from database inception date up until November 18, 2024*. Search strings are displayed in the supplementary documents. No restrictions on language and publication status were applied to the searches. The reference lists of all included studies and relevant systematic reviews were checked to identify additional studies missed from the electronic searches. Searches were initially conducted on 31 March 2022 and updated twice on 9 May 2024 and 18 November 2024, using the same strategy.

5.2. Eligibility criteria

Studies were eligible for inclusion if they were published in peer-reviewed journals in English and met the following PICOS inclusion criteria: (P) *Population:* children/adolescents younger than 19 years. There was no requirement for diagnostic assessment of anxiety disorders at baseline. Interventions for children/adolescents diagnosed with at least an anxiety disorder were categorized as interventions for *anxiety disorder treatment.* Interventions for children/adolescents from whole populations that had not been identified on the basis of any particular risk factors were categorized as interventions for *universal anxiety prevention.* Interventions for children/adolescents considered to be at risk of developing anxiety disorder (e.g., elevated anxiety symptoms, behavioural inhibition, parental anxiety) were categorized as *targeted anxiety prevention*. (I) *Intervention:* interventions explicitly stating the use of a cognitive and/or behavioural therapy (CBT) that aimed to change anxiety-provoking cognitions. The intervention must be CBT alone, without any combination with pharmacological or other psychological interventions that can work independently without CBT. There was no restriction on the duration, number of sessions, or the content delivered directly to parents. However, facilitator-initiated real-time contact (face-to-face/remote) aimed at facilitating achievement of intervention goals was compulsory. The facilitators could be mental health professionals (e.g., therapists) or other providers (e.g., school staff). (C) *Comparator:* non-active control group, including waiting list, no intervention, usual school practice, placebo (e.g., irrelevant reading material, placebo pills). (O) *Outcome:* children's broad anxiety symptoms assessed using a child−/parent-reported continuous measure. (S) *Study design:* randomized controlled or cluster randomized trials.

In order to reduce the influence of potential confounders (e.g., intervention content, primary anxiety diagnosis/symptom, comorbidity) and increase our ability to detect the effect of targeted moderators, this review exclusively focused on manualized CBTs (i.e., all participants followed the same intervention protocol) targeting a range of anxiety symptoms or disorders in children and adolescents (i.e., generic anxiety interventions). We excluded individual-tailored CBTs (e.g., modular CBT, personalized CBT) and CBT developed for one specific anxiety disorder (i.e., specific-disorder CBT) due to the specific delivery formats and/or intervention components and measures that may be used during these interventions which might confound study findings. For the same reason, we excluded CBTs that were specifically designed for children and adolescents with non-anxiety health conditions (e.g., depression, attention-deficit hyperactive disorder (ADHD), autistic spectrum disorders (ASD), intellectual disabilities, externalizing behavioural problems, physical disease (e.g., cancer, asthma).

Studies comparing CBT to active controls (e.g., treatment as usual, attention controls, medications, other psychological interventions) were also excluded because the wide variation in active control conditions across studies (James, Reardon, Soler, James, & Creswell, 2020) could make it difficult to identify and interpret the effects of targeted moderators. In contrast, non-active controls, including waiting lists, placebos, usual school practices, or no-intervention controls, are more consistently used as control conditions in CBT trials for child and adolescent anxiety disorders. Focusing on studies comparing CBT to non-active controls enabled us to minimize variation in control conditions across studies and to identify the effect of target moderators on the effectiveness of CBT compared to non-active controls.

5.3. Outcome measures

The primary outcomes of this meta-analysis were child- and parent-reported continuous measures of children's broad anxiety symptoms at post intervention because they are more consistently reported in CBT trials for anxiety prevention and treatment in children and adolescents than diagnostic outcomes (James, Reardon, Soler, James, & Creswell, 2020; Lawrence et al., 2017). Considering the low-to-moderate parent-child agreement on reported anxiety symptoms in children (Popp, Neuschwander, Mannstadt, In-Albon, & Schneider, 2017), we extracted all child- and parent-reported broad measures of children's anxiety symptoms from each trial and conducted data analysis separately by reporter. If mother- and father-reported measures were reported, we used mother-reported measures (as these were provided more consistently). If multiple relevant child- or/and parent-reported measures were used in one trial, we selected one child- and one parent-reported measure (where available) based on which were the most frequently used measures among trials included in the corresponding analysis.

5.4. Study selection

Two authors (masked for review) independently screened the title and abstract of all articles identified through the search and coded them as included/maybe/excluded. All articles coded included/maybe by either reviewer were retrieved for full-text screening. The full texts of all retrieved articles were screened by the first author (masked for review) to identify eligible studies for inclusion and record reasons for exclusion of the ineligible studies. A random selection of 150 (10 % of both the included and excluded articles) were checked by a second author (masked for review). Agreement between the two coders was found on 98.7 % of the papers, equating to a kappa of 0.91 ($p < 0.001$). Disagreement was resolved in a discussion with other authors (masked for review). Given the high agreement between two coders in the first round of screening, the updated searches and screenings were finished by the first author (masked for review) independently.

5.5. Data extraction

The first author (masked for review) extracted data from all eligible trials using a standard form. A random selection of 10 % of standard forms were verified by a second author (masked for review). The form included information on 1) study details (title, author, publication year, study location and setting, RCT or cluster RCT), 2) continuous measures of children's broad anxiety symptoms (measure name, reporter [child/parent], score range, pre- and post-intervention mean, SD and sample sizes in the intervention and control groups), 3) child age at baseline (mean and range), 4) intervention purpose including *universal prevention* for whole populations that had not been identified on the basis of any particular risk factors, *targeted prevention* for those considered to be at risk of developing anxiety disorder (e.g., elevated anxiety symptoms, behavioural inhibition, parental anxiety), or *treatment* for those diagnosed with at least an anxiety disorder, 5) continuous measures of parent self-reported broad anxiety symptoms (measure name, reporter, score range, baseline mean, SD and sample sizes in the intervention and control groups), 6) duration of intervention without any booster sessions (in weeks), 7) number of sessions delivered to children/parents/both, 8) amount of facilitator-initiated real-time facilitator contact time with children/parents/both (in hours), 9) facilitator background (mental health professionals/school staff/others), 10) delivery formats (number of individual/group sessions, number of face-to-face/remote sessions).

5.6. Data analysis

The R statistical environment with the metafor and dmetar package were used for data analysis (Harrer, Cuijpers, Furukawa, & Ebert, 2019; Viechtbauer, 2010). All data analyses were conducted separately on child- and parent-reported outcomes.

5.6.1. Effect size calculation

Following Cochrane guidelines (Version 6.3, 2022, Chapter 8.2.2), this meta-analysis focused on the intention-to-treat (ITT) effect of each intervention at post intervention to get the most conservative results. Therefore, the standardized between-group mean difference (SMD) of children's broad anxiety symptoms between each CBT and non-active control (i.e., Cohen's d), reported by children or parents at post intervention, was calculated using the post-intervention means, standard deviation and sample size of all participants randomized to intervention and control group at baseline (i.e., ITT participants). If the data of ITT participants was not available, we used the data of completers and recorded the potential risks of bias due to deviations from intended interventions and missing outcome data. A small-sample correction was then applied to the Cohen's d values ([Borenstein, et al., 2011]) resulting in an unbiased estimate of the population standardized mean difference (Hedge's g). As many trials involved clustered designs, we corrected the sample size for clustering using Cochrane guidelines with an average intracluster correlation coefficient (ICC) of 0.02 (James, Reardon, Soler, James, & Creswell, 2020; Parker, Nunns, Xiao, Ford, & Ukoumunne, 2021). If trials had two or more eligible intervention arms to be compared against one control group, we followed Cochrane guidelines (Version 6.3, 2022, Chapter 23.3.4) and divided the control group equally into two or more groups to compare the means and SDs of broad anxiety symptoms in these groups against the means and SDs of broad anxiety symptoms in the two intervention arms.

5.6.2. Moderation analysis

A moderator was examined within the subsets of CBT trials providing data on that moderator. Subgroup analysis and meta-regression was performed for moderation analysis. We followed recommendations that for meta-regression each covariate should contain at least 10 comparisons and for subgroup analysis, each subgroup should contain at least 4 comparisons (Borenstein, Hedges, Higgins, & Rothstein, 2011; Fu et al., 2011).

If data were available, *meta-regression analysis* was performed to examine the effect of moderators that could be treated as continuous variables, including child mean age, child baseline anxiety scores, parental baseline anxiety scores, intervention duration without booster sessions (in weeks), amount of facilitator-initiated real-time contact time with children or parents (in hours). Child mean age, child baseline anxiety scores, and parent baseline anxiety scores of the entire sample were calculated using the weighted average of the data of the intervention and control groups. Considering the different scaling of different anxiety measures, meta-regressions of child and parent mean anxiety scores at baseline were only conducted within trials using the same anxiety measure. In addition, since the score range of the same measure may also vary across studies, we normalized the raw score of child and parent broad anxiety symptoms at baseline by subtracting the minimum score from the raw score and dividing it by the score range of the scale (i.e., maximum score minus minimum score). A mixed-effects model was used for meta-regression. We reported R^2 of the regression model, which represents the proportion of the difference in true effect sizes that can be explained by the moderator, and the estimated regression coefficient of the moderator with a p-value below 0.05 indicating a significant difference.

If data were available, subgroup analyses were performed to examine the effects of moderators that could be coded as categorical variables: child age, intervention duration, amount of facilitator contact time, facilitator background, delivery formats, parental involvement. Categorization of these moderators are presented in Table 1. The pooled effect size, 95 % confidence interval and p value of each subgroup was calculated using the random-effects model. A pooled effect size was considered to be statistically significant if the p-value was below 0.05 or confidence interval including zero. A pooled effect size of 0.2 was considered to be a small effect, 0.5 represented a medium effect, and 0.8 a large effect. Between-group Q value was calculated based on mixed-effects model to evaluate the heterogeneity between different groups, with a p-value below 0.05 indicating a significant between-group difference.

5.6.3. Between-study heterogeneity

I^2 statistics were calculated to evaluate the between-study heterogeneity within each subset of comparisons between CBTs and non-active controls for subgroup analysis. For this review, I^2 value <30 % was considered to indicate small heterogeneity, while a value between 30 and 60 % represented moderate heterogeneity, and between 60 and 90 % represented substantial heterogeneity (Higgins et al., 2020).

5.6.4. Outlier identification

Outliers were identified from each subset of comparisons between CBTs and non-active controls for subgroup analyses based on the results of influential analysis using the leave-one-out method. Effect sizes that contributed to over 30 % between-study heterogeneity and had significant influence on the pooled effect size were identified as outliers. All data analyses (meta-regression analysis, subgroup analysis, test of publication bias) were conducted without outliers to capture a general pattern of the moderators of CBTs for anxiety outcomes in children and adolescents without the influence of trials with extreme low or high effect sizes.

5.6.5. Publication bias

The risk of publication bias was assessed separately among studies providing child-report and parent-report outcomes using Egger's test of funnel plot asymmetry and visual inspection of funnel plots and contour funnel plots with trim and fill method.

5.6.6. Quality assessment

The Revised Cochrane risk-of-bias tool (RoB 2) for randomized trials and cluster-randomized trials were used to assess risk of bias of eligible comparisons between CBTs and non-active controls ([Higgins et al., 2020]).

Table 1
Coding list of subgroups.

Potential moderator	Subgroup name	Definition
Child age	1 Young children	CBTs where all participants aged 8 or younger (≤8 years)
	2 Preadolescent children	CBTs where all participants aged 12 or younger but must include participants over age 8 (≤12 years but not all ≤8 years)
	3 Adolescents	CBTs where all participants aged 12 or older (≥12 years)
	4 Mixed child/ adolescent samples	CBT included a mixed preadolescent and adolescent sample under and over age 12 (≥12 and < 12)
Intervention duration	1 Short-term CBT	CBT lasted 8 weeks or below without booster sessions.
	2 Medium-term CBT	CBT lasted 8–12 weeks without booster sessions.
	3 Long-term CBT	CBT lasted 12 weeks or above without booster sessions.
Facilitator contact time	1 Limited contact time	Total amount of facilitator-initiated real-time contact time with parent, child, or both <9 h.
	2 Medium contact time	Total amount of facilitator-initiated real-time contact time with parent, child, or both 9–16 h.
	3 Long contact time	Total amount of facilitator-initiated real-time contact time with parent, child, or both >16 h.
Facilitator background and delivery formats	1 Face-to-face individual CBT by mental health professional	All sessions were facilitated by mental health professionals face-to-face in individual format.
	2 Face-to-face group CBT by mental health professional	All sessions were facilitated by mental health professionals face-to-face in group format.
	3 Face-to-face group CBT by school staff	All sessions were facilitated by school staff trained by therapists before the intervention face-to-face in group format.
	4 Remote CBT	CBT provided facilitator-initiated real-time contact and all contact happened remotely, such as internet-based CBT or bibliotherapy CBT with therapist remote support via telephone/video calls.
Parent involvement	1 Child-only CBT	All facilitator contact was with children, no facilitator contact time with parents.
	2 Child-focused CBT with limited parent involvement	Some facilitator contact time with parents, but less contact with parents than with children.
	3 Child-focused CBT with high parent involvement	Some facilitator contact time with children, but less contact with children than with parents.
	4 Parent-only CBT	All facilitator contact was with parents, no facilitator contact time with children.

The revised RoB 2 provides different assessment criteria for reviews focusing on the effect of assignment of intervention (intention-to-treat effect) and the effect of adhering to intervention (per-protocol effect). Since this review focused on the intention-to-treat (ITT) effect, the criteria for the effect of assignment to intervention was used to assess the risk of bias of each comparison in five domains: 1) randomization process; 2) deviations from intended interventions (adherence to intervention protocol and appropriate analysis to estimate the effect of assignment); 3) missing outcome data; 4) measurement of outcome; 5) selection of the reported results. Each included comparison was rated as showing "low risk of bias", "some concerns", or "high risk of bias" on each domain. The risk of bias in individual domains across comparisons were summarised narratively.

6. Results

6.1. Study characteristics

Our systematic literature search identified 22,488 articles. After excluding 19,553 irrelevant articles, we assessed 1381 full-text articles for eligibility. We identified 86 studies that met our eligibility criteria (see Fig. 1), among which 12 studies included two eligible active intervention arms to be compared against a single non-active control. Therefore, a total of 98 trials of CBTs versus non-active control were included in this meta-analysis, including 31 trials of CBTs for *universal prevention*, 31 trials of CBTs for *targeted prevention*, 36 trials of CBTs for *treatment*. Based on that, we obtained 89 child-reported effect sizes and 54 parent-reported effect sizes, representing the post-intervention mean difference in children's broad anxiety symptoms between CBT and non-active control conditions. The sample and intervention characteristics of all included trials are shown in the supplementary documents.

6.2. Moderating role of child age

***Universal prevention*:** Meta-regression analysis of child-reported outcomes indicated a significant association between child age and the post-intervention effect sizes between universal CBT prevention and non-active control conditions ($k = 22$, $b = -0.07$, $p = 0.03$, $R^2 = 29.11$ %), with older age being associated with greater effect sizes. Subgroup analyses of child-reported outcomes were conducted between each pair of the following three age groups: preadolescent children (≤12 but not all ≤8 years) (Hedge's g = −0.09, $p > 0.05$, 95 %CI-0.24 to 0.06, $I^2 =$ 51.8 %, $k = 12$), adolescents (≥12 years) (Hedge's g = −0.56, $p = 0.05$, 95 %CI-1.13 to 0.02, $I^2 = 68.6$ %, $k = 5$), and mixed child/adolescent samples (≥12 and < 12 years) (Hedge's g = −0.40, $p = 0.05$, 95 %CI-0.79 to 0.00, $I^2 = 85.2$ %, $k = 7$). Universal CBT prevention for adolescents showed a significantly greater post-intervention pooled effect size than those for preadolescent children ($Q = 4.60$, $p = 0.03$). No other significant between-group differences were found ($Q = 0.37$ to 3.12, $p =$ 0.08 to 0.55). No trials of CBT for universal anxiety prevention versus non-active controls in young children (≤8 years) provided child-reported outcomes, so this was not included in this subgroup analysis.

Meta-regression analysis of parent-reported outcomes indicated no significant association between child age and the post-intervention effect sizes between universal CBT prevention and non-active controls ($k = 10$, $b = -0.00$, $p = 0.85$, $R^2 = 0.00$ %). Subgroup analysis of parent-reported outcomes was not conducted given the limited available data.

Targeted prevention: Meta-regression analysis of child-reported outcomes indicated no significant association between child age and the post-intervention effect sizes between targeted CBT prevention and non-active control conditions ($k = 20$, $b = -0.04$, $p = 0.46$, $R^2 = 0.00$ %). Subgroup analyses of child-reported outcomes were conducted between each two pairs of the following three age groups: preadolescent children (≤12 but not all ≤8 years) (Hedge's g = −0.27, $p > 0.05$, 95 % CI-0.61 to 0.07, $I^2 = 61.6$ %, $k = 11$), adolescents (≥12 years) (Hedge's g = −0.96, $p = 0.05$, 95 %CI-1.89 to −0.03, $I^2 = 90.1$ %, $k = 8$), and mixed child/adolescent samples (≥12 and < 12 years) (Hedge's g = −0.08, $p > 0.05$, 95 %CI-0.37 to 0.21, $I^2 = 55.2$ %, $k = 7$). Targeted CBT prevention for adolescents showed a significantly greater post-intervention pooled effect size than those for mixed child/adolescent samples ($Q = 4.56$, $p = 0.03$). No other significant between-group differences were found ($Q = 0.98$ to 2.66, $p = 0.32$ to 0.97). Only one trial of CBT for targeted anxiety prevention versus a non-active control in young children (≤8 years) provided child-reported outcomes, so this was not included in this subgroup analysis.

Meta-regression analysis of parent-reported outcomes indicated no

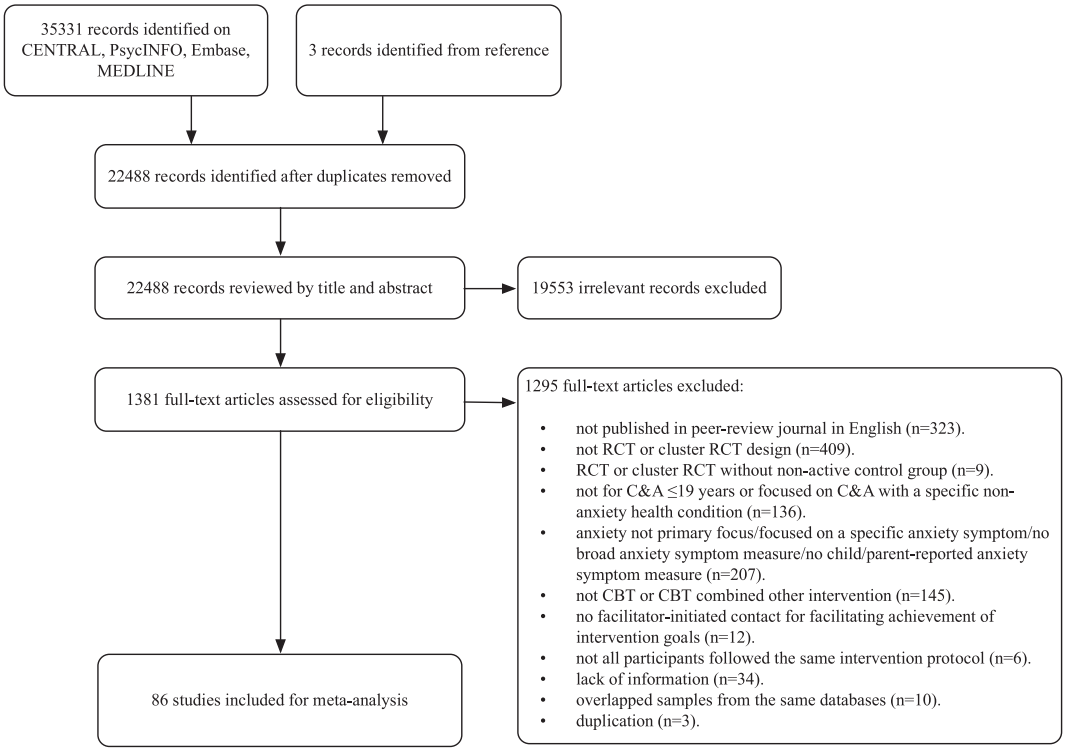

Fig. 1. Flow diagram of the study selection.

significant association between child age and the post-intervention effect sizes between targeted CBT prevention and non-active controls (k = 16, b = 0.02, p = 0.47, R^2 = 0.00 %). Subgroup analysis of parent-reported outcomes was conducted between two age groups: young children (≤8 years) (Hedge's g = −0.34, $p < 0.05$, 95 %CI-0.58 to −0.10, I^2 = 15.7 %, k = 5) and preadolescent children (≤12 but not all ≤8 years) (Hedge's g = −0.25, $p > 0.05$, 95 %CI-0.66 to 0.16, I^2 = 70.2 %, k = 6). No significant between-group difference was found (Q = 0.25, p = 0.62). Fewer than four trials of CBTs for targeted anxiety prevention versus non-active controls in adolescents (≥12 years) and mixed child/adolescent samples (≥12 and < 12 years) provided parent-reported outcomes, so these were not included in this subgroup analysis.

Treatment: Meta-regression analysis of child-reported outcomes indicated no significant association between child age and the post-intervention effect sizes between CBT treatment and non-active control conditions (k = 25, b = −0.06, p = 0.42, R^2 = 0.00 %). Subgroup analyses of child-reported outcomes were conducted between three age groups: preadolescent children (≤12 but not all ≤8 years) (Hedge's g = −0.25, $p > 0.05$, 95 %CI-0.52 to 0.02, I^2 = 51.2 %, k = 9), adolescents (≥12 years) (Hedge's g = −0.73, $p > 0.05$, 95 %CI-2.36 to 0.91, I^2 = 90.0 %, k = 4), and mixed child/adolescent samples (≥12 and < 12 years) (Hedge's g = −0.90, $p < 0.001$, 95 %CI-1.23 to −0.57, I^2 = 80.3 %, k = 20). CBT treatment for mixed child/adolescent samples showed a significantly greater post-intervention effect size than those for preadolescent children (Q = 10.97, $p < 0.001$). No other significant between-group differences were found (Q = 0.10 to 0.83, p = 0.36 to 0.74). No trials of CBT treatment versus non-active controls in young children (≤8 years) provided child-reported outcomes.

Meta-regression analysis of parent-reported outcomes indicated no significant association between child age and the post-intervention effect sizes between CBT treatment and non-active controls (k = 22, b = 0.02 p = 0.61, R^2 = 0.00 %). Subgroup analyses of parent-reported outcomes were conducted between each pair of the following three age groups: preadolescent children (≤12 but not all ≤8 years) (Hedge's g = −0.37, $p < 0.05$, 95 %CI-0.66 to −0.08, I^2 = 48.9 %, k = 8), adolescents (≥12 years) (Hedge's g = −0.35, $p > 0.05$, 95 %CI-1.59 to 0.89, I^2 = 79.0 %, k = 4), and mixed child/adolescent samples (≥12 and < 12 years) (Hedge's g = −0.72, $p < 0.001$, 95 %CI-0.97 to −0.47, I^2 = 62.3 %, k = 14). CBT treatment for mixed child/adolescent samples showed a significantly greater post-intervention effect size than those for preadolescent children (Q = 4.39, p = 0.04). No other significant between-group differences were found (Q = 0.00 to 0.85, p = 0.06 to 0.36). Only one trial of CBT treatment versus a non-active control in young children (≤8 year) provided parent-reported outcomes, so this was not included in this subgroup analysis.

6.3. Moderating role of child baseline anxiety levels

Universal prevention: To examine the moderating role of child self-reported baseline anxiety levels on child-reported anxiety outcomes of CBT for universal anxiety prevention, meta-regression analysis was conducted within 12 trials of CBTs for universal anxiety prevention versus non-active controls using the same child-reported measure of child broad anxiety symptoms (i.e., Spence Children's Anxiety Scale, SCAS). No significant moderating effect was found (k = 12, b = −0.013, p = 0.58, R^2 = 0.00 %). Meta-regression on parent-reported outcomes was not conducted given the limited available data.

Targeted prevention: Meta-regression analysis was not conducted on either child- or parent-reported outcomes as no child- or parent-reported measure of child broad anxiety symptoms was used in 10 or more trials of CBT for targeted anxiety prevention versus non-active controls.

Treatment: Meta-regression analysis of child-reported outcomes was conducted within 17 trials of CBT treatment versus non-active controls using the Spence Children's Anxiety Scale (SCAS) and 14 trials of CBT treatment versus non-active controls using the Revised Children's Manifest Anxiety Scale (RCMAS). No significant moderating effect was found (SCAS: k = 17, b = −0.02, p = 0.70, R^2 = 0.00 %; RCMAS: k = 14, b = 0.012, p = 0.3780, R^2 = 0.00 %). Meta-regression analysis of parent-reported outcomes was conducted within 15 trials of CBT treatment versus non-active controls using the same parent-reported measure of child broad anxiety symptoms (i.e., Spence Children's Anxiety Scale-Parent Version, SCAS-P). No significant moderating effect was found

($k = 15$, $b = -0.03$, $p = 0.28$, $R^2 = 7.65$ %).

6.4. Moderating role of parental baseline anxiety levels

The moderating role of parental baseline anxiety levels and its interactive effect with parental involvement were not examined because only three trials of CBTs versus non-active controls included in this review provided data on parental baseline anxiety levels, including one trial of parent-only CBT for targeted anxiety prevention in young children (≤ 8 years) and two trials of CBT for anxiety treatment in mixed child/adolescent samples (≥12 and < 12 years) (one parent-only CBT and one child-focused CBT with high parental involvement).

6.5. Moderating role of intervention duration

Universal prevention: Meta-regression analysis showed no significant moderating role of intervention duration on child-reported ($k = 26$, $b = 0.02$, $p = 0.59$, $R^2 = 0.00$ %) or parent-reported ($k = 10$, $b = 0.05$, $p = 0.34$, $R^2 = 0.00$ %) post-intervention effect sizes between universal CBT prevention and non-active controls. Subgroup analysis on child−/parent-reported outcomes was not conducted because most CBTs for universal prevention (26 out of 31 included in this review) lasted for 8–12 weeks.

***Targeted prevention*:** Meta-regression analysis showed no significant moderating role of intervention duration on child-reported post-intervention effect sizes between targeted CBT prevention and non-active controls ($k = 25$, $b = -0.04$, $p = 0.32$, $R^2 = 1.83$ %). However, subgroup analysis of child-reported outcomes indicated a significant difference in post-intervention effect sizes between targeted CBT prevention lasting for less than 8 weeks and those lasting for 8–12 weeks ($Q = 5.68$, $p = 0.02$). Targeted CBT prevention lasting for 8–12 weeks showed a significant pooled effect size compared to non-active controls (Hedge's g = −0.46, $p < 0.05$, 95 %CI-0.86 to −0.06, $I^2 = 78.6$ %, $k = 16$), but those lasting for less than 8 weeks did not (Hedge's g = 0.05, $p > 0.05$, 95 %CI-0.19 to 0.30, $I^2 = 11.7$ %, $k = 7$). Only three trials of targeted CBT prevention lasting for more than 12 weeks versus non-active controls provided child-reported outcomes, so these were not included in this subgroup analysis.

Meta-regression analysis of parent-reported outcomes indicated no significant association between intervention duration and the post-intervention effect sizes between targeted CBT prevention and non-active controls ($k = 16$, $b = 0.01$, $p = 0.81$, $R^2 = 0.00$ %). Subgroup analysis of parent-reported outcomes was not conducted as most targeted CBT prevention programs that provided parent-reported outcomes (13 out of 16) lasted for 8–12 weeks.

Treatment: Meta-regression analysis of child-reported outcomes indicated no significant association between intervention duration and the post-intervention effect sizes between CBT treatment and non-active controls ($k = 32$, $b = -0.02$, $p = 0.59$, $R^2 = 0.00$ %). Subgroup analysis of child-reported outcomes was conducted between CBT treatment lasting for 8–12 weeks (Hedge's g = −0.52, $p < 0.05$, 95 %CI-0.86 to −0.16, $I^2 = 80.3$ %, $k = 17$) and CBT treatment lasting for more than 12 weeks (Hedge's g = −0.92, $p < 0.001$, 95 %CI-1.32 to −0.52, $I^2 = 85.0$ %, $k = 15$). No significant between-group difference was found ($Q = 2.74$, $p = 0.10$). Only one trial of CBT treatment lasting for less than 8 weeks versus a non-active control provided child-reported outcomes, so this was not included in this subgroup analysis.

Meta-regression analysis of parent-reported outcomes indicated no significant association between intervention duration and the post-intervention effect sizes between CBT treatment and non-active controls ($k = 27$, $b = -0.02$, $p = 0.55$, $R^2 = 0.00$ %). Subgroup analysis of parent-reported outcomes also indicated no significant difference in post-intervention effect sizes between CBT treatment lasting for 8–12 weeks (Hedge's g = −0.40, $p < 0.05$, 95 %CI-0.66 to −0.14, $I^2 = 63.7$ %, $k = 15$) and CBT treatment lasting for more than 12 weeks (Hedge's g = −0.68, $p < 0.001$, 95 % CI-0.95 to −0.41, $I^2 = 60.7$ %, $k = 11$) ($Q = 2.64$, $p = 0.10$). Only one trial of CBT treatment lasting for less than 8 weeks versus a non-active control provided parent-reported outcomes, so this was not included in this subgroup analysis.

6.6. Moderating role of facilitator contact time

Universal prevention: Meta-regression analysis indicated no significant moderating role of the amount of facilitator contact time on the child- ($k = 26$, $b = 0.00$, $p = 0.87$, $R^2 = 0.00$ %) or parent-reported ($k = 10$, $b = 0.00$, $p = 0.78$, $R^2 = 0.00$ %) post-intervention effect sizes between universal CBT prevention and non-active control. Subgroup analysis of child-reported outcomes indicated no significant difference in post-intervention effect sizes between universal CBT prevention involving 9–16 h of facilitator contact time (Hedge's g = −0.26, $p < 0.05$, 95 %CI-0.46 to −0.06, $I^2 = 79.1$ %, $k = 13$) and those involving less than 9 h of facilitator contact time (Hedge's g = −0.29, $p > 0.05$, 95 %CI-0.71 to 0.13, $I^2 = 74.0$ %, $k = 9$) ($Q = 0.02$, $p = 0.89$). Only three trials of universal CBT prevention involving more than 16 h of facilitator contact time versus non-active controls provided child-reported outcomes, so they were not included in this subgroup analysis. Subgroup analysis of parent-reported outcomes was not conducted given the limited available data.

Targeted prevention: Meta-regression analysis indicated no significant moderating role of the amount of facilitator contact time on the child- ($k = 25$, $b = -0.00$, $p = 0.80$, $R^2 = 0.00$ %) or parent-reported ($k = 16$, $b = 0.00$, $p = 0.72$, $R^2 = 0.00$ %) post-intervention effect sizes between targeted CBT prevention and non-active controls. Subgroup analysis of child-reported outcomes indicated no significant difference in post-intervention effect sizes between targeted CBT prevention involving less than 9 h of facilitator contact time (Hedge's g = −0.09, $p > 0.05$, 95 %CI-0.46 to 0.29, $I^2 = 26.0$ %, $k = 6$), 9–16 h (Hedge's g = −0.37, $p = 0.03$, 95 %CI-0.69 to −0.05, $I^2 = 75.2$ %, $k = 13$), and those involving more than 16 h of facilitator contact time (Hedge's g = −0.18, $p < 0.05$, 95 %CI-0.30 to −0.05, $I^2 = 0.00$ %, $k = 6$) ($Q = 0.34$ to 1.87, $p = 0.17$ to 0.56). Subgroup analysis of parent-reported outcomes was not conducted given the limited available data.

Treatment: Meta-regression analysis indicated no significant association between the amount of facilitator contact time and the child- ($k = 32$, $b = -0.00$, $p = 0.15$, $R^2 = 7.55$ %) or parent-reported ($k = 27$, $b = -0.00$, $p = 0.63$, $R^2 = 0.00$ %) post-intervention effect sizes between CBT treatment and non-active control conditions. However, subgroup analysis of child-reported outcomes indicated a significant difference in post-intervention effectiveness between CBT treatment involving less than 9 h of facilitator contact time and those involving 9–16 h of facilitator contact time ($Q = 7.50$, $p = 0.006$). Specifically, CBT treatment involving 9–16 h of facilitator contact time compared to non-active controls showed a significant pooled effect size (Hedge's g = −1.02, $p < 0.001$, 95 %CI-1.45 to −0.60, $I^2 = 85.7$ %, $k = 14$), but those involving less than 9 h of facilitator contact time did not (Hedge's g = −0.27, $p > 0.05$, 95 %CI-0.70 to 0.15, $I^2 = 68.3$ %, $k = 11$). CBT treatment involving more than 16 h of facilitator contact time also showed a significant pooled effect size compared to non-active controls (Hedge's g = −0.62, $p < 0.01$, 95 %CI-0.93 to −0.31, $I^2 = 61.6$ %, $k = 8$). However, its pooled effect size did not significantly differ from those with less than 9 h or 9–16 h of facilitator contact time ($Q = 2.26$ to 2.87, $p = 0.09$ to 0.13).

Subgroup analysis of parent-reported outcomes indicated that CBT treatment with less than 9 h (Hedge's g = −0.48, $p < 0.005$, 95 %CI-0.71 to −0.24, $I^2 = 42.9$ %, $k = 11$), 9–16 h (Hedge's g = −0.53, $p = 0.05$, 95 %CI-1.07 to 0.00, $I^2 = 82.6$ %, $k = 9$), more than 16 h (Hedge's g = −0.67, $p < 0.01$, 95 %CI-0.98 to −0.36, $I^2 = 35.3$ %, $k = 7$) of facilitator contact time all showed significant pooled effect sizes compared to non-active controls, and no significant difference was observed between each pair of the three subgroups ($Q = 0.05$ to 1.37, $p = 0.24$ to 0.83).

6.7. Moderating role of facilitator background and delivery formats

Universal prevention: Almost all universal CBT prevention programs in trials included in this review were delivered in a face-to-face group format (30 out of 31) by mental health professionals or school staff. Subgroup analysis of child-reported outcomes indicated a medium and significant pooled effect size for universal CBT prevention facilitated by mental health professionals compared to non-active controls (Hedge's g = −0.43, $p < 0.001$, 95 %CI-0.62 to −0.24, $I^2 = 67.0$ %, $k = 16$), which was significantly greater than the small and non-significant pooled effect size between universal CBT prevention facilitated by school staff versus non-active controls (Hedge's g = 0.05, $p > 0.05$, 95 %CI-0.36 to 0.46, $I^2 = 83.2$ %, $k = 9$) ($Q = 5.88$, $p = 0.02$). However, subgroup analysis of parent-reported outcomes indicated that neither universal CBT prevention facilitated by mental health professionals (Hedge's g = −0.00, $p > 0.05$, 95 %CI-0.29 to 0.28, $I^2 = 0.00$ %, $k = 4$) nor universal CBT prevention facilitated by school staff (Hedge's g = 0.04, $p > 0.05$, 95 %CI-0.12 to 0.20, $I^2 = 0.00$ %, $k = 5$) was significantly more effective than compared to non-active controls. The between-group difference was not significant ($Q = 0.19$, $p = 0.66$).

Targeted prevention: Almost all targeted CBT prevention programs in trials included in this review were delivered by mental health professionals in a face-to-face individual or group format (27 out of 31). Subgroup analysis of child-reported outcomes indicated that group format showed significant pooled effect sizes compared to non-active controls (Hedge's g = −0.22, $p < 0.05$, 95 %CI-0.41 to −0.03, $I^2 = 54.9$ %, $k = 18$) but individual formats didn't (Hedge's g = 0.05, $p > 0.05$, 95 %CI-0.61 to 0.71, $I^2 = 46.8$ %, $k = 4$). However, no significant between-group difference was found ($Q = 1.43$, $p = 0.23$). Subgroup analysis of parent-reported outcomes was not conduced given the limited available data.

Treatment: All CBT treatments in trials included in this review were facilitated by mental health professionals in a face-to-face individual or group format or in a remote format (i.e., CBT providing remote facilitator-initiated real-time contact, such as internet-based CBT or bibliotherapy CBT with therapist support provided remotely via telephone/video calls). Subgroup analysis of child-reported outcomes indicated no significant difference in post-intervention effect sizes between face-to-face individual (Hedge's g = −0.93, $p < 0.01$, 95 %CI-1.44 to −0.41, $I^2 = 84.6$ %, $k = 10$) and group formats (Hedge's g = −0.68, $p < 0.001$, 95 %CI-1.00 to −0.36, $I^2 = 64.1$ %, $k = 13$) ($Q = 0.84$, $p = 0.36$). Similarly, subgroup analysis of parent-reported outcomes indicated no significant difference in post-intervention effect sizes between face-to-face individual (Hedge's g = −0.46, $p > 0.05$, 95 %CI-1.05 to 0.13, $I^2 = 81.6$ %, $k = 8$) and group formats (Hedge's g = −0.70, $p < 0.001$, 95 %CI-0.99 to −0.41, $I^2 = 50.1$ %, $k = 9$) ($Q = 0.72$, $p = 0.40$).

According to child-reported outcomes, the pooled effect size of remote CBT treatment was not significant compared to non-active controls (Hedge's g = −0.20, $p > 0.05$, 95 %CI-0.62 to 0.23, $I^2 = 56.7$ %, $k = 6$), and was significantly smaller than that of face-to-face individual CBT treatment ($Q = 6.67$, $p = 0.01$) and that of face-to-face group CBT treatment ($Q = 4.69$, $p = 0.03$). However, according to parent-reported outcomes, remote CBT treatment was significantly more effective than non-active controls (Hedge's g = −0.60, $p < 0.05$, 95 %CI-0.95 to −0.26, $I^2 = 50.4$ %, $k = 7$) and showed a comparable pooled effect size compared to face-to-face individual and group CBT treatment ($Q = 0.25$ to 0.26, $p = 0.61$ to 0.62).

6.8. Moderating role of parental involvement in different age groups

Given the limited available data, we were only able to examine the moderating role of parental involvement within trials of CBT for universal anxiety prevention versus non-active controls in preadolescent children (≤12 but not all ≤8 years) and trials of CBT for anxiety treatment versus non-active controls in mixed child/adolescent samples (≥12 and < 12 years).

Among the 12 trials involving CBT for universal anxiety prevention versus non-active controls in preadolescent children, 8 involved child-only CBT (all facilitator contact was with children) and 4 involved child-focused CBT with limited parental involvement (some facilitator contact time with parents, but less contact with parents than with children). Subgroup analysis of child-reported outcomes indicated a significant difference between two subgroups ($Q = 6.02$, $p = 0.01$). Child-focused CBTs with limited parental involvement showed a significant pooled effect size compared to non-active controls (Hedge's g = −0.25, p = 0.01, 95 %CI-0.41 to −0.10, $I^2 = 0.00$ %, $k = 4$), but child-only CBTs did not (Hedge's g = −0.02, $p > 0.05$, 95 %CI-0.21 to 0.17, $I^2 = 57.2$ %, $k = 8$). Subgroup analysis of parent-reported outcomes was not conducted because of the limited available data.

Among the 19 trials involving CBT for anxiety treatment versus non-active controls in mixed child/adolescent samples, 2 involved child-only CBTs, 10 involved child-focused CBTs with limited parental involvement, 5 involved child-focused CBTs with high parental involvement (some facilitator contact time with children, but less contact with children than with parents), 3 involved parent-only CBTs (all facilitator contact was with parents). Subgroup analysis of child-reported outcomes indicated that both child-focused CBTs with limited parental involvement (Hedge's g = −0.89, $p < 0.05$, 95 %CI-1.42 to −0.36, $I^2 = 86.4$ %, $k = 10$) and CBTs with high parental involvement (Hedge's g = −0.81, $p = 0.001$, 95 %CI-1.09 to −0.52, $I^2 = 0.00$ %, $k = 5$) were significantly more effective than non-active controls, and no significant difference was found between the two subgroups ($Q = 0.10$, $p = 0.75$). Subgroup analysis on parent-reported outcomes was not conducted because of the limited available data.

6.9. Publication bias

After removing outliers, visual inspection of funnel plots (see Figs. 2–3) and Egger's intercept regression tests showed evidence of significant publication bias based on both child-reported (k = 81, $t = -4.68$, $p < 0.0001$) and parent-reported outcomes (k = 53, $t = -4.10$, $p < 0.0001$). Further contour funnel plots using the trim and fill method further revealed that all missing studies were in the areas of non-significant or significantly negative results, indicating a marked absence of published trials of CBT versus non-active controls for anxiety in children and adolescents with non-significant or negative results.

6.10. Quality assessment

Fig. 4 showed a summary of quality assessment results. The risk of bias of each comparison between CBT and non-active control was provided in the supplementary documents.

Risk of bias due to randomization process: Among the 98 trials of CBT versus non-active control conditions included in this review, 61 did not provide sufficient information on the randomization process and allocation concealment, 6 showed imbalanced child baseline anxiety levels between the intervention and control groups, indicating a high risk of bias due to the randomization process.

Risk of bias due to deviations from intended interventions: Given the nature of psychological interventions, blinding of either participants or personnel delivering the interventions is impossible for trials included in this meta-analysis involving CBT versus non-active controls. Adherence to intervention protocol was reported to be good in 47 trials of CBT versus non-active controls, while 50 did not provide sufficient information about on adherence. One trial reported low adherence to intervention protocol, indicating a high risk of bias due to deviations from the intended interventions. In addition, 21 trials either did not report intention-to-treat (ITT) analysis outcomes or did not clarify whether the reported outcomes were based on ITT analysis. Among these, 10 trials showed evidence that their reported outcomes might significantly deviate from those expected under ITT analysis, indicating a high risk of bias due to deviations from intended interventions.

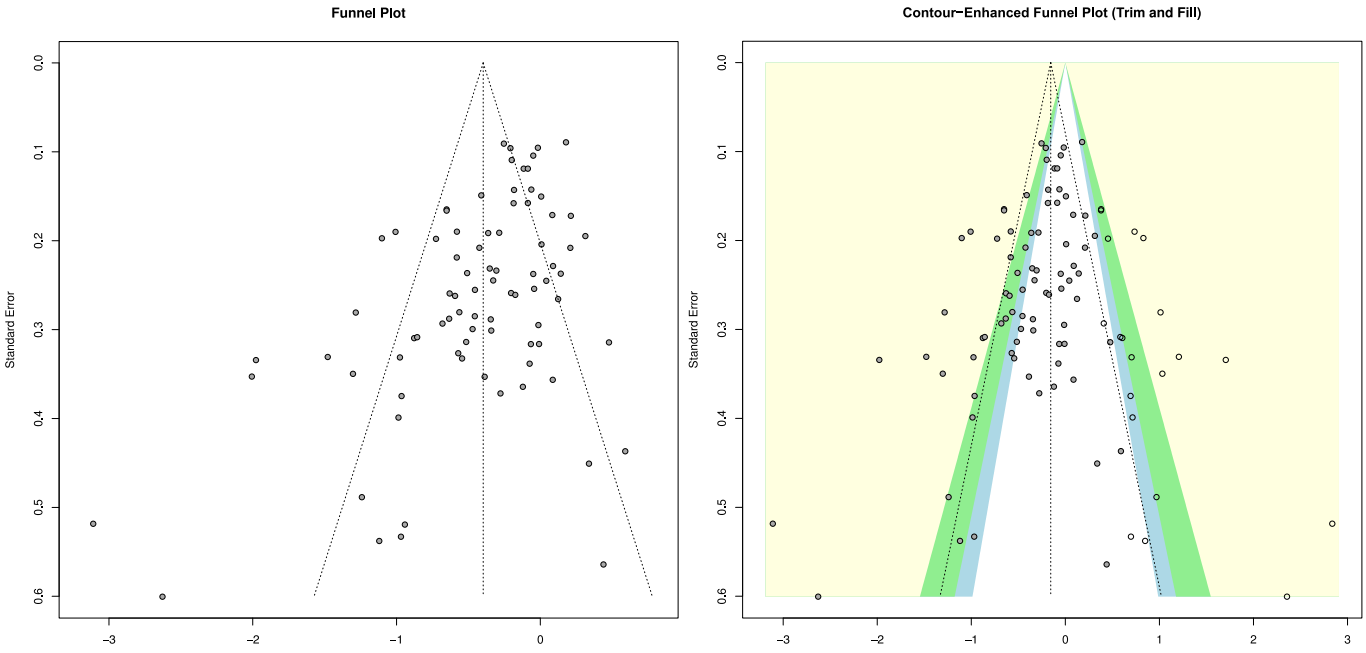

Fig. 2. (left). Funnel plot of CBTs providing child-reported outcomes. (right). Contour funnel plot of CBTs providing child-reported outcomes using trim and fill method.

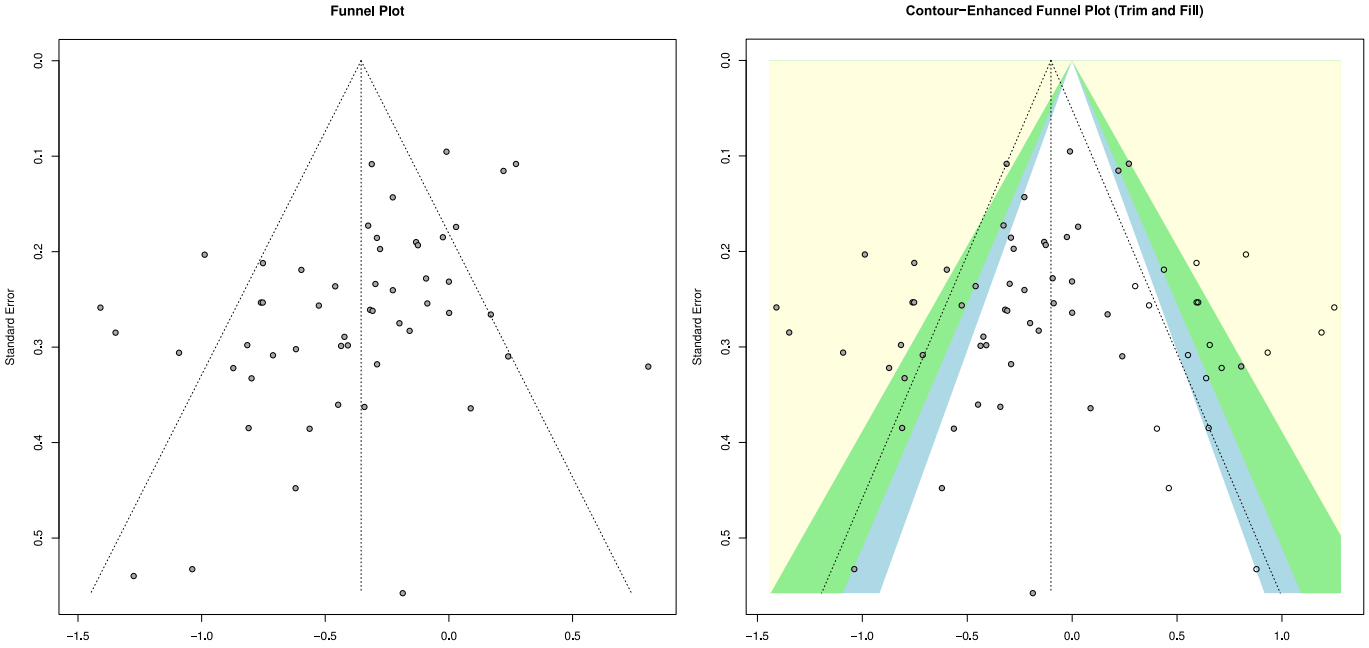

Fig. 3. (left). Funnel plot of CBTs providing parent-reported outcomes. (right). Contour funnel plot of CBTs providing parent-reported outcomes using trim and fill method.

Risk of bias due to missing outcome data: Among the 98 trials of CBT versus non-active control conditions included in this review, 27 reported outcome data for all participants, 21 provided evidence that their results were not biased due to missing data (e.g., sensitivity analysis), 8 clarified that the reasons of missingness were not related to outcomes. Among the remaining 42 trials, 15 found no specific difference between missing and no-missing samples, 20 didn't provide sufficient information on the missing pattern, 7 showed imbalanced missing data across groups, with more missing data in the CBT group than in the non-active control group, indicating a high risk of bias due to missing outcome data.

Risk of bias due to measurement of outcome: All included trials of CBT versus non-active controls showed a high risk of bias due to measurement of outcomes because the primary outcomes of this meta-analysis were children's broad anxiety symptoms reported by children or parents who were not blind to group allocation. The results reported by parents and children in intervention groups could be influenced by their knowledge of the intervention.

Risk of bias due to selection of the reported results: All included trials of CBT versus non-active controls reported the post-intervention mean and SD of all child/parent-reported measures of children's broad anxiety symptoms listed in the methods section. Therefore, there was not a high risk of bias due to selection of the reported results as observed

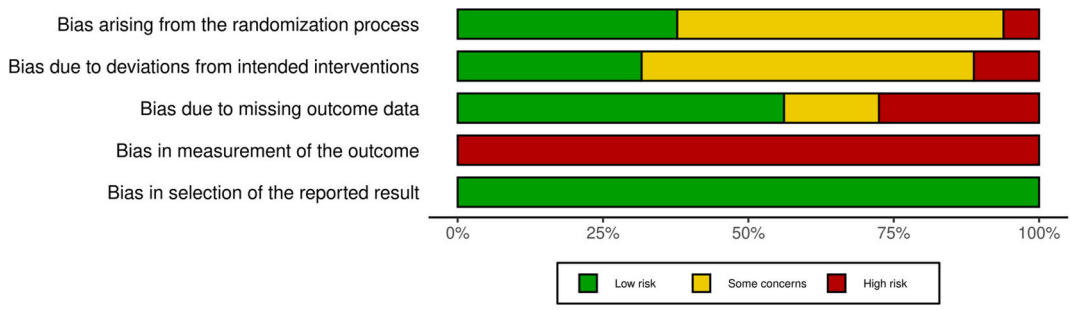

Fig. 4. Risk of bias graph: each risk of bias domain presented as percentages across all included studies.

in this meta-analysis.

7. Discussion

This review aimed to provide meta-analytic evidence for the moderating role of sample characteristics (child age, child baseline anxiety levels, parental baseline anxiety levels) and intervention characteristics (intervention duration, facilitator contact time, facilitator background, delivery formats, parental involvement) on the post-intervention broad anxiety symptom outcomes of CBTs for universal/targeted prevention and treatment of anxiety disorders in children and adolescents compared to non-active controls. Our findings provide insights into the question of what works for whom, however, should be interpreted cautiously given the limited available data, wide variations in outcomes, potential confounders, and discrepancies between child- and parent-reported outcomes. The following sections discuss the results of our data analyses, the implications and limitations of these results, and priorities for future studies.

7.1. Child age

Given the limited available data and potential confounding factors, we were not able to draw clear conclusions about the association between child age and the effectiveness of CBTs for universal/targeted anxiety prevention or anxiety treatment. Specifically, both meta-regression and subgroup analysis of child-reported outcomes indicated that older age was associated with greater effect sizes of CBTs for universal anxiety prevention versus non-active controls. While this result may suggest a need for caution when implementing CBT programs for universal anxiety prevention in preadolescent children, it may also reflect age-related measurement issues rather than true differences in effect (Creswell et al., 2021). Furthermore, although targeted CBT prevention for adolescents showed significantly larger effect sizes than those for mixed child/adolescent samples, we found no significant difference between the effectiveness of targeted CBT prevention for adolescents and preadolescent children-specific groups. Similarly, although subgroup analysis of child-reported outcomes indicated that CBT treatment for mixed child/adolescent samples showed significantly larger effect sizes than those for preadolescent children, we found no significant difference between the effectiveness of CBT treatment for preadolescent children and adolescent-specific groups. The wide age range of participants included in mixed child/adolescent samples made it difficult to draw conclusions on whether this was a specific effect of age. In addition, only a few trials included in this review evaluated CBTs specifically designed for young children ($\leq$ 8) and the majority of these trials only provided parent-reported outcomes. This is understandable given that young children may not be able to respond reliably to anxiety symptom measures (Spence, Rapee, McDonald, & Ingram, 2001). However, given that relatively few trials evaluating CBTs for preadolescent children and adolescents provided parent-reported outcomes, our ability to compare CBT outcomes across age groups is limited. Therefore, in order to better understand the association between child age and the effectiveness of CBTs for anxiety prevention and treatment in children and adolescents, we call for more CBT trials that target specific age groups and encourage those with samples spanning a broad age range to also report outcomes separately for narrower age groups. In addition, consistent with recommendations in Creswell et al. (2021), we encourage future CBT trials for preadolescent children and adolescents to provide both child- and parent-reported anxiety symptom outcomes to increase the consistency of reporting and to facilitate outcome comparisons across age groups.

7.2. Child baseline anxiety levels

Meta-regression analysis indicated no significant association between child baseline anxiety levels and either child or parent-reported effectiveness of CBTs for universal/targeted anxiety prevention or anxiety treatment. However, the small number of data points for the meta-regression analysis may have reduced the certainty of these results. Due to the different scaling across different anxiety measures, we performed meta-regression analyses within CBT trials that used the same anxiety measure which limited the data available for analysis. For example, meta-regression analysis of child baseline anxiety on the effectiveness of CBTs for targeted anxiety prevention was not performed because no single child anxiety symptom measure (child/parent report) was used in 10 or more trials. Therefore, in line with previous reviews (Creswell et al., 2021), we call for consistency in measures of child anxiety symptoms across trials to facilitate outcome comparison and moderator investigations.

7.3. Parent baseline anxiety levels

We were not able to test the moderating role of parental baseline anxiety levels and its potential interaction with parental involvement as only three of the included trials provided relevant information and each of these three trials evaluated CBTs involving parent sessions. Considering the potential influence of parental anxiety on the effectiveness of CBTs for child and adolescent anxiety (Kunas et al., 2021), we encourage researchers to assess and explicitly report parental anxiety status when evaluating the effectiveness of CBTs for child and adolescent anxiety in order to investigate how parental anxiety may influence intervention outcomes and what strategies may mitigate any potential negative effects.

7.4. Intervention duration

We were also unable to draw clear conclusions on the association between intervention duration and the effectiveness of CBTs for universal/targeted anxiety prevention due to limited available data and potential confounding factors. In terms of limited available data, most CBTs for universal anxiety prevention (26 out of 31) lasted for 8–12 weeks. Such lack of variability in duration may explain the non-significant association between duration and the effectiveness of CBTs for universal anxiety prevention. In terms of potential confounding

factors, we found that CBT for targeted anxiety prevention lasting for less than 8 weeks showed significantly smaller effect sizes compared to those lasting for 8–12 weeks. It is possible that longer duration may provide children with more time to learn and practice CBT skills (Fujii et al., 2013; Perihan et al., 2020), or foster a stronger therapeutic alliance that can improve intervention outcomes (Feindler & Smerling, 2022; Kendall et al., 2009). Or it may be that longer duration allows more time for changes to occur. In this case, what may truly matter is not the duration of the intervention, but when the assessment is conducted. To further reveal the association between intervention duration and CBT effectiveness while reducing the confounding effect of assessment time points, future research could usefully compare the effectiveness of CBTs with different durations measured at the same time point (e.g., comparing the effectiveness of 4-week and 8-week CBTs evaluated 12 weeks after randomization and at longer term follow-up assessments).

Furthermore, we found no significant difference in the effectiveness of CBTs for anxiety treatment lasting 8–12 weeks compared to those lasting more than 12 weeks. While this finding may suggest that extending the duration of a CBT treatment from 8 to 12 weeks to more than 12 weeks does not necessarily enhance its effectiveness, the wide variations in reported effect sizes within two subgroups reduces the certainty of this finding and highlights the need for further investigation to fully understand reasons for those variations. In addition, only one trial of CBT treatment lasting for less than 8 weeks (6 weeks) versus a non-active control group was included in this review (Cobham, 2012), limiting our ability to investigate whether brief CBT programs for anxiety treatment under 8 weeks can be as effective as longer programs. This highlights an important question for future research to explore, especially considering the 6-week CBT treatment for child anxiety included in this review demonstrated significant effectiveness in reducing child anxiety symptoms and diagnoses compared to the non-active control group (Cobham, 2012).

7.5. Amount of facilitator contact time

Given that reducing the amount of facilitator contact time may help increase access to and the cost-effectiveness of an intervention, it is notable that we found no significant association between facilitator contact time and the effectiveness of CBTs for universal/targeted anxiety prevention. However, the wide variation in reported effect sizes across trials evaluating interventions with less than 9 h and 9–16 h of facilitator contact time reduces the certainty of this finding and highlights the need for further investigation to fully understand reasons for this variation.

We were also unable to draw clear conclusions on the association between facilitator contact time and CBT treatment outcomes due to potential confounding factors and discrepancies between child- and parent-reported outcomes. In terms of potential confounding factors, our subgroup analysis of child-reported outcomes indicated that CBT treatment with less than 9 h of facilitator contact time showed significantly smaller effect sizes than those with 9–16 h of facilitator contact time, suggesting that limited amount of facilitator contact time may result in unsatisfactory outcomes. However, this finding differs from James et al.'s review (2021) which found no difference in outcomes from CBT treatment involving less than 10 h of facilitator contact time compared to interventions with more facilitator contact time. This inconsistency may be due to the different inclusion criteria used in the two reviews. James et al.'s review (2021) focused on face-to-face CBT treatments. However, this review included both face-to-face and remote CBT treatments, and most CBT treatments with less than 9 h of facilitator contact time were delivered in remote formats (7 out of 8). As a result, it is difficult to distinguish whether the difference in CBT treatment outcomes across facilitator contact time observed in this review was due to the amount of facilitator contact time or delivery formats (face-to-face or remote).

In terms of discrepancies between child- and parent-reported outcomes, our subgroup analysis of child-reported outcomes indicated that CBT treatment with less than 9 h of facilitator contact time were not significantly more effective than non-active controls with significantly smaller effects to CBT treatment with 9–16 h of facilitator contact time. However, subgroup analysis of parent-reported outcomes that included almost all of the same trials, indicated that CBT treatment with less than 9 h of facilitator contact time was significantly more effective than non-active controls and showed a comparable effect to CBT treatment with 9–16 h of facilitator contact time. This discrepancy between child- and parent-reported outcomes may indicate measurement issues related to reporters (Creswell et al., 2021), making it difficult to draw clear conclusions about the association between facilitator contact time and CBT treatment outcomes.

7.6. Facilitator background and delivery formats

Almost all CBTs for universal anxiety prevention in this review were delivered in a face-to-face group format. However, according to child-reported outcomes, those facilitated by school staff showed significantly smaller effects than those facilitated by mental health professionals and were not significantly more effective than non-active controls. This finding highlights the need for caution when delivering school staff-facilitated CBT for universal anxiety prevention in children and adolescents and the need for further investigation to understand what influences its outcomes and how to improve its effectiveness.

All of the CBT programs for targeted anxiety prevention included in this review except one were delivered face-to-face by mental health professionals (27 out of 31). Among these, the majority were delivered in a face-to-face group format (18 out of 27), limiting our ability to investigate which delivery formats work better for targeted anxiety prevention in children and adolescents. More recently novel forms of CBT (e.g., online parent-delivered/self-help CBT with therapist remote support) have been applied for targeted anxiety prevention (e.g., Reardon, Dodd, Hill, Jasper, & Creswell, 2022). With this increased variability in delivery format, it will be critical to continue to evaluate and compare the effectiveness of CBTs for targeted anxiety prevention across different formats.

All of the CBT treatments included in this review were delivered by mental health professionals in a face-to-face individual/group format or a remote format. We found no significant difference between face-to-face individual and group formats, which was inconsistent with one previous network meta-analysis of psychotherapies for anxiety treatment in children and young people which reported favourable outcomes for group compared to individual formats (Zhou et al., 2019). There are multiple reasons for this inconsistency. Firstly, our review focused on the between-group mean difference of child anxiety symptoms between CBT and non-active control groups, while Zhou et al. (2019) focused on the post-treatment CBT outcomes measured as the mean change scores of child anxiety symptoms from baseline to end points. Secondly, our review extracted all child- and parent-reported measures of child broad anxiety symptoms from each trial and conducted data analysis separately by reporter, while Zhou et al. (2019) prioritised child self-report outcomes. Third, our review categorized delivery formats into three categories: face-to-face individual, face-to-face group, and remote formats. However, Zhou et al. (2019) categorized delivery formats into two categories: individual and group formats. Most group CBT treatments were delivered face-to-face, whereas individual CBT treatments could be delivered either face-to-face or remotely. As a result, it is difficult to determine whether the difference in effects across delivery formats found by Zhou et al. (2019) was caused by individual vs. group formats or face-to-face vs remote formats. Fourth, to reduce potential confounding factors, this review focused on trials of CBT treatments targeting a range of anxiety disorders in children and adolescents without non-anxiety health conditions (e.g., ADHD, ASD). However, Zhou et al. (2019) included trials of disorder-specific CBT treatments and CBT treatments for children and adolescents with non-anxiety health conditions. It is important to note that CBT treatments that differ in delivery

format may also differ in other ways that may also influence treatment outcomes. For example, James, Reardon, Soler, James, & Creswell, 2020 found that the majority of CBT treatments targeting a specific anxiety disorder in children and adolescents (e.g., social anxiety disorder) were delivered in a group format, indicating that the difference in effect sizes for individual versus group delivery formats observed in Zhou et al.'s review (2019) may in fact be due to other factors, such as treatment targets, rather than the individual or group format. Therefore, we do not feel that the evidence was sufficient to assert that face-to-face group CBT holds an advantage over face-to-face individual CBT for treating anxiety disorders in children and adolescents.

Furthermore, although child-reported outcomes indicated significantly smaller effects for remote CBT treatments (all facilitator contact happened remotely, e.g., internet-based CBT or bibliotherapy CBT with therapist remote support via telephone/video calls) compared to face-to-face individual/group CBT treatments, these results should be interpreted cautiously for a number of reasons. Firstly, the wide variation in child-reported outcomes observed in the small number of remote CBT treatments versus non-active controls reduces the precision of the subgroup analysis. Secondly, all remote CBT treatment included in the review involved less than 9 h of facilitator contact time, making it difficult to distinguish between the influence of delivery formats and facilitator contact time. Third, despite including almost the same trials, subgroup analyses of child- and parent-reported outcomes showed different results. Specifically, child-reported outcomes indicated that remote CBT treatment was not superior to-active controls and was inferior to face-to-face individual/group CBT treatment. However, parent-reported outcomes indicated that both face-to-face individual/group CBT treatment and remote CBT treatment were superior to non-active controls, with no significant difference between face-to-face and remote formats. This discrepancy between child- and parent-reported outcomes indicates that the difference identified for child-reported outcomes may reflect measurement issues rather than true differences in effects. As such, on the basis of current available evidence, we believe it is too premature to conclude that remote CBTs are less effective than face-to-face CBTs for anxiety treatment in children and adolescents. Given the potential value of remote formats in terms of increasing accessibility and cost-effectiveness of an intervention (Podina et al., 2016), we call for more trials to evaluate the effectiveness of remote CBTs for anxiety prevention and treatment in children and adolescents and assess whether it is an effective but more accessible alternative to face-to-face CBTs for preventing and treating anxiety disorders in children and adolescents.

7.7. Parental involvement in intervention for different age groups

To reduce the potential confounding effect of child age, this review examined the moderating role of parental involvement on CBT outcomes in different age groups. This approach, although necessary, resulted in limited data for analysis. For example, child-reported outcomes indicated that, for preadolescent children (≤12 but not all ≤8 years), child-focused CBTs with 'limited' parental involvement for universal anxiety prevention (some facilitator contact time with parents, but less contact with parents than with children) showed significantly greater effectiveness compared to child-only CBTs (all facilitator contact was with children), indicating that parental involvement may enhance the effectiveness of CBTs for universal anxiety prevention among this age group. However, we were not able to examine the consistency of this finding in other age groups, as all CBTs for universal anxiety prevention in young children (≤8 years) included in this review were classified as 'child-focused CBTs with limited parental involvement', while most CBTs for universal anxiety prevention in adolescents (≥ 12 years) and mixed child/adolescent samples (≥12 and < 12 years) were child-only CBTs (10 out of 14).

Similarly, the moderating role of parental involvement on the effectiveness of CBTs for targeted anxiety prevention was not examined in any age group given the limited available data. In terms of CBT treatment, subgroup analysis could only be conducted to compare child-focused CBTs with 'limited' parental involvement and 'high' parental involvement for mixed child/adolescent samples (≥12 and < 12 years) and found no significant difference. Clearly, there is a great deal more work to be done to understand of the degree to which parental involvement may affect child outcomes in different age groups.

7.8. Discrepancies between child- and parent-report outcomes

As discussed earlier, the discrepancies between parent- and child-reported outcomes observed in several subgroups could reduce the certainty of some of our findings. For example, almost all CBT treatments with less than 9 h of facilitator contact time and remote CBT treatments provided both child- and parent-reported outcomes. However, parent-reported outcomes exhibited greater effect sizes for these CBT treatments than child-reported outcomes. These findings are consistent with previous studies which also failed to demonstrate the effectiveness of CBT treatment on child-reported anxiety symptom measures despite significant changes in diagnostic outcomes and parent reported outcomes (e.g., Rapee et al., 2017). There is also evidence that, at least for preadolescent children, parent-reported anxiety symptom outcomes are more often consistent with diagnostic outcomes (Evans, Thirlwall, Cooper, & Creswell, 2017). It is for this reason that Creswell et al. (2021) encouraged evaluations of psychological interventions for preadolescent anxiety to prioritize parent-reported anxiety symptom outcomes. This review adds weight to this recommendation. Furthermore, to facilitate outcome comparisons across different age groups, we encourage evaluators of psychological interventions for adolescent anxiety to provide both child- and parent-reported anxiety symptom outcomes. Having said this, it is interesting to note that the discrepancies between child- and parent-report outcomes were only observed in certain subgroups (e.g., remote CBT treatment, CBT treatment with less facilitator contact time) but not others, indicating the presence of confounding factors that may influence discrepancies between child- and parent-reported outcomes. Further investigation into these factors would help researchers and clinicians prioritize reporters based on the unique features of each CBT programs.

8. Limitations of included trials

First, significant publication bias was observed among the included CBTs trials, which, consistent with previous reviews (e.g., James, Reardon, Soler, James, & Creswell, 2020) indicates a tendency of journals to publish trials on this topic with positive results. Furthermore, according to the results of quality assessment, 62 % of the included CBT trials exhibited some level of risk of bias due to the randomization process, 44 % showed risks of bias related to missing data, 56 % trials did not report the extent to which the intervention adhered to the protocol, and 20 % trials either did not follow the intention-to-treat principle or did not provide sufficient information regarding it. In addition, using child- and parent-reported measures of child anxiety symptoms as primary outcomes may lead to bias, since exposure to the intervention content could lead children and parents in the intervention group to interpret scale items differently compared to those in the control groups.

8.1. Limitations of our review and future directions

8.1.1. Eligible criteria

This review has several limitations related to its eligibility criteria. First of all, in order to reduce the influence of potential confounding factors (e.g., intervention content, primary anxiety diagnosis/symptom, comorbidity) and increase our ability to detect the effect of targeted moderators, this review excluded individually tailored CBTs, disorder-specific CBTs, and CBTs designed for children and adolescents with other non-anxiety health conditions (e.g., depression, ADHD, ASD, intellectual disabilities, etc) due to the specific delivery formats and/or

intervention components and measures that may be used during these interventions which might confound study findings. Therefore, caution is needed when generalising our findings to these CBT programs.

Furthermore, in order to minimize the variation in control conditions across included studies and detect the effect of target moderators, this review exclusively focused on studies comparing CBTs to "non-active controls" (e.g., waiting lists, placebos, usual school practices, or no-intervention controls). As a result, findings of this review are limited to the moderating role of sample and intervention characteristics on the effectiveness of CBT compared to non-active controls. Exploring factors that may moderate the effectiveness of CBT compared to a specific type of "active control" would provide valuable insights to guide recommendations for selecting appropriate interventions for different populations, but this opportunity is currently limited by the small number of studies comparing CBT to active controls, and the broad range of "interventions" in these active control arms (e.g., treatment as usual, attention controls, medications, other psychological interventions, James, Reardon, Soler, James, & Creswell, 2020). Treating all existing active controls as a single category would make it difficult to draw meaningful conclusions about the targeted moderators and the lack of studies comparing CBT to a single specific type of "active control" makes it difficult to explore moderators of CBT effectiveness compared to a particular active control. Future trials that compare CBT to clearly defined and consistent active controls would allow for a more nuanced understanding of the factors that influence the relative effectiveness of CBT for the prevention and treatment of child and adolescent anxiety disorders compared to specific active control conditions.

In addition, this review only included articles published in English in peer-reviewed journals to set a standard for the quality of the included studies. However, the inclusion of studies published in languages other than English, unpublished studies, partially published studies, and studies published in 'grey' literature sources such as dissertations, theses and conference abstracts can help reduce the risk of language or indexing bias and publication bias and increase the pool of available data for analysis. Future reviews may consider including those studies but would also need to be aware of the potential risk of bias this alternative approach could introduce, particularly because unpublished studies that can be located may be an unrepresentative sample of all unpublished studies (Higgins et al., 2020).

8.1.2. Outcomes

This review only examined the moderators of effectiveness of CBT in reducing child anxiety symptoms, which is reported more consistently across CBT trials for anxiety prevention and treatment than anxiety diagnosis outcomes. However, the remission/absence/presence of anxiety diagnosis is another critical indicator for the evaluation of CBT effectiveness for anxiety prevention and treatment. Further investigation on the moderators of the anxiety diagnosis outcomes of CBT for anxiety prevention and treatment will also be helpful.

Furthermore, this review specifically focused on post-intervention outcomes, as relatively few RCTs reported longer-term follow-up outcomes of CBT groups compared to non-active controls (James, Reardon, Soler, James, & Creswell, 2020; Lawrence et al., 2017). However, the effectiveness of CBTs for anxiety prevention and treatment in children and adolescents may vary over time (Ginsburg et al., 2018, 2015; Ginsburg, Tein, & Riddle, 2021; Rasing, Creemers, Janssens, & Scholte, 2017). The factors that moderate the short-term outcome of a CBT intervention may differ from those that moderate its longer-term outcomes (Thirlwall, Cooper, & Creswell, 2017). Further investigation into the moderators of CBT outcomes over time would be helpful for enhancing the maintenance of intervention gains and reducing the risk of relapse.

8.2. Categorization of moderators

To facilitate comparisons between the results of this review and previous ones, we used the same cut off points as previous reviews (when available) when categorizing moderators for subgroup analysis. However, some cut off points could be somewhat arbitrary (e.g., age groups, intervention duration, amount of facilitator contact time). It is also important to acknowledge that some of our categorization approaches may result in the loss of information. For example, remote CBT in this review is classified as CBT which provided facilitator-initiated real-time contact aimed at facilitating achievement of intervention goals and all contact happened remotely (internet-based or bibliotherapy CBT with therapist remote support via telephone/video calls). Therefore, our findings on remote CBTs cannot be generalized to full self-help internet-based or bibliotherapy CBT without any facilitator-initiated real-time support. Similarly, we classified parental involvement into four categories (child-only, child-focused with limited parental involvement, child-focused with high parental involvement, parent-only) according to the amount of facilitator contact time with parents and children. However, it is likely that how parents are involved and what is done with parents matters more than how much time is spent (Lawrence, Parkinson, Jasper, Creswell, & Halligan, 2021). Further studies investigating the role of parental involvement in CBT for child and adolescent anxiety should explore in greater detail the specific forms of parental involvement and the content provided to them.

8.3. Statistical analysis

This review used meta-regression analysis and subgroup analysis to investigate the moderators of CBTs for anxiety prevention and treatment in children and adolescents. However, both approaches have limitations. Meta-regression operates under the assumption of linear relationships, potentially leading to less accurate results in non-linear scenarios. In terms of subgroup analysis, the small numbers of studies, wide variations in outcomes, or both, observed in several subgroups could limit our ability to identify significant between-group difference. Even where a significant difference was observed between subgroups, the presence of potential confounding factors could make it difficult to draw meaningful conclusions (e.g., intervention duration and assessment point, face-to-face/remote and facilitator contact time). To minimize the interference of potential confounders and reveal the true effect of moderators of interests, we call for more experimental research, dismantling studies, and efficacy trials specifically designed for identifying moderators of interest with other factors controlled. Qualitative studies are also needed to delve into the underlying reasons behind moderation effects.

9. Conclusion

Despite these limitations, this is the first meta-analytic review specifically focusing on the moderating role of sample and intervention characteristics on the effectiveness of CBTs for the universal prevention, targeted prevention, and treatment of anxiety disorders in children and adolescents compared to non-active controls. However, the limited available data, wide variations in outcomes, potential confounders, and discrepancies between child- and parent-reported outcomes limited our ability to draw firm conclusions about any moderators or make recommendations for clinical decision-making based on any significant or non-significant moderating effect identified in this review. Clearly, there is a great deal more work to be done to understand what works for whom, to then develop more effective CBT interventions for the prevention and treatment of anxiety disorders in children and adolescents. Specifically, individual trials evaluating the effectiveness of a CBT intervention should further investigate the moderating role of sample characteristics (e.g., child age, child baseline anxiety levels, parental anxiety) using both quantitative and qualitative methods, to understand who may benefit from the intervention, who may not, and why. High-quality experimental research, dismantling studies, and efficacy trials incorporating both non-active and active control groups are also needed to

evaluate and compare the effectiveness of CBT programs varying in a specific intervention characteristic within the same sample group, to understand which types of CBT programs work better for the population being targeted. We also encourage consistency across studies in the reporter (child/parent) and instruments used to assess anxiety symptoms to enable meaningful comparisons and moderator identification.

Contributors

Siyu Zhou contributed to study conceptualization, methodology, data curation, formal data analysis, writing the original manuscript draft. Cathy Creswell and Tessa Reardon contributed to study conceptualization, methodology, review and editing of the manuscript.

Urška Košir contributed to data curation and reviewing and editing of the manuscript.

Declaration of competing interest

All authors declare that they have no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cpr.2025.102548.

Data availability

Data will be made available on request.

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