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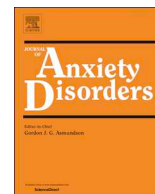
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## Cognitive-behavior therapy for children and adolescents with anxiety disorders: A meta-analysis of secondary outcomes



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### ABSTRACT

Anxiety-focused cognitive-behavioral therapy (CBT) effectively reduces anxiety in children and adolescents. An important remaining question is to what extent anxiety-focused CBT also affects broader outcome domains. Additionally, it remains unclear whether parental involvement in treatment may have impact on domains other than anxiety. A meta-analysis ( $n_{\text{studies}} = 42$ ,  $n_{\text{participants}} = 3239$ ) of the effects of CBT and the moderating role of parental involvement was conducted on the following major secondary outcomes: depressive symptoms, externalizing behaviors, general functioning, and social competence. Randomized controlled trials were included when having a waitlist or active control condition, a youth sample (aged < 19) with a primary anxiety disorder diagnosis receiving anxiety-focused CBT and reported secondary outcomes. Controlled effect sizes (Cohen's  $d$ ) were calculated employing random effect models. CBT had a large effect on general functioning ( $-1.25[-1.59;0.90]$ ,  $n_{\text{studies}} = 17$ ), a small to moderate effect on depressive symptoms ( $-0.31[-0.41;-0.22]$ ,  $n_{\text{studies}} = 31$ ) and a small effect on externalizing behaviors ( $-0.23[-0.38;0.09]$ ,  $n_{\text{studies}} = 12$ ) from pre- to post-treatment. Effects remained or even further improved at follow-up. Social competence only improved at follow-up ( $n_{\text{studies}} = 6$ ). Concluding, anxiety-focused CBT has a positive effect on broader outcome domains than just anxiety. Higher parental involvement seemed to have beneficial effects at follow-up, with improvements in general functioning and comorbid symptoms.

### 1. Introduction

Clients with problems in multiple life domains and comorbid disorders are more the rule rather than the exception (Ormel et al., 2014). Currently, most treatment protocols focus mainly on one specific classification or symptom dimension. This is also true for anxiety disorders, which are commonly accompanied by comorbid disorders and problems in functioning. Do the effects of such specific treatments generalize to these comorbid symptoms or general functioning?

Anxiety disorders are among the most prevalent disorders in childhood and adolescence; around 10% of children suffer from an anxiety disorder. As mentioned, comorbidity with other mental disorders is high (median odds ratio comorbidity depression and anxiety: 8.1, comorbidity anxiety and conduct problems: 3.1; Angold, Costello, & Erkanli, 1999); and anxiety disorders are associated with decreased

social competence (Dodd et al., 2011), problems in family functioning (Towe-Goodman, Franz, Copeland, Angold, & Egger, 2014), problems in social functioning (Settipani & Kendall, 2013), academic impairment (Nail, 2015), and decreased general functioning (Peris et al., 2015). Furthermore, childhood anxiety disorders are predictive of continued mental disorders in adolescence and adulthood: a review of four longitudinal studies with follow-up intervals ranging from 3 to 5 years, found increased chance of continued mental disorders for youth presenting with internalizing disorders (Ollendick & King, 1994).

Cognitive-behavior therapy (CBT) is an effective treatment for childhood anxiety disorders. The first randomized clinical trial of the effect of CBT for childhood anxiety has been conducted in 1994 and was found to be efficacious (Kendall, 1994), after which multiple studies have been conducted. A meta-analysis including 48 randomized controlled studies of CBT for anxiety disorders in children and adolescents

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found moderate to large effect sizes from pre- to post treatment for reductions in anxiety symptoms ( $d = 0.77$  relative to a passive control condition, and  $d = 0.39$  relative to an active control condition) (Reynolds, Wilson, Austin, & Hooper, 2012). In treatment outcome research, the majority of studies has focused on symptom reduction as the primary marker of treatment success (Swan & Kendall, 2016). As mentioned in Becker, Chorpita, and Daleiden, (2011) this is because these treatments are offered under tightly controlled conditions and prioritize measures of symptoms that are the focus of the intervention in order to optimize internal validity (Becker et al., 2011). However, evaluations based solely on symptom reduction might in some cases overestimate or underestimate the impact of a treatment. For example, symptoms might improve following treatment, but no improvement is demonstrated in other domains, or sometimes symptoms might remain but people learn how to better cope with their symptoms and experience less interference in daily life. In order to use a higher standard for evaluating treatments (Becker et al., 2011), it is necessary to consider how treatments affect multiple outcomes (Hoagwood et al., 2012). Such a comprehensive assessment of treatment outcomes is necessary to better understand the meaning of symptom change (Hoagwood et al., 1996). Evaluating treatments across multiple outcome domains helps in providing guidance in the selection of treatments for clients taking the specific goals of the client into account (Becker et al., 2011). It can help in identifying the best practices for a particular purpose and for particular client groups.

Furthermore, often it is not the symptoms but the interference of daily functioning that creates suffering for children and results in treatment seeking by the parents (Angold et al., 1998; Becker et al., 2011; Farmer, Burns, Angold, & Costello, 1997). Swan and Kendall (2016) indicate that anxiety disorders are meaningfully associated with impairment in social, educational, occupational and/or family functioning and highlight the importance to consider changes in functioning when examining treatment effects. Given the high rate of comorbidity present in children with anxiety disorders, such as depression and externalizing behavior (Angold et al., 1999), it is also important to examine effects of anxiety-focused CBT on these comorbid symptoms. This all points to the importance of not only focusing on improvement in anxiety symptoms when studying the effectiveness of anxiety-focused CBT, but also investigating the effects of CBT on secondary outcomes such as general functioning as well as comorbid symptoms such as depression and externalizing behaviors.

It seems plausible that CBT for anxiety disorders in children will lead to improvement in comorbid symptomatology, given that certain components in anxiety-focused CBT are also applied in treatments for comorbid disorders, such as cognitive restructuring in depression or contingency management in treatments for children with behavioral problems. In line with this assumption, anxiety-focused CBT is expected to lead to reductions in comorbid complaints, such as depressive and externalizing symptomatology. This might also, or especially, hold for comorbid complaints that are thought to arise secondary to anxiety. Externalizing problems (e.g. anger/oppositional behavior) as well as depression have been found in a subgroup of children presenting with anxiety disorders (Cunningham & Ollendick, 2010). It might be that children with anxiety disorders become angry and oppositional in situations where avoidance is hindered and anger serves as a defensive response (Corr, 2013). One would expect that externalizing problems arising in these threatening situations will be reduced as a consequence of participating in anxiety focused therapy. However, it might also be the case that an anxious child when freed of the emotional constraints of anxiety might show a burst of expressiveness and increase in externalizing symptoms. Cummings et al. (2014) describe a multiple pathway model to anxiety-depression comorbidity in which the first pathway describes youth with primary an anxiety disorder with subsequent comorbid depression resulting from anxiety-related impairment. In case depressive symptoms arise via this pathway, it is expected that successful treatment of the anxiety disorder would also decrease

the mood symptoms.

Most of all, it is expected that reduction of children's anxiety will lead to improvement in their general functioning. General functioning encompasses the children's ability to meet age appropriate roles and participate in life activities without interference (Becker et al., 2011). General functioning encompasses multiple domains, such as functioning with peers and at home, as well as academic functioning. Previous studies have found academic impairment to be positively correlated with anxiety severity and negatively with global functioning. Following CBT for anxiety, treatment responders showed fewer academic difficulties compared to non-responders, suggesting that anxiety reduction may enable these responders to improve academically too (Nail et al., 2015). With regard to social competence, especially in social phobia, multiple studies have indicated poorer social competence in socially anxious children (Alfano, Beidel, & Turner, 2008; Erath, Flanagan, & Bierman, 2007; Spence, Donovan, & Brechman-Toussaint, 1999; Inderbitzen-Nolan et al., 2007). Social competence refers to the consequences of a persons' performance in social situations, such as number of friends, being invited for parties, playing with other children or level of popularity (Spence et al., 1999). It is the question whether this reduced social competence is a reflection of have having poorer social skills. It has been found that socially anxious people have similar levels of social skills as non-anxious persons, but perceive themselves to be less skilled (Cartwright-Hatton et al., 2005). In line with this, another study with an analogue sample of 84 high school students found social anxiety to be associated with negative social performance expectations but not with conversation skills. They did find social anxiety to be associated with decreased peer acceptance and increased peer victimization (Erath et al., 2007). It might be that it is not so much that anxiety disordered people have poorer social skills, but that they have more negative expectations of social outcomes which result in less social competence. Anxiety-focused CBT might help in lowering the threshold for children to seek social contact with peers and thereby increase their social competence. As far as we know, no systematic evaluation of the effects of anxiety-focused CBT on social competence of children has been conducted. Therefore, it remains to be seen whether or not social competence improves following CBT.

Lastly, it has been found that greater anxiety in childhood is associated with lower levels of general family functioning and cohesion, with higher levels of dysfunction and conflict. These associations are thought to be reciprocal. It is expected that effective treatment of a child's anxiety may resolve parental or family distress. However, the treatment literature provides little information about the effects of child-focused treatment on parent and family variables (Keeton et al., 2013). Although it seems plausible to assume that improvements in general functioning and its more specific components will follow anxiety-focused CBT, no systematic evaluation has been conducted on which to base a firm hypothesis regarding these variables.

Fortunately, studies have started to systematically evaluate the effects of anxiety disorder treatments on secondary outcomes. For example, in a meta-analysis by Ishikawa, Okajima, Matsuoka, and Sakano et al. (2007) reductions in depressive symptoms of a moderate effect size were found following anxiety-focused CBT. Given that secondary outcomes are more commonly reported nowadays (Hoagwood et al., 2012), a systematic evaluation of the effects of anxiety-focused CBT on these broader outcome domains is needed.

Another important question relates to the involvement of parents in CBT of their anxious children and adolescents. It has been suggested that involving parents may reduce obstacles, such as parental anxiety, parental frustration with the child, anxiogenic parenting styles and parents' modeling of an avoidant coping style (Manassis et al., 2014). It has been proposed that involving parents in treatment might facilitate the generalization of learned skills to children's daily life, since parents can support their children in performing exposure exercises, which are thought to be of key relevance for successful treatment outcomes (Ale, McCarthy, Rothschild, & Whiteside, 2015).

Research has evaluated the beneficial effect of parental involvement on the primary outcome of anxiety. Surprisingly and intriguingly, no consistent body of empirical evidence has so far indicated that involving parents in treatment has beneficial effects on children's anxiety (Reynolds et al., 2012). Beneficial effects of more intensive parental involvement have, however, been reported in studies where the major focus was on child anxiety management, including contingency management techniques or transfer of control, although only at follow-up (Manassis et al., 2014). This may suggest that parental involvement is especially important in the maintenance of treatment gains, given that parental involvement may aid in the continued use of skills learned in CBT beyond the end of therapy (Ginsburg, Silverman, & Kurtines, 1995). Parents can model healthy coping, remind their children to practice newly-acquired coping skills, and continue to encourage and reward positive changes in behavior after treatment has ended (Manassis et al., 2014).

This indicates that parental involvement in treatment might be especially important to facilitate generalization of acquired skills to daily life (Barmish & Kendall, 2005). Following this line of reasoning, it is expected that the involvement of parents in treatment may also aid in the generalization of effects to broader outcome domains. Parents might facilitate transfer of the learned skills to daily life, thereby facilitating the improvement of general functioning and the child's social competence. Furthermore, parents might help in the generalization of learned skills to comorbid problems, such as using contingency management techniques to externalizing problems of the child, or they may assist the child in cognitive restructuring when the child feels sad. However, as indicated above, whether parental involvement indeed facilitates the generalization of treatment effects to broader outcome domains has not been systematically evaluated and remains to be seen.

In order to address the important issues of the effect of CBT on broader outcome domains and the potential beneficial effects of parental involvement in treatment, we conducted a meta-analysis to better establish the breadth of impact of the effectiveness of this widely-applied treatment. A bottom-up approach was used to identify secondary outcomes, that is, ones that were reported in the literature with sufficient frequency to include in a meta-analysis. The considered outcomes were general, family, social and academic functioning, as well as comorbid symptomatology, such as depressive symptoms and externalizing behaviors. Not all relevant secondary outcomes could be included, due to an insufficient amount of studies reporting on them. We were able to include; depressive symptoms, externalizing behaviors, general functioning and social competence in our meta-analysis. Additionally, we investigated whether parental involvement in treatment moderated the generalization of effects from anxiety-focused CBT to secondary outcomes.

## 2. Materials and method

### 2.1. Systematic search

A combined search in the PsychInfo and Medline databases was performed on the 15<sup>th</sup> of July 2016. The search consisted of a combination of terms, thesaurus terms and synonyms for the two main factors in the research question, namely, "anxiety disorders" and "intervention", and were based on keywords in already-identified articles, words in guidelines and expert suggestions: "anx\*" OR "phobi\*" OR "agora" OR "panic disor\*" OR "overanxious" OR "avoidant disorder" AND "psychotherapy" OR "behavior therapy" OR "cognitive therapy" OR "psychologic desensitization" OR relaxation therapy" OR "parent training" OR "CBT" OR cognitive behaviour therapy" OR "cognitive behavioral therapy" OR "behavior therapy" OR "treatment".

Limiters in the advanced search option were used to search for published English language, peer-reviewed studies including children and adolescents (age < 19). Additionally, reference lists of recent meta-analyses were checked for eligible articles.

### 2.2. Procedure

The selection process for inclusion in the meta-analysis consisted of a two-stepped approach. For the first step, each study had to meet the following criteria:

- a Randomized controlled trial including a waitlist, care as usual, pill placebo, or attention placebo condition
- b Used an anxiety-focused CBT
- c Participants were children and adolescents (aged < 19) with a primary anxiety disorder diagnosis
- d Baseline and post-treatment data reported for any secondary outcome measure with regard to comorbid symptoms and general, social, academic and family functioning.

Authors LK, MP, MN and YJ selected papers that met the inclusion criteria that were first applied to the titles, next to the abstracts, and lastly to the full-text articles. MN and MP are both researchers in clinical psychology and registered health psychologists, LK is a PhD student in clinical psychology and YJ a research master student in clinical psychology. In case no full-texts were available, authors were emailed to request the full article. Moreover, a cross-reference search of the eligible articles was conducted to identify additional studies that were not found in the electronic search. In accordance with the Meta-Analysis Reporting Standards (American Psychological Association, 2008) each study was assessed by two authors. In cases of disagreement, the issue was discussed until consensus was reached. Initial interrater agreement was moderate for the abstract selection (kappa of 0.5) and substantial for the title and full-text selection (both kappa of 0.8). Following this first selection procedure, the second step consisted of a bottom-up approach for inclusion of studies in the meta-analysis.

Secondary outcome measures with regard to comorbid symptoms and general, family, social and academic functioning that were reported by at least four studies that were rated as having adequate quality were eligible for inclusion in this meta-analysis. This cut-off point of four studies to select secondary outcomes is similar to the strategy used in the meta-analysis by Scaini, Belotti, Ogliari, and Battaglia, (2016), who regard this as an adequate trade-off between coverage and representativeness. We added the criteria of having adequate quality in order to ascertain the reliability of our results. Outcomes that were closely related to the content of anxiety-focused CBT, such as interference of the anxiety disorder, anxious behaviors, coping and anxious or coping thoughts were excluded from inclusion in the analysis since they do not reflect generalization effects of the treatment.

### 2.3. Quality assessment

Quality of the studies was assessed using the 'Clinical Trials Assessment Measure for psychological treatments' (CTAM; [Tarrier & Wykes, 2004](#)), a scale designed to assess the quality of psychological treatments in mental health, based on sample characteristics, the allocation procedure, assessments, type of control group, analysis and the provided treatment. CTAM scores can range from 0 to 100, with studies scoring above 64 considered to be of adequate quality ([Tarrier & Wykes, 2004](#)). Scores were independently determined by authors LK and YJ and discussed until consensus was reached, with substantial interrater agreement given by a kappa statistic of 0.65

### 2.4. CBT format

A sensitivity analysis was conducted only including studies that are more similar with regard to the format of the provided CBT. Studies were included when they were provided face to face to the child, either with or without parental involvement and consisted of at least eight weekly sessions. Treatments that were partly or completely conducted via the computer, were parent-mediated, were bibliotherapy or

consisted of blocks of multiple hours instead of weekly sessions were excluded. Treatment inclusion based on these criteria was independently determined by authors LK and YJ with substantial inter-rater agreement given by a kappa statistic of 0.81, disagreements were discussed until consensus was reached.

## 2.5. Moderator analysis: coding parental involvement

Treatment descriptions were carefully read by two independent coders, after which treatments were categorized in one of four groups, according to the following criteria:

*Group 1: no or low parental involvement with only psycho-education:* consists of treatment in which parents have a maximum of two parent sessions or only participate in a brief period of the treatment sessions, receiving psycho-education.

*Group 2: moderate parental involvement, involvement in more than two sessions with emphasis on specific components of parent training:* consists of treatments in which parents are present in more than two treatment sessions but not all sessions. Therefore, there is some variability in the extent of parental involvement within this category. The treatments included in this category not only included psychoeducation but also specific components of parent training such as contingency management, problem solving, parental anxiety management, modeling, cognitive restructuring or communication skills.

*Group 3: high parental involvement, involvement in all sessions with attention to specific components of parent training:* consists of treatment in which parents are present during all sessions or receive the same number of sessions as their child, with emphasis on multiple specific components of parent training, such as contingency management, problem solving, parental anxiety management, modeling, cognitive restructuring or communication skills.

*Group 4: parent-mediated treatment:* Treatment in which the parents are mediators and receive the treatment information, which often consists of an iCBT or bibliotherapy approach. Sometimes, treatments also included therapist support over the course of treatment.

Studies were categorized into these four groups by two independent coders with moderate interrater reliability ( $\kappa = .62$ ). Disagreements were discussed until consensus was reached. We acknowledge that therapist are likely to have had some flexibility with respect to parent contact in a given case, which might mean that parental contact may have been underestimated in some cases. Furthermore, these data do not take into account the extent of parental involvement in homework exercises given to the child, as this has not been reported in the studies.

## 2.6. Statistical analysis

Statistical analyses were conducted using RevMan Version 5.3, developed by the Cochrane Collaboration (Review Manager (RevMan) (2014)). The Generic Inverse Variance Method was employed, and given the variance in type of interventions, a random effects model was used. Heterogeneity in the outcome of studies was assessed using the chi-squared ( $\chi^2$ ), with  $I^2$  as a quantifiable measure of inconsistency describing the percentage of variability in effect sizes due to heterogeneity rather than sampling. Overall effects were given by z-scores. Furthermore, to check for publication bias, funnel plots were created and Egger's test was conducted (Egger, Smith, Schneider, & Minder, 1997). There are indications for a publication bias when funnel plots are asymmetric or if the p-value of Egger's test is equal or below 0.1.

Cohen's  $d$  was computed as the effect size measure, in order to standardize the outcome. The following equation was used (Becker, 1988):

$$\text{Cohen's } d = \frac{M_{\text{post}} - M_{\text{pre}}}{SD_{\text{pre}}}$$

Where  $M_{\text{post}}$  was the mean post-intervention and  $M_{\text{pre}}$  is the mean pre-

intervention.  $SD_{\text{pre}}$  is the standard deviation of the baseline measure. Subsequently, the overall effect size for each study from pre- to post-treatment was calculated by subtracting the effect size of the control condition from the effect size of the intervention condition.

The standard error of the overall effect size was calculated using the subsequent equation (Cooper & Hedges, 1994)

$$SE = \sqrt{\left(\frac{2(1-r)}{ntreatment} + \frac{dtreatment^2}{2(ntreatment-1)}\right) + \frac{2(1-r)}{ncontrol}}$$

where  $n$  stands for the number of participants,  $r$  stands for baseline to post-treatment correlation and  $d$  stands for effect size given by Cohen's  $d$ .

As a first step, the controlled effect size for reductions on the primary outcome measure of self-reported anxiety symptoms was calculated for all included studies, comparing CBT to all control conditions and the uncontrolled effect size from post- to follow-up, to see whether this effect size for reductions in anxiety is similar to previous results.

Following this, for each secondary outcome variable, four effect sizes were calculated: (I) comparing CBT to all possible control groups (both waitlist controls and active control conditions), (II) the effect size for studies comparing CBT to only active control conditions (III) the effect size of the sensitivity analysis including only studies with a quality assessment score (e.g. CTAM score) > 64 comparing CBT to all possible control groups and (IV) the effect size of the sensitivity analysis including only studies with a more similar CBT format comparing CBT to all possible control groups. Furthermore, follow-up effects were calculated by using post- to follow-up uncontrolled ES (Cohen's  $d$ ), including all studies that reported follow-up results. When studies reported multiple follow-up results, the period that was most common in other studies that reported follow-up results was included in the analysis. In Table 1, the follow-up periods of the studies used in the follow-up analysis are reported.

A moderator analysis was conducted, comparing the effect sizes in which CBT was compared to all possible control groups for the four parental involvement groups. We looked at the 95% confidence intervals for the effects of the different parent involvement groups, to see whether the effects were significant and compared the intervals of the four parental groups, applying the rule that for a significant difference, no more than 25% of the confidence intervals should overlap (Van Belle, 2008).

When a study reported a measurement scale that assessed the outcome in the opposite direction (increase in scores indicating a positive effect of CBT), the effect size was multiplied by -1. When only SE's were reported,  $sd$ 's were calculated by multiplying the SE with the square root of the number of participants in that group. In studies with multiple CBT groups, each CBT group was included as a separate comparison with the same control group in the analysis.

Furthermore, heterogeneity was assessed for the conducted analyses. Heterogeneity reflects the variation in the true treatment effects in magnitude or direction and is given by the  $I^2$  statistics. The Cochrane collaboration (Higgins & Green, 2011) gives as a rough rule of thumb, that 0–40% represents low heterogeneity, 30–60% moderate heterogeneity, 50–90% substantial heterogeneity and 75–100% large heterogeneity. A low percentage of heterogeneity suggests that the treatments employed in the different studies had similar effects on the outcome variable, and accordingly that Cohen's  $d$  can be interpreted meaningfully. When heterogeneity is high, Cohen's  $d$  should be interpreted with caution (Cochrane Collaboration).

## 3. Results

### 3.1. Results of the search

The search and cross-referencing identified 2828 potential studies. Following the whole selection procedure, a total of 42 studies was included in the meta-analysis, comprising a total of 3239 participants (see

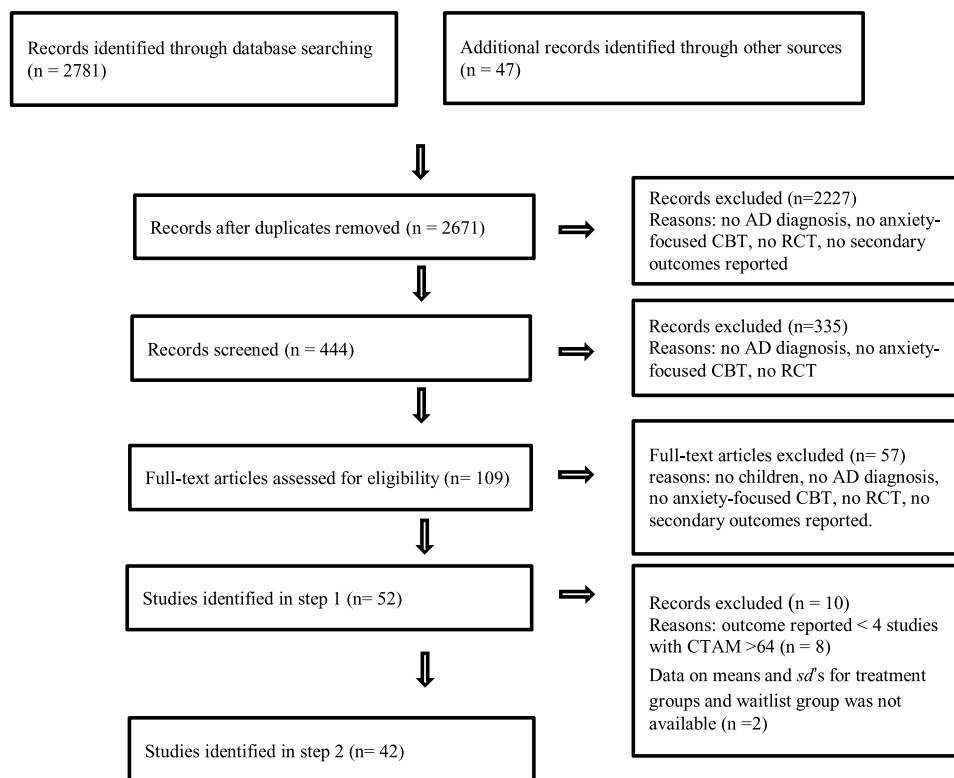


Fig. 1. Study Flow Diagram (Mother, Liberati, Tetzlaff, Altman, and the PRISMA Group, 2009).

Fig. 1). Characteristics of the included studies are reported in Table 1. The secondary outcome variables that were included were: depressive symptoms, externalizing behaviors, general functioning and social competence. Some outcome measures were reported in less than four high quality studies and were therefore discarded from the current meta-analysis, namely: quality of life, loneliness, child perfectionism, child's intolerance of uncertainty, parental anxiety, parental perceived ability to deal with the child, family disruption, family dysfunction and number and severity of physical complaints.

### 3.2. Outcome measures

For externalizing behaviors and social competence, parent report scales were always included in the studies. Sometimes scores were separately reported for mother and father (Barrett, 1996; Barrett, 1998; Suveg, 2009) or mother and teacher (Kendall, 1994; Suveg, 2009). In these cases, mothers' scores were used. Sometimes both parent and child scales were included in studies, in these cases only parent scales were included in the analyses (Donovan, 2015).

Scores on general functioning were most often reported by the clinician, however three studies included only a parent report measure (Thirwall, 2013; Silverman 1999; Silverman 1999a) and two studies included both a parent and child report measure (Storch, 2015; Schneider, 2011). For these studies, the parent measure was included in the analysis. One study only included a child self-report measure (Wuthrich, 2012) which was included in the analysis.

The baseline to post-treatment correlation was not reported in the individual articles. Therefore, in line with previous research (Hofmann, Sawyer, Witt, & Oh, 2010; Steenhuis, Nauta, Bockting, & Pijnenborg, 2015) a conservative correlation of 0.7 was assumed. A sensitivity analysis around this correlation (using a correlation of 0.3 and 0.8) indicated support for the use of this correlation.

### 3.3. Preliminary analyses: anxiety symptoms

For reductions on the primary outcome measure of anxiety symptoms as reported by the children and adolescents for all the included studies ( $n = 42$ ), a significant moderate effect size of  $-0.44$  (95% C. I. =  $-0.55, -0.32$ ;  $Z = 7.21, p < 0.001$ ) from pre to post-treatment was found, taking the changes in the control group into account. This ES is within a similar range as the effect size ( $d = -0.53$ ) for generic CBT found in the meta-analysis by Reynolds et al. (2012), who compared generic CBT to all control conditions. From post-treatment to follow-up, a significant small to moderate uncontrolled effect size ( $n = 33, \text{mean}_{\text{fu}} = 31 \text{ weeks}, \text{sd}_{\text{fu}} = 18 \text{ weeks}, \text{range } 3\text{--}52 \text{ weeks}$ ) of  $-0.36$  (95% C. I.  $-0.45, -0.27$ ;  $Z = 7.75, p < 0.001$ ) was found.

### 3.4. Depressive symptoms pre-post treatment

**3.4.1 CBT vs. all control conditions:** For this comparison, 31 studies were included, including a total of 2326 participants. The analysis yielded a significant small to moderate ES of CBT on depressive symptoms of  $-0.31$  (95% C. I. =  $-0.41, -0.22$ ;  $Z = 6.48, p < 0.001$ ) with moderate heterogeneity given by  $I^2$  of 51%. The heterogeneity indicates that this effect must be interpreted with slight caution (see Fig. 2).

**3.4.2 CBT vs. active control conditions:** For this comparison, eleven studies were included, including a total of 900 participants. The analysis yielded a significant small ES of CBT on depressive symptoms of  $-0.27$  (95% C. I. =  $-0.47, -0.07, Z = 2.68, p < .001$ ) with substantial heterogeneity given by  $I^2$  of 68%. The heterogeneity indicates that this effect must be interpreted with caution (see Appendix A).

**3.4.3 Sensitivity Analysis studies with CTAM > 64 CBT vs. all control conditions:** For this comparison, sixteen studies were included, including a total of 1365 participants. The analysis yielded an overall small ES of CBT on depressive symptoms of  $-0.23$  (95% C. I. =  $-0.37, -0.09, Z = 3.17, p < .001$ ) with substantial heterogeneity of  $I^2$  of 65% indicating that this effect should be interpreted with caution (see

**Table 1**  
Study characteristics.

Study	Country	Primary diagnosis	Treatment	Parental Involvement group	N sessions	Control	N	Age mean (range)	% female	CTAM	Outcome	Measurement	Follow-up period
Baer, 2005	Canada	SoP	Group-CBT	1	12	Waitlist	12	15.5	58	58	Dep.	BDI-II	-
Barrett, 1998	Australia	OAD, SAD, SoP	Group-CBT and Group-CBT + p	1 3	12 12	Waitlist	43	7-14	47	74	Ext.	CBCL-E	12 month
Barrett, 1996	Australia	OAD, SAD, SoP	CBT and CBT + p	1 3	12 12	Waitlist	79	9.33	43	67	Dep.	CDI	12 month
Beidel, 2000	U.S.	SoP	Group-CBT	1	24	Testbusters	67	10.5	45	67	Dep.	CDI	6 month
Donovan, 2014	Australia	SoP, SAD, SP, GAD	e-CBT	4	8	Waitlist	52	4.08	54	62	Gen. F.	K-GAS	6 month
Donovan, 2015	Australia	SoP	Group-CBT + p	3	4 (3-h)	Waitlist	40	9.43	63	43	Gen. F.	CGAS	6 month
Flannery-Schroeder, 2000	U.S.	GAD, SAD, SoP	CBT and Group-CBT	1	18	Waitlist	37	(8-14)	49	69	Dep.	CDI	3 month
Gallagher, 2004	U.S.	SoP	Group-CBT	1	18	Waitlist	37	(8-12)	52	67	Dep.	CDI	3 weeks
Holmes, 2014	Australia	GAD	Group-CBT + p	2	19	Waitlist	42	9.64	67	62	Soc. C.	CBCL-social	3 month
Infantino, 2016	Australia	SAD, SoP, GAD, SP, OCD	Audio-CBT + p	4	10	Waitlist	57	7.46	54	71	Gen. F.	CGAS	3 month
Inglu, 2014	Norway	SoP	CBT and Group-CBT	1 1	12 10	Atten. Plac.	57	14.5	56	67	Dep.	CDI	12 month
Kendall, 1994	U.S.	OAD, SAD, AD	CBT	1	16	Waitlist	47	(9-13)	45	44	Dep.	CDI	12 month
Kendall, 1997	U.S.	OAD, SAD, AD	CBT	1	16	Waitlist	94	(9-13)	41	46	Ext.	CBCL-E	12 month
Khanna, 2010	U.S.	SAD, SoP, GAD, SP, PD	CBT	1	12	CESA	49	10.6	33	65	Dep.	CDI	3 month
Last, 1998	U.S.	SP, SoP, SAD, AD, OAD, PD	e-CBT	1	12	Atten. Plac.	56	12.04	50	43	Dep.	CDI	-
Lyneham, 2006	Australia	GAD, SAD, SoP, OCD, SP, PD	Bibliotherapy + p + email Bibliotherapy + p + phone Bibliotherapy + p + client initiated	4 4 4	9 9 9	Waitlist	100	9.42	49	54	Dep.	CDI	12 month
March, 2009	Australia	SAD, GAD, SoP, SP	e-CBT + p	2	16	Waitlist	73	9.45	55	76	Dep.	CES-D	6 month
Masia-Warner, 2007	U.S.	SoP	Group-CBT	1	18	Educ. Sup.	36	15.1	83	74	Dep.	CGAS	6 month
Masia-Warner, 2005	U.S.	SoP	Group-CBT	1	18	Waitlist	35	14.8	74	65	Dep.	BDI-II	6 month
Mellsen, 2011	Germany	SoP	CBT	2	24	Waitlist	44	10.4	48	77	Dep.	CGAS	9 month
Mendlowitz, 1999	Canada	anxiety disorder (DSM-IV)	Group-CBT parent only	4	12	Waitlist	68	9.8	57	51	Dep.	CGAS	-
Nauta, 2003	Netherlands	SAD, SoP, GAD, PD	Group-CBT + p	3	12	Waitlist	79	11	51	50	Dep.	CDI	3 month
Ollendick, 2009	Sweden	SP	CBT + p	1	12	Waitlist	101	11.1	54	64	Dep.	Ext.	6 month
Ollendick, 2009	U.S.	SP	One-session exposure	2	19	Educ. Sup.	95	64	64	64	Dep.	CDI	6 month
Ost, 2001	Sweden	SP	One-session exposure	1	2	Waitlist	60	11.7	62	75	Dep.	CDI	12 month
Ost, 2015	Sweden	SoP	One-session exposure + p	3	24	Waitlist	55	11.6	62	58	Dep.	CDI	12 month
Pincus, 2010	U.S.	GAD + AgP	CBT + p	1	32	Self-mon	26	15.75	73	54	Dep.	Ext.	6 month
Rapee, 2006	Australia	GAD, SoP, SAD, SP, OCD, PD	Group-CBT + p	3	11	Waitlist	267	(6-12)	40	69	Ext.	CDI	3 month
			Bibliotherapy	4	-								

(continued on next page)

Table 1 (continued)

Study	Country	Primary diagnosis	Treatment	Parental involvement group	N sessions	Control	N	Age mean (range)	% female	CT/AM	Outcome	Measurement	Follow-up period
Santucci, 2013	U.S.	SAD	Group-CBT	1	7 (half-days)	Waitlist	29	9.18	100	51	Gen. F.	CGAS	6 weeks
Schneider, 2011	Germany	SAD	CBT + p	3	24	Waitlist	43	6.24	58	67	Gen. F.	SDS	3 month
Silverman, 1999	U.S.	GAD, SoP, OAD	Group-CBT + p	3	12	Waitlist	56	9.96	39	73	Dep.	CDI	-
Silverman, 1999a	U.S.	SP, SoP, AgP	Exposure-CM + p	3	10	Educ. Sup.	104	9.83	48	51	Dep.	CBCL-E	12 month
Southam-Gerow, 2010	U.S.	GAD, SAD, SoP, SP	Exposure-SC + p	3	10	TAU	48	10.9	56	61	Dep.	CBCL-E	-
			CBT	1	18	TAU	48	10.9	56	61	Dep.	DISC-dep	-
Spence, 2011	Australia	GAD, SoP, SAD, SP	CBT + p	2	15	Waitlist	115	11.39	59	91	Ext.	DISC-P DBD	12 month
			e-CBT + p	2	15	Waitlist	115	11.39	59	91	Gen. F.	CGAS	12 month
Spence, 2000	Australia	SoP	CBT	1	12	Waitlist	50	10.68	38	65	Soc. C.	SCQ-P	12 month
			CBT + p	3	24	Waitlist	72	9.93	42	64	Dep.	CDI	12 month
Spence, 2006	Australia	SAD, GAD, SoP, SP	CBT + p	2	16	Waitlist	72	9.93	42	64	Dep.	CDI	12 month
			e-CBT + p	2	16	TAU	100	9.82	44	88	Dep.	CDI	1 month
Storch, 2015	U.S.	SAD, SoP, GAD, SP, PD	e-CBT	1	12	TAU	100	9.82	44	88	Ext.	CBCL-E	1 month
											Ext.	CBCL-E	
Suveg, 2009	Australia	GAD, SAD, SoP	CBT	1	16	FESA	161	10.27	44	82	Gen. F.	CAIS-P	12 month
			CBT + p	3	16	FESA	161	10.27	44	82	Dep.	CDI	12 month
Thirlwall, 2013	U.K.	SAD, SoP, GAD, other AnxD	CBT + p (full guided)	4	4	Waitlist	194	(7-12)	48	91	Dep.	SMFQ-C	6 month
			CBT + p (brief guided)	4	2	Waitlist	194	(7-12)	48	91	Ext.	SDQ-conduct	6 month
Tillfors, 2014	Sweden	SoP	e-CBT	1	9	Waitlist	19	16.5	89	45	Gen. F.	CAIS-P	6 month
Walkup, 2008	U.S.	Walkup et al., 2008	CBT	1	14	Placebo	215	10.6	51	73	Dep.	MADR-S	6 month
Wergeland, 2014	Norway	SAD, SoP, GAD	CBT and Group-CBT	1	10	Waitlist	182	11.5	53	68	Gen. F.	CGAS	6 month
				1	10	Waitlist	182	11.5	53	68	Dep.	SMFQ-c	6 month
Wuthrich, 2012	Australia	GAD, SoP, SAD, PD, OCD, SP, ANOS	e-CBT	4	8	Waitlist	43	15.17	63	77	Gen. F.	ALIS	6 month

Abbreviations: social phobia (SoP) specific phobia (SP) overanxious disorder (OAD) avoidant disorder (AD) agoraphobia (AgP) separation anxiety disorder (SAD) generalized anxiety disorder (GAD) obsessive-compulsive disorder (OCD) panic disorder (PD) e-health cognitive-behavior therapy (CBT-e) treatment with high parental involvement (+ p) exposure with contingency management (Exposure-CM) exposure with self-control techniques (Exposure-SC) Depressive symptoms (Dep. Externalizing behaviors Ext General Functioning (Gen. F. Social Competence (Soc. C. Attentional Placebo (Atten. Plac Educational Support (Educ. Sup. self-monitoring(Self-mon) cognitive-behavior therapy (CBT) Children's depression inventory (CDI) German: DIKJ Centre for epidemiological studies for depression scale CES-D) short moods and feelings questionnaire (SMFQ-P) adolescent well-being scale (AWS Beck's Depression Inventory II (BDI-II) Treatment as usual (TAU) family education support attention (FESA) depression diagnosis (DISC-dep) diag. computer-assisted education support and attention (CESA) child behavior checklist externalizing domain (CBCL-E) Strengths and difficulties questionnaire conduct problems scale (SDQ-c) externalizing diagnosis (DISC-P) DBD Clinical Global Assessment scale (CGAS) German: K-GAS Adolescent life interference scale (ALIS) Child behaviour checklist social scale (CBCL-social) Social competence questionnaire-parent (SSQ-P) children's social competence (PRSC-social).



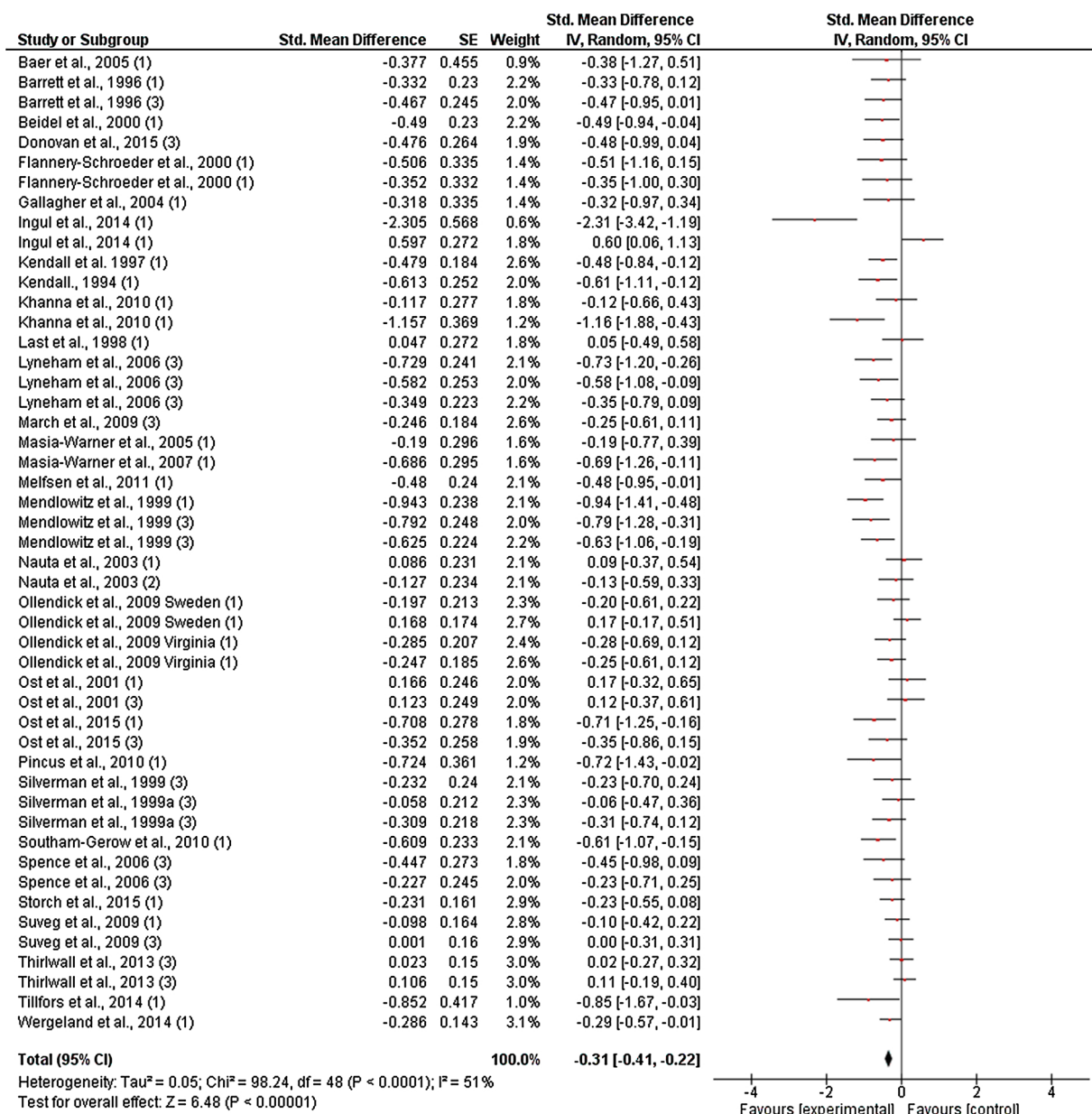


Fig. 2. Forestplot Depressive Symptoms (CBT vs. Control).

Appendix A).

3.4.4. Sensitivity Analysis CBT format, CBT vs. all control conditions: For this comparison, 22 studies were included, including a total of 1434 participants. The analysis yielded an overall small to moderate ES of CBT on depressive symptoms of -0.35 (95% C. I. = -0.48, -0.23, Z = 5.53, p < .001) with moderate heterogeneity of I<sup>2</sup> of 50% indicating that this effect should be interpreted with some caution (see Appendix A).

3.5. Externalizing behaviors pre-post treatment

3.5.1. CBT vs. all control conditions

For this comparison, twelve studies were included, including a total of 1293 participants. The analysis yielded a significant small ES of CBT on externalizing behaviors of -0.22 (95% C. I. = -0.37, -0.07; Z = 2.91, p < 0.01) with substantial heterogeneity given by I<sup>2</sup> of 67%. The heterogeneity indicates that this effect must be interpreted with caution (see Fig. 3).

3.5.2. CBT vs. active control conditions

For this comparison, four studies were included, including a total of 413 participants. The analysis yielded a non-significant ES on externalizing behaviors of -0.03 (95% C. I. = -0.37, 0.31, Z = 0.16, p = 0.87) with large heterogeneity given by I<sup>2</sup> of 79% indicating that his effect must be interpreted with caution (see Appendix A).

3.5.3. Sensitivity analysis studies with CTAM > 64 CBT vs. all control conditions

For this comparison, seven studies were included, including a total of 900 participants. The analysis yielded an overall small ES of CBT on externalizing behaviors of -0.25 (95% C. I. = -0.41, -0.09, Z = 3.11, p < .005) with substantial heterogeneity of I<sup>2</sup> = 62%, indicating that this effect must be interpreted with caution (see Appendix A).

3.5.4. Sensitivity analysis CBT format, CBT vs. all control conditions

For this comparison, ten studies were included, including a total of 896 participants. The analysis yielded an overall small ES of CBT on externalizing behaviors of -0.26 (95% C. I. = -0.44, -0.08, Z = 2.83,

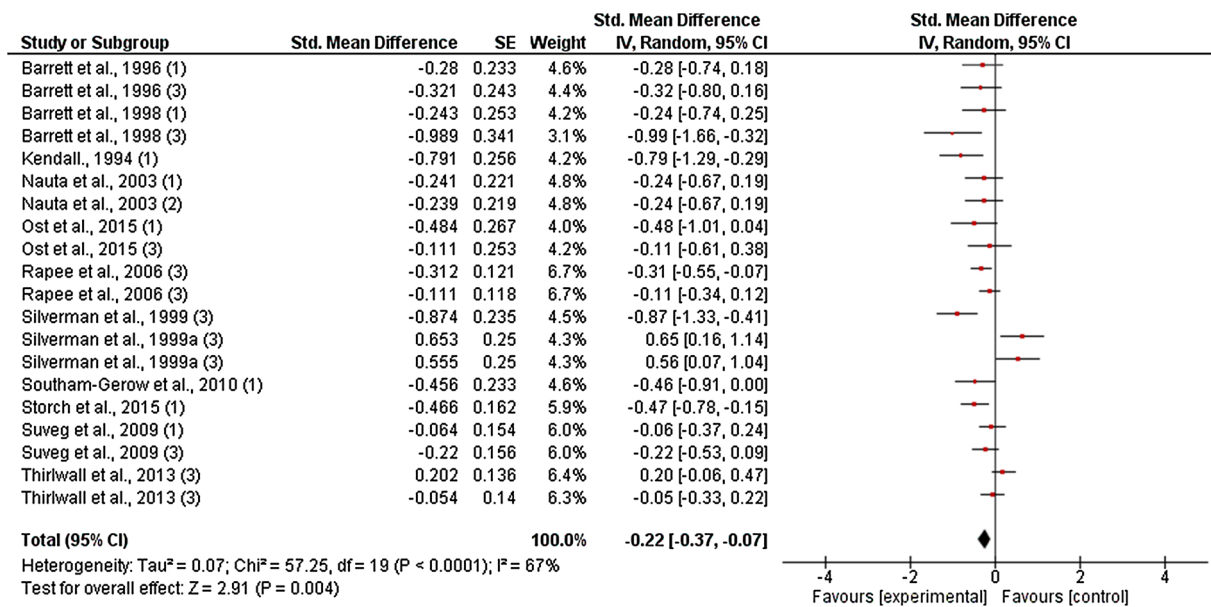


Fig. 3. Forestplot externalizing behaviors (CBT vs. Control).

$p < .01$ ) with substantial heterogeneity of  $I^2$  of 65% indicating that this effect should be interpreted with caution (see Appendix A).

### 3.6. General functioning pre-post treatment

#### 3.6.1. CBT vs. all control conditions

For this comparison, seventeen studies were included, including a total of 1234 participants. The analysis yielded a significant large ES of CBT on general functioning of -1.25 (95% C. I. = -1.59, -0.90;  $Z = 7.10$ ,  $p < 0.001$ ) with large heterogeneity given by  $I^2$  of 87% (see Fig. 4).

#### 3.6.2. CBT vs. active control conditions

For this comparison, five studies were included, including a total of 467 participants. The analysis yielded a significant large ES of CBT on general functioning of -1.06 (95% C. I. = -1.57, -0.55,  $Z = 4.11$ ,  $p < .001$ ) with large heterogeneity given by  $I^2$  of 79% (see Appendix A).

#### 3.6.3. Sensitivity analysis studies with CTAM > 64 CBT vs. all control conditions

For this comparison, thirteen studies were included ( $n = 1071$ ). The analysis yielded an overall large ES of CBT on general functioning of -1.24 (95% C. I. = -1.63, -0.84,  $Z = 6.18$ ,  $p < .001$ ) with large heterogeneity of  $I^2 = 89%$  (see Appendix A).

#### 3.6.4. Sensitivity analysis CBT format, CBT vs. all control conditions

For this comparison, nine studies were included, including a total of 586 participants. The analysis yielded an overall large ES of CBT on general functioning of -1.37 (95% C. I. = -1.81, -0.93,  $Z = 6.08$ ,  $p < .001$ ) with substantial heterogeneity of  $I^2$  of 78% indicating that this effect should be interpreted with caution (see Appendix A). The pre-post analyses for general functioning indicate large heterogeneity, indicating that the effect estimates should be interpreted with caution. However, all studies except one (Thirlwall et al., 2013) indicate a positive effect on general functioning in the moderate to large range,

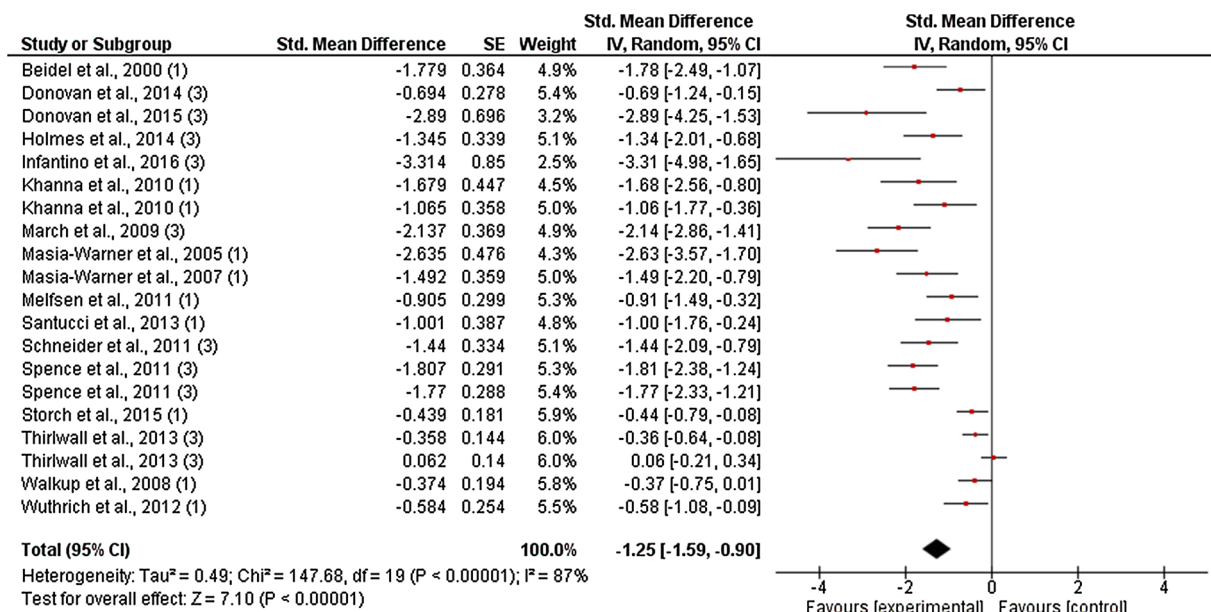


Fig. 4. Forestplot General Functioning (CBT vs. Control).

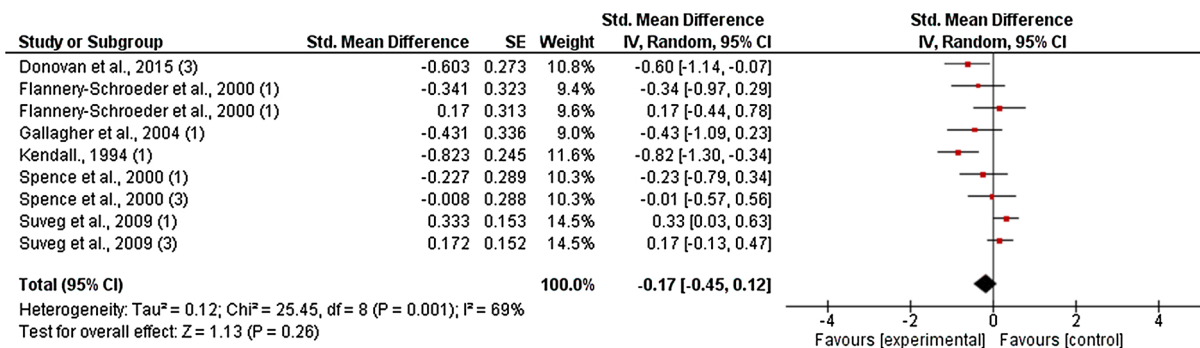


Fig. 5. Forestplot Social competence (CBT vs. Control).

Table 2 Moderator Analysis.

	Group 1 Low involvement	Group 2 Moderate involvement	Group 3 High involvement	Group 4 Parent-mediated
Anxiety symptoms pre-post	-0.45 -0.65, -0.26 n = 32	-0.31 -0.50, -0.12 n = 10	-0.51 -0.74, -0.27 n = 13	-0.42 -0.73, -0.10 n = 9
Anxiety symptoms post-fu	-0.34 -0.47, -0.20 n = 23	-0.38 -0.55, -0.22 n = 9	-0.43 -0.68, -0.18 n = 10	-0.36 -0.64, -0.09 n = 6
Depressive symptoms pre-post	-0.33 -0.47, -0.18 n = 29	-0.29 -0.45, -0.13 n = 6	-0.24 -0.40, -0.09 n = 10	-0.32 -0.62, -0.02 n = 6
Depressive symptoms post-fu	-0.11 -0.23, 0.00 n = 16	-0.06 -0.16, 0.04 n = 7	-0.27 -0.52, -0.03 n = 6	-0.10 -0.51, 0.32 n = 3
Externalizing behaviors pre-post	-0.34 -0.50, -0.19 n = 8	X n = 1	-0.18 -0.48, 0.12 n = 9	0.08 -0.17, 0.33 n = 2
Externalizing behaviors post-fu	-0.33 -0.66, 0.01 n = 7	X n = 1	-0.54 -0.83, -0.25 n = 6	0.11 -0.16, 0.37 n = 4
General functioning pre-post	-1.17 -1.65, -0.68 n = 8	-1.50 -1.88, -1.12 n = 6	-2.04 -3.43, -0.64 n = 2	-0.59 -1.18, 0.01 n = 4
General functioning post-fu	-0.48 -0.84, -0.11 n = 6	-0.97 -1.42, -0.52 n = 5	X n = 1	-0.36 -0.83, 0.10 n = 4
Social competence pre-post	-0.20 -0.61, 0.21 n = 6	X no study	-0.11 -0.48, 0.35 n = 3	X no study
Social competence post-fu	-0.26 (-0.47, -0.05) n = 6	X no study	-0.06 (-0.21, 0.10) n = 3	X no study

n = number of included treatment effects, X indicates no effect size could be calculated.

showing that caution concerning interpretation of these effect sizes lies not in determining the direction of the effects, but in determining the exact magnitude of the effects.

### 3.7. Social competence pre-post treatment

#### 3.7.1. CBT vs. all control conditions

For this comparison, six studies were included (n = 372). The analysis yielded a nonsignificant ES of CBT on social competence of -0.17 (95% C. I. = -0.45, 0.12; Z = 1.13 p = 0.26) with substantial

heterogeneity given by I<sup>2</sup> of 69%, indicating that the results must be interpreted with caution (see Fig. 5).

#### 3.7.2. CBT vs. active control conditions

Only one of the studies with social competence as the secondary outcome had an active control condition (Suveg et al., 2009). Therefore, no analysis was performed.

#### 3.7.3. Sensitivity analysis studies with CTAM > 64 CBT vs. all control conditions

For this comparison, four studies were included, including a total of 285 participants. The analysis yielded a non-significant ES of CBT on social competence of 0.05 (95% C. I. = -0.16, 0.26, Z = 0.48, p = .63) with low heterogeneity given by I<sup>2</sup> of 28%. This indicates that this effect can be interpreted meaningfully (see Appendix A).

#### 3.7.4. Sensitivity analysis CBT format, CBT vs. all control conditions

For this comparison, four studies were included, including a total of 295 participants. The analysis yielded a nonsignificant ES of CBT on social competence of -0.08 (95% C. I. = -0.39, 0.24, Z = 0.48, p = 0.63) with substantial heterogeneity of I<sup>2</sup> of 69% indicating that this effect should be interpreted with caution (see Appendix A).

### 3.8. Follow-up effects

Follow-up effects yielded a significant small ES from post- to follow-up treatment on depressive symptoms (n<sub>studies</sub> = 24, n<sub>participants</sub> = 2023, mean<sub>fu</sub> = 33 weeks, sd<sub>fu</sub> = 17 weeks, range 3–52 weeks), of -0.13 (95% C. I. = -0.20, -0.05, I<sup>2</sup> = 64%), a significant small ES on externalizing behaviors (n<sub>studies</sub> = 10, n<sub>participants</sub> = 1129, mean<sub>fu</sub> = 37 weeks, sd<sub>fu</sub> = 20 weeks, range 4–52 weeks) of -0.27 (95% C. I. = -0.45; -0.09, I<sup>2</sup> = 89%), and a significant large ES on general functioning (n<sub>studies</sub> = 13, n<sub>participants</sub> = 889, mean<sub>fu</sub> = 22 weeks, sd<sub>fu</sub> = 13 weeks, range 4–52 weeks) of -0.64 (95% C. I. = -0.90; -0.37, I<sup>2</sup> = 90) with heterogeneity ranging from substantial to large, indicating that these effects should be interpreted with caution. Additionally a significant small ES on social competence (n<sub>studies</sub> = 6, n<sub>participants</sub> = 372, mean<sub>fu</sub> = 33 weeks, sd<sub>fu</sub> = 22 weeks, range 3–52 weeks) of -0.19 (95% C. I. = -0.33, -0.04) was found, with moderate heterogeneity of I<sup>2</sup> = 45%, indicating that this effect should be interpreted with some caution.

### 3.9. Moderator analysis

In Table 2 the effect sizes, 95% confidence intervals and the number of treatments included for the four parental involvement groups are reported for the primary outcome measure of anxiety symptoms and each secondary outcome variable from pre- to post-treatment and from post- to follow-up treatment.

For anxiety symptoms, both from pre- to post treatment (low involvement n<sub>treatments</sub> = 32, moderate involvement n<sub>treatments</sub> = 10, high

involvement  $n_{\text{treatments}} = 13$ , parent-mediated  $n_{\text{treatments}} = 9$ ) and from post-treatment to follow up (low involvement  $n_{\text{treatments}} = 23$ , moderate involvement  $n_{\text{treatments}} = 9$ , high involvement  $n_{\text{treatments}} = 10$ , parent-mediated  $n_{\text{treatments}} = 6$ ), moderate effect sizes were found for reductions in anxiety symptoms for the four parental involvement groups. There was substantial overlap of the confidence intervals for the different parental involvement groups and no significant differences based on parental involvement could be identified.

For depressive symptoms, from pre- to post treatment, significant small reductions in depressive symptoms were found for all four parent involvement groups with much overlap of the confidence intervals (low involvement  $n_{\text{treatments}} = 29$ , moderate involvement  $n_{\text{treatments}} = 6$ , high involvement  $n_{\text{treatments}} = 10$ , parent-mediated  $n_{\text{treatments}} = 6$ ). However, at follow-up a significant small improvement was found for the group with high parental involvement ( $n_{\text{treatments}} = 6$ ) and not for the other groups (low involvement  $n_{\text{treatments}} = 16$ , moderate involvement  $n_{\text{treatments}} = 7$ , parent-mediated  $n_{\text{treatments}} = 3$ ).

On externalizing symptoms, small significant improvement was only found for the group with low ( $n_{\text{treatments}} = 8$ ) parental involvement from pre- to post-treatment, however there was much overlap of the confidence intervals with the other involvement groups so no significant differences between the groups were identified (high involvement  $n_{\text{treatments}} = 9$ , parent-mediated  $n_{\text{treatments}} = 2$ ).

At follow-up, a significant moderate effect on externalizing symptoms was found for the group with high parental involvement ( $n_{\text{treatments}} = 6$ ), whereas no significant improvement was found for the other groups (low involvement  $n_{\text{treatments}} = 7$ , parent-mediated  $n_{\text{treatments}} = 4$ ).

For general functioning, large improvement was found for the three groups with low ( $n_{\text{treatments}} = 8$ ), moderate ( $n_{\text{treatments}} = 6$ ) and high ( $n_{\text{treatments}} = 2$ ) involvement from pre- to post-treatment. No significant improvement was found in the parent-mediated group ( $n_{\text{treatments}} = 4$ ). At follow-up again there was no significant improvement in the parent-mediated group ( $n_{\text{treatments}} = 4$ ) whereas the effect size in the group with moderate involvement ( $n_{\text{treatments}} = 5$ ) was large and for the group with low involvement ( $n_{\text{treatments}} = 6$ ) the effect size was moderate. No effect size could be calculated for the high parental involvement group, since there was only one study in this group. Lastly, with regard to social competence, no significant improvement was found from pre- to post-treatment (low involvement  $n_{\text{treatments}} = 8$ , high involvement  $n_{\text{treatments}} = 3$ ). No effect sizes could be calculated for the other two groups, since there was no studies included in these groups. At follow-up there was a small significant improvement in the low parental involvement group ( $n_{\text{treatments}} = 6$ ), but not in the high parental involvement group ( $n_{\text{treatments}} = 3$ ).

### 3.10. Power

Power analyses for meta-analyses can be conducted retrospectively, and are recommended especially in the case of moderator variables, to put the failure to reach statistical significance in perspective (Valentine, Pigott, & Rothstein, 2010). They suggest to use the observed number of studies, the within-study sample size (mean study sample size of 31 in the current meta-analysis), to take into account heterogeneity and to use the smallest meaningful effect size. The main analyses on anxiety, depressive symptoms and general functioning had high power (ranging from .97 to .99) and adequate power for the analysis on externalizing symptoms (.78 (with moderate heterogeneity)/.66 (with high heterogeneity)). Also for the follow-up analyses on depression and general functioning power was high (ranging from 0.92 to 0.98), for externalizing symptoms power was 0.70–0.58. Post-hoc power analyses suggest that for the main and follow-up analyses on social competence (power = .49/.39) and for the moderator analyses except for anxiety (depressive symptoms power = .70/.58, externalizing behaviors power = .49/.39, general functioning power = .71/.58, social competence power = .42/.33, anxiety power = .99/.95), null findings should

be interpreted with caution given the lower power for these analyses. For these analyses, results should be regarded as preliminary and we need more information to judge adequately the effect of CBT on social competence and the effects of different parental involvement groups on secondary outcomes.

### 3.11. Publication Bias

Funnel plots were created and Egger's test was performed to check for publication bias for the four outcome variables on the comparison CBT versus all control conditions (plots can be found in the supplementary materials). Egger's test was significant for depressive symptoms ( $t = -4.02$ ,  $p < 0.001$ ), general functioning ( $t = 8.24$ ,  $p < 0.001$ ) and social competence ( $t = -2.27$ ,  $p = 0.058$ ), and non-significant for externalizing behaviors ( $t = -1.12$ ,  $p = .276$ ). This indicates that a publication bias cannot be ruled out for the depressive symptoms, general functioning and social competence outcomes. When looking at the funnel plots, there is an indication that studies with a smaller sample size tend to find larger reductions in depressive symptoms and larger improvements in general functioning.

## 4. Discussion

### 4.1. Summary of main results

The current meta-analysis suggests that the effects of anxiety-focused CBT are not limited to a reduction of anxiety symptoms, but that they also generalize to other aspects of children's and adolescents' lives. The main goal of treatment for children and families is not just symptom reduction, but rather improvement in general functioning. In line with this, large effect sizes were found on improvements in general functioning following CBT for anxiety. It was found that following CBT, the mean scores of the children and adolescents changed from a moderate degree of interference in most social areas or severe impairment of functioning in one area, to some difficulty in a single area but in general functioning well (American Psychiatric Association, 2013). General functioning encompasses multiple situations, including school, family and peer contact. It also takes into account the frequency and level of experienced distress. Importantly, the results indicate that CBT indeed helps children and adolescents considerably with regard to reduction of impairment in daily life. Importantly, gains in general functioning seem to be even further improved at follow up.

Following anxiety-focused CBT, in line with previous finding by Ishikawa et al. (2007), reductions in depressive symptoms were found, with small to moderate effect sizes. When looking at the mean scores on the depression scales of the studies pre-treatment, it was found that, in most studies, mean baseline scores were below cut-off, or in the minimal to mild depression range. Given that not all children and adolescents with anxiety disorders suffer from depressive symptoms, the small effects found on depression are promising. The reductions in depression scores were found for the mean scores of the sample. Therefore, it is unknown whether these reductions reflect reduced symptoms in most individuals presenting with mild cases or subclinical levels of depressive symptoms, or whether these results are due to larger reductions in a subgroup of anxiety disordered children who suffered from more severe depression and had larger improvements in these depressive symptoms. The reductions in depressive symptoms are promising and important, given that children suffering from anxiety and depression have a worse prognosis compared to children suffering from anxiety only (Lamers et al., 2011). These findings are in line with the expectations of the multiple pathways model formulated in Cummings et al. (2013) for the pathway where depressive symptoms result from anxiety-related impairment. Depressive symptoms were thus expected to improve with treatment focusing on the anxiety symptoms.

Additionally, with regard to comorbid symptoms, CBT also seemed to lead to reductions in externalizing behaviors. In both the comparison

including all control groups and the sensitivity analyses, small significant reductions in externalizing behaviors were found. In the comparison including only active control conditions, no significant reductions in externalizing behaviors were found, which seems to be largely due to the Silverman (1999a) study. This study included two active treatment arms, in one arm there was more focus on contingency management strategies and in the other arm it was more on self-control strategies. The control condition consisted of psychoeducation on anxiety for both children and parents, without exposure exercises. The control condition had a higher initial score on externalizing symptoms whereas post-treatment scores in all conditions were around the same, which explains the results in favor of the control condition as found in our meta-analysis. However, overall, anxiety-focused CBT seems to reduce externalizing behaviors. Mean scores of the groups on externalizing behaviors prior to treatment lay in the normal range, which reflects that not all children with anxiety disorders suffer from comorbid externalizing symptomatology. Research shows that 20–30 percent of anxiety disordered children also suffer from externalizing disorders, and a larger proportion displays subclinical externalizing symptoms (Cunningham & Ollendick, 2010). Therefore, the identified reductions are promising. Since the focus is on mean scores of the groups, we do not know whether reductions reflect small reductions in a large group of children or larger reductions in a smaller subgroup of children presenting with more severe externalizing behaviors. Furthermore, effects on these comorbid symptoms seem to be maintained or even further improved at follow-up. These results indicate that reducing anxiety in children also reduces externalizing problems. This in line with previous findings that externalizing problems decrease following anxiety-focused CBT suggesting that at least for some anxious children externalizing problems might arise secondary to anxiety symptoms (Johnco et al., 2015). However, the current methodology identifies changes on group level, but does not provide information on within-individual changes. Therefore, we do not know whether all children follow a similar change trajectory on externalizing symptoms or whether subgroups of children and adolescents can be identified that reduce in externalizing symptoms, expected when externalizing problems arises in threat situations, whereas others might increase in externalizing symptoms when freed of their anxiety.

No significant effects of CBT on social competence from pre- to post-treatment were found in the meta-analysis. However, the follow up results showed a significant positive increase in social competence. It seems that gains in social competence are not yet evident immediately post-treatment but take a longer time to emerge. It is possible that skills acquired during treatment are brought into action following treatment and therefore improvement in social competence is only evident at follow-up. Social competence is most often measured using the social competence scale of the CBCL which includes items of number of friendships, frequency of playing with friends and involvement in social activities. It could be hypothesized that after anxiety is reduced following CBT, children start participating more in social activities and new friendships develop. Therefore, these effects might only be present at follow-up but not yet at post-treatment.

With regard to the role of parental involvement on treatment outcome, it seems that higher parental involvement is important for the further improvement of treatment outcomes on general functioning and comorbid externalizing and depressive symptoms. This is in line with the expectation that parental involvement in treatment would be especially important to facilitate generalization of acquired skills to daily life (Barmish & Kendall, 2005) and the finding that parental involvement is especially important in the maintenance of treatment gains (Ginsburg et al., 1995; Manassis et al., 2014), with strongest support for an emphasis on contingency management and transfer of control to support long-term maintenance of treatment gains (Manassis et al., 2014). Also, anxiety disorders in parents might be a focus point in treatment for long-term maintenance of gains, given the findings of Kendall, Hudson, Gosch, Flannery-Schroeder, and Suveg, (2008) that

children with nonanxious mothers were significantly more likely to be free of their principal anxiety diagnoses at follow-up compared to children with anxious mothers.

For social competence, this beneficial effect of parental involvement was not found. Additionally, for the generalization of effect to general functioning and externalizing symptoms, it seems important that children and adolescents receive treatment themselves, since no significant effects on these outcomes were found for the parent-mediated treatments. However, most studies included in the parent-mediated treatment group consisted of iCBT or bibliotherapy, and clients were self-referred. It might be that families who self-refer for an iCBT or self-help approach differ from a referred clinical group. They might have fewer comorbid problems and experience less impairment in daily life, which might also explain the non-significant effects on secondary outcomes.

In line with Manassis et al. (2014) we found that beneficial effects of more parental involvement only become evident at follow-up. In contrast to their findings, we did not find this effect for improvement in anxiety symptoms at follow-up. Differences in findings might be due to methodological differences between these two studies: the present study focused on reductions in anxiety symptoms whereas Manassis et al. (2014) focused on the proportion of anxiety disorder diagnoses. Additionally, we had more studies in the follow-up analyses. Furthermore, the studies included in our meta-analysis were divided into four parental involvement categories rather than two. In creating the parent involvement groups we did not specifically focus on contingency management or transfer of control in our high parental involvement group. However, most studies included in the high parental involvement group did focus on contingency management or transfer of control.

#### 4.2. Limitations

A publication bias could not be ruled out, given that most of the funnel plots were asymmetric. Therefore, it might be that the effects we found are overestimated. However, this asymmetry could also be due to the smaller number of studies reporting these effects. Another explanation for this finding might be that in studies with lower sample sizes, it is more feasible to control correct administration of the treatment, contributing to larger effect sizes.

With regard to the inclusion criteria, the criterion of including only a secondary outcome variable in this meta-analysis that was reported by at least four studies of high quality might be perceived as arbitrary, given that no firm recommendations exist on the minimum number of studies required to conduct a meta-analysis. This criterion led to the exclusion of ten studies that also encompassed outcomes that may have been interesting to examine, such as family functioning and school functioning. Future research on CBT for anxiety should encompass measures taking these outcomes into account.

Additionally, for the main and follow-up analyses on depressive and externalizing symptoms and general functioning power was found to be high or adequate. However, the results of the analyses on social competence and the moderator analyses should be interpreted with caution, given the lower power. More studies are needed to examine the robustness of these findings. Also, heterogeneity was encountered; it was noted that caution should be observed for findings where there was much heterogeneity. Caution in interpreting these effect sizes lies not in determining the direction of the effects, but in determining the exact magnitude of the effects.

#### 4.3. Implications for practice and research

The current meta-analysis is expected to be representative of the effects of child-focused CBT for anxiety, given that all included treatments used an evidence-based treatment manual, including cognitive-behavior strategies. However, specific factors of the interventions, the number of sessions, duration and format varied widely between studies.

We therefore also conducted a sensitivity analysis with a more rigorous selection of trials, including only studies with a more similar CBT format. In these sensitivity analyses there was a slight decrease in heterogeneity, however, the level of heterogeneity remained substantial. Results of these sensitivity analyses were similar to the findings when all treatment formats were included. Effects seemed to be slightly larger for the studies with the more similar CBT format, however there is substantial overlap in the confidence intervals of the comparisons with all included studies, and no significant differences were found. Therefore, the identified effects from this meta-analysis seem to hold for different treatment formats that include cognitive-behavior strategies.

CBT for anxiety disorders in children and adolescents already fulfilled the criteria for classifying as well-established empirically supported treatment (Silverman & Hinshaw, 2008). This label necessitates at least two good group-design experiments in two independent research settings that indicate superiority of the treatment to a pill or placebo condition or to another treatment or equivalence to an already established treatment, with symptom reduction as primary outcome. It has been argued that such a definition of well-established empirically supported treatment may no longer be sufficient, since many treatments now qualify for such basic criteria (Chorpita et al., 2011). We may need additional criteria to discriminate between available treatments. One of the options would be to take the benefits of the treatment on multiple outcomes and functioning into account (Becker et al., 2011). Functioning as outcome relates to client and clinician's views of treatment success, it provides a context for the interpretation of the clinical significance of symptom reduction or lack thereof (Becker et al., 2011). Our meta-analysis indicates that CBT for children and adolescents with anxiety disorders would meet such a new criterion of having impact on multiple outcomes including functioning.

We excluded outcomes that were closely related to anxiety, such as anxious behaviors, coping and anxious thoughts, since they do not reflect generalization effects of the treatments to broader domains. Previous studies show that anxious thoughts, measured using the children's automatic thoughts scale (e.g. CATS, Schniering & Rapee, 2002; Hogendoorn et al., 2010), and coping, measured using the Coping Questionnaire (e.g. CQ, Kendall, 1994), change following CBT (Muris et al., 2009; Hogendoorn et al., 2014; Kendall et al., 2016). These kind of variables are not only interesting as outcome, but may also help in understanding the process of change in anxiety-focused CBT and are therefore interesting to include in mediator analyses on treatment effects.

All participants were outpatients; therefore the findings are applicable to this group. The samples in the studies consisted primarily of Caucasian/white children and adolescents, with only small proportions of the samples consisting of minorities. Furthermore, mastery of the native language of the country was often an inclusion criteria, with all studies being conducted in western countries. Therefore, the current results are mainly applicable to the white/Caucasian population. Furthermore, the reporting of demographic characteristics across studies in the child anxiety treatment literature is not consistent, making it difficult to draw conclusions about treatment outcomes among different ethnic/socio-economic groups (Warwick et al., 2017). More research is needed on the applicability of anxiety-focused CBT or childhood anxiety in minority groups and non-western countries.

We should be cautious about the clinical implications of the results of this meta-analysis, keeping in mind that although anxiety-focused CBT also has beneficial effects on broader outcomes, there is still room for improvement. Previous research has indicated that around 60% of the children suffering from an anxiety disorder are diagnosis-free following CBT treatment (Warwick et al., 2017). Although this is a large proportion of children that profits from CBT, there is still also a large minority (around 40%) that remains with a diagnosis, which calls for further improvement of our current treatment approaches.

Comorbid mood and externalizing disorders have been found to predict poorer treatment outcome following CBT (Hudson et al., 2013,

2014). Therefore it might be that, although the mean scores of the whole sample on comorbid symptoms decrease following CBT, there is still a subgroup of children that might need additional modules that specifically focus on these secondary problems. It might be that, for some children, difficulties in other domains arise secondarily to their anxiety and therefore improve following anxiety-focused CBT, whereas for other children this is not the case and more specific attention should be paid to these problems in treatment (Cummings, Caporino, & Kendall, 2014).

Recently, Weisz et al. (2012) developed a modular approach, with modules addressing anxiety, depression and disruptive behaviors that can be flexibly applied by a clinician based on weekly scores on different symptomatology and progress. Children treated with this flexible, modular approach reported quicker gains than children treated with the standard evidence-based treatment. The modular approach and the standard approach were both more effective than care as usual in terms of anxiety disorder remission. After 1-year follow-up, the modular approach did not differ significantly from the standard treatment, however only the modular approach afforded a significant advantage over usual care (Chorpita et al., 2013). These findings indicate that it might indeed be beneficial for children to provide treatment with modules that specifically focus on secondary problems children might present with.

Additionally, it might be that for children with comorbidity, taking a transdiagnostic approach is more fruitful than anxiety-focused CBT. Interestingly, a recent meta-analysis (Pearl & Norton, 2017) found increased rates of comorbidity to be unrelated to outcomes in trans diagnostic CBT, but to attenuated outcomes in diagnosis-specific CBT, suggesting that effects of trans diagnostic CBT are more robust when working with heterogeneous populations.

Since our meta-analysis worked with the mean scores of a group, it is not possible to disentangle subgroups of children and their response to CBT. We therefore recommend the use of a procedure that allows for the analysis of subgroups in future research. This can be done by conducting an individual patient data meta-analysis in which subgroup analyses can be performed. Including, for example, non-comorbid and comorbid children with anxiety disorders to see whether outcomes differ for these subgroups (Borenstein & Higgins, 2013).

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## Declaration of interest

MN is a member of the task force of the Dutch National Care Standard for anxiety disorders (Zorgstandaard Angststoornissen), for which she received travel expenses and some subsistence. MN receives travels expenses, some subsistence and sometimes an associated speaker honorarium for lectures or clinical training workshops. MN has received grants from ZonMW (The Netherlands Organization for Health Research and Development). MN developed and translated CBT treatment manuals, including a blended internet-based treatment program and the Dutch Coping Cat manual, for which she receives no personal fees.

All other authors declare that they have no conflicts of interest.

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## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.janxdis.2018.10.005>.

Datafiles can be found using the following link: <https://hdl.handle.net/10411/EQ3H8V>.

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