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Associations between maternal and paternal parenting behaviors, anxiety and its precursors in early childhood: A meta-analysis



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HIGHLIGHTS

- Meta-analysis on associations between maternal and paternal parenting and child anxiety
- Associations between parenting and child anxiety (0–5 years) are small.
- Paternal, not maternal, challenging parenting is associated with less child anxiety.
- Parenting is more strongly related to child anxiety symptoms than to anxiety precursors.
- Fathers' parenting is more strongly related to child anxiety symptoms than mothers'.

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ABSTRACT

In this meta-analysis we investigated differential associations between maternal and paternal parenting behaviors (overcontrol, overprotection, overinvolvement, autonomy granting, challenging parenting) and anxiety and its precursors (fearful temperament, behavioral inhibition, shyness) in children (0–5 years). Two meta-analyses were conducted, one for mothers ($k = 28, N = 5,728$), and one for fathers ($k = 12, N = 1,019$). In general, associations between parenting and child anxiety were small. Associations between child anxiety and overcontrol, overprotection, and overinvolvement did not differ for mothers and fathers. Maternal autonomy granting was not significantly related to child anxiety, and no studies examined fathers' autonomy granting. A significant difference was found for challenging parenting; mothers' challenging parenting was not significantly related to child anxiety, whereas fathers' challenging parenting was related to less child anxiety. Post-hoc meta-analyses revealed that mothers' and fathers' parenting was more strongly related to children's anxiety symptoms than to child anxiety precursors. Moreover, the association between parenting and child anxiety symptoms was stronger for fathers than for mothers. In conclusion, although parenting plays only a small role in early childhood anxiety, fathers' parenting is at least as important as mothers'. Paternal challenging behavior even seems more important than maternal challenging behavior. Research is needed to determine whether challenging fathering can prevent child anxiety development.

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1. Introduction

Anxiety disorders are very common in children. The lifetime prevalence rate of any anxiety disorder in children and adolescents is estimated to be between 15% and 20% (Beesdo, Knappe, & Pine, 2009). Anxiety has a negative impact on the child's functioning and is as disabling as other psychiatric childhood disorders (Ezpeleta, Keeler, Erkanli, Costello, & Angold, 2001). In addition, children with anxiety are likely to be diagnosed with more than one anxiety disorder (Kashani & Orvaschel, 1990) as well as depression (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Furthermore, child anxiety disorders place a burden on society via direct and indirect costs, with public expenses being more than 20 times higher for a clinically anxious child than for a non-anxious child (Bodden, Dirksen, & Bögels, 2008). A combination of genetic vulnerability and certain parenting behaviors increase the risk of developing an anxiety disorder (Murray, Creswell, & Cooper, 2009). Two meta-analyses (McLeod, Wood, & Weisz, 2007; Van der Bruggen, Stams, & Bögels, 2008) have previously examined the association between parenting and child anxiety and found small to medium associations between parenting and child anxiety. However, in these meta-analyses no distinction was made between parenting behaviors that are more typical for fathers or mothers, although there is considerable evidence showing that mothers and fathers differ in parenting behavior (Bögels & Phares, 2008; Möller, Majdandžić, De Vente, & Bögels, 2013). Moreover, reviews suggest that mothers' and fathers' behavior may have a different effect on the development of child anxiety (Bögels & Perotti, 2011; Bögels & Phares, 2008). Therefore, in the present meta-analysis, we first aimed to explore whether maternal and paternal parenting behaviors are differentially associated with child anxiety. Different from the two previous meta-analyses, our meta-analyses focuses on children aged 0–5 years. Second, we aimed to assess whether sample, design and measurement characteristics of the studies moderated the association between parenting behavior and child anxiety.

1.1. The role of parenting behavior in the development of child anxiety

Anxiety disorders have significant familial aggregation (Hettema, Neale, & Kendler, 2001), and next to genetic factors, parenting behavior could be an important factor in the intergenerational transmission of anxiety (e.g., Chorpita & Barlow, 1998; Wood, McLeod, Sigman, Hwang, & Chu, 2003). Different parenting behaviors have been linked to the development of anxiety in children. First, parental *overinvolvement* is a style of parenting that is characterized by excessive interfering in a child's behavior, thoughts, and feelings, and encouragement of excessive dependence on the parent (Chorpita & Barlow, 1998; Wood et al., 2003). There is inconsistency in how this construct is operationalized, and several terms (e.g., overcontrol, overprotection, intrusiveness, psychological control) have been used to describe it. These constructs may be considered different subcomponents of the broader overall dimension overinvolvement (see below). According to Van der Bruggen et al. (2008), parental overinvolvement may lead to child anxiety in three ways: (1) it may increase a child's threat perception; (2) it may reduce a child's perceived control over threat; and (3) it may reduce a child's opportunities to explore his/her surroundings and to learn how to cope with unexpected environmental events. Second, parental *autonomy granting* has been described as a parenting behavior that may reduce children's anxiety. Autonomy granting is characterized by encouragement of a child's individuality and independence (Morris et al., 2001; Silk, Morris, Tomoe, & Steinberg, 2003). This may enhance a child's perceived control over events, thereby reducing a child's anxiety (Chorpita & Barlow, 1998). Third, *rejection*, defined as parenting behavior that is hostile, disapproving, and low in warmth (Maccoby, 1992; Rapee, 1997; Wood et al., 2003), is linked to anxiety development. Rejection may induce perception of the environment as hostile and threatening and lead to a negative view of the self, thus increasing child anxiety (Bögels & Brechman-Toussaint, 2006; Bögels & Tarrier, 2004). Fourth, more recently attention has been given to the role of *challenging parenting behavior* in the development of child anxiety (Bögels & Perotti,

2011; Bögels & Phares, 2008; Majdandžić, Möller, De Vente, Bögels, & Van den Boom, 2014). Parents who display challenging parenting behavior playfully encourage their child to exhibit risky behavior or to go outside his/her comfort zone (Majdandžić et al., 2014). Examples of challenging parenting behavior are rough-and-tumble play, tickling, competing with the child, teasing, and encouraging competition and performances. Thus, parents may challenge their children both physically and socio-emotionally. As challenging parenting behavior pushes the child's limits, the child learns to be braver in unfamiliar situations, to explore the world, and to take chances, which may foster the child's confidence that s/he is able to cope with threats and novelty in his/her environment (Paquette & Bigras, 2012). As a result, challenging parenting behavior may prevent the development of child anxiety (Bögels & Phares, 2008).

Two meta-analyses have previously examined the association between parenting and child anxiety. First, McLeod et al. (2007) conducted a meta-analysis including 47 studies assessing the relationship between parenting behavior and child anxiety. McLeod and colleagues distinguished between two dimensions of parenting: rejection and overcontrol. These two broad dimensions were divided in specific subdimensions; rejection included the subdimensions withdrawal, aversiveness, and lack of warmth, whereas control consisted of overinvolvement and autonomy granting. Higher levels of rejection and control were associated with more anxiety in the child. For parental control an effect size of $r = .25$ was found, reflecting a medium effect (explaining around 6% of the variance in childhood anxiety). For parental rejection, a small effect of $r = .20$ was found (accounting for approximately 4% of the variance). Significant differences in effect sizes were found for the subdimensions of parenting behavior. Regarding the subdimensions of rejection, for warmth, withdrawal, and aversiveness effect sizes of $r = .06$, $.22$, and $.23$ were found respectively. For the subdimensions of control, McLeod et al. (2007) found an effect size of $r = .23$ for overinvolvement and $r = .42$ for autonomy granting. Second, Van der Bruggen et al. (2008) conducted a meta-analysis (including 17 studies) on the association between *observed* parental control and child anxiety and found a medium effect size of $d = .58$ ($r = .28$) for the positive association between observed parental control and child anxiety.

1.2. Father-mother differences in parenting

The meta-analyses of McLeod et al. (2007) and Van der Bruggen et al. (2008) did not distinguish between parenting behaviors that are more typical for fathers or mothers. However, there is considerable evidence showing quantitative and qualitative differences between maternal and paternal parenting behaviors towards their children (see the reviews of Bögels & Phares, 2008 and Möller et al., 2013). Quantitatively, fathers spend less time with their children than mothers across cultures (Geary, 2010). Fathers only seem to spend more time than mothers playing with their children (e.g., Lawson & Mace, 2009; Lewis & Lamb, 2003). Moreover, qualitative differences between maternal and paternal parenting have been found. For example, compared to fathers, mothers are more sensitive (e.g., Barnett, Deng, Mills-Koonce, Willoughby, & Cox, 2008; Lewis & Lamb, 2003), warmer and more supportive (McKinney & Renk, 2008; Simons & Conger, 2007), and talk more about emotions (Fivush, Brotman, Buckner, & Goodman, 2000). Fathers engage more in physical play (rough-and-tumble-play) with their children, whereas mothers engage more in pretend play (e.g., Lindsey & Mize, 2001; Lindsey, Mize, & Pettit, 1997). Furthermore, in general men are found to take more risks than women (Eckel & Grossman, 2008), and with respect to parenting fathers display more parenting choices emphasizing challenge than mothers (Ishak, Tamis-LeMonda, & Adolph, 2007). To summarize, evidence shows that fathers are more inclined to challenge their children and stimulate risk taking, whereas mothers tend to have a more caring and nurturing role in the parenting of their children (Möller et al., 2013).

1.3. Differential effects of maternal and paternal parenting on child anxiety

Theoretical models state that maternal and paternal parenting behaviors may differentially affect the development of child anxiety (Bögels & Perotti, 2011; Bögels & Phares, 2008). According to Bögels and Perotti (2011), children may be differentially affected by paternal and maternal parenting behaviors according to whether the mother or the father is specialized in that behavior. That is, assuming that fathers are specialized in opening children to the outside world, encouraging independence, and stimulating risk taking behavior, and mothers more in caring, nurturing, and protective behavior, it may be expected that lack of challenging and autonomy granting behavior of fathers would have a stronger effect on children's anxiety development than that of mothers. Likewise, paternal overprotective behavior would have a stronger impact on child anxiety than maternal overprotection, as mothers' protective behavior is more compatible with their purported caring role in the development of their children. In contrast, fathers' specialization in opening children to the outside world and encouraging independence and risk taking is less compatible with protective behaviors. Thus, if fathers engage in overprotective behaviors, instead of encouraging independence behaviors, anxiety of children may increase as a consequence of not having experience with the outside world. There is some empirical evidence supporting this model. For example, Majdandžić et al. (2014) found in a longitudinal study that observed paternal challenging parenting behavior decreased the social anxiety of 4-year-olds 6 months later, whereas maternal challenging parenting behavior increased the social anxiety of these children. Similarly, Möller, Majdandžić, and Bögels (2015) found that fathers' challenging parenting behavior was associated with less anxiety in their 10–15-month-old infants. Mothers' challenging parenting behavior was not related to infant anxiety. As another example, Van der Bruggen, Stams, Bögels, and Paulussen-Hoogeboom (2010) found that lower levels of fathers' autonomy granting behavior were related to higher levels of anxiety/depression of 4.5-year-olds, while mothers' autonomy granting appeared to be unrelated to children's anxiety/depression.

In the meta-analyses of McLeod et al. (2007) and Van der Bruggen et al. (2008) on the association between parenting and child anxiety no significant effect of parent gender was found, although Van der Bruggen et al. (2008) found larger effect sizes for studies including fathers/both parents ($d = .84$; $r = .39$) than for studies including only mothers/primary caregivers ($d = .50$; $r = .24$). There are three possible reasons why the two previous meta-analyses did not find a significant parent gender effect. First, both meta-analyses did not distinguish between parenting behaviors that are more typical for fathers or mothers. Second, the relatively small number of studies which included (also) fathers (53% in the meta-analysis of McLeod et al., 2007; 29% in the meta-analysis of Van der Bruggen et al., 2008) may have masked a difference in effect of paternal and maternal parenting behaviors on child anxiety. Third, the way in which the moderating role of parent gender was investigated did not allow calculating different effect sizes for mothers and fathers. That is, McLeod et al. (2007) only coded whether mothers, fathers, or both mothers and fathers were included in a study, and in the meta-analysis of Van der Bruggen et al. (2008) parent gender was coded as mothers/primary caregivers or fathers/both parents.

1.4. The current meta-analysis

The meta-analyses of McLeod et al. (2007) and Van der Bruggen et al. (2008) included studies up to 2006. A decade later, the increased attention to the role of fathers in the development of child anxiety has stimulated researchers to study not only the effects of mothers', but also fathers' parenting behavior on children's anxiety. Therefore, we examined the associations between parenting and child anxiety, and more importantly, we investigated whether maternal and paternal parenting behaviors have different effects on the development and maintenance of child anxiety. Thus, using a meta-analytic approach, we aimed to

investigate the model of Bögels et al. (Bögels & Perotti, 2011; Bögels & Phares, 2008) on differential associations between maternal and paternal parenting behaviors and child anxiety. Different from the two previous meta-analyses (McLeod et al., 2007; Van der Bruggen et al., 2008), our meta-analysis focused on children aged 0–5, as parents play an especially important role in children's development during early childhood (Fox, Henderson, Marshall, Nichols, & Ghera, 2005). Environmental influences, such as parenting (Belsky & De Haan, 2011), exert a particular powerful influence during early childhood (Dawson, Ashman, & Carver, 2000), when children show the largest neural and behavioral plasticity (e.g., Heckman, 2006; Stiles, Reilly, Paul, & Moses, 2005; Thomas & Johnson, 2006). Moreover, during the preschool years, the immediate family is still the most important socializing agent, whereas the school environment and peers become increasingly important from around the age of 6 when children enter formal schooling (Belle, 1989; Rimm-Kaufman & Pianta, 2000).

As it is difficult to measure anxiety (disorders) before the age of 6, we also included studies that examined precursors of anxiety that can be measured at earlier ages, such as fearful temperament, behavioral inhibition, and shyness. Children's early fearful temperament has been consistently associated with the later development of anxiety disorders (e.g., Clauss & Blackford, 2012; Fox, Calkins, Schmidt, Rubin, & Coplan, 1996; Kagan & Snidman, 1999; Rapee & Coplan, 2010). The measures of fearful temperament focus on general fearful behaviors related to reactivity to novelty, caution, and ease versus inhibition (Rapee & Coplan, 2010). Before the age of 1 year, a fearful temperament is reflected by increased negative reactivity to unfamiliar sensory stimuli (e.g., smells, sounds, sights), for example by crying or increased motor activity (Kagan & Snidman, 1991; Moehler et al., 2008). Fearful temperament is also measured through questionnaires of children's temperament that reflect individual differences in biological, behavioral, and emotional reactivity, such as the Infant Behavior Questionnaire (IBQ-R, Gartstein & Rothbart, 2003) and the Children's Behavior Questionnaire (CBQ, Rothbart, Ahadi, Hershey, & Fisher, 2001). Behavioral inhibition (BI) reflects fearful temperament on the behavioral level and is characterized by biologically based wary and fearful reactions to novel people and situations (Kagan, Reznick, Clarke, Snidman, & Garcia-Coll, 1984; Rubin & Asendorpf, 1993). Behaviorally inhibited children display anxiety and fear in the face of novel, unfamiliar, and challenging situations (Rubin, Hastings, Stewart, Henderson, & Chen, 1997). Unlike fearful temperament and its behavioral manifestation (displayed inhibition), shyness refers specifically to novel social situations (Burgess, Rubin, Cheah, & Nelson, 2001). Furthermore, shyness involves not only the experience of fear and anxiety in social situations, but also self-conscious emotions, such as embarrassment (Buss, 1986; Coplan & Rubin, 2010), and ambivalence which arises from an approach-avoidance conflict in a social situation, that is from the motivation to both approach and avoid social stimuli (Asendorpf, 1989, 1993).

In our meta-analysis, we distinguished between overcontrol and overprotection, as we believe these are separate constructs. We defined *overcontrol* as the extent to which the parent needlessly helps the child or interferes with his/her behavior and does not take the needs, interests, and desires of the child into account (Majdandžić et al., 2014). In this sense, it is similar to psychological control, defined as parents' attempts to manage their children's behavior through manipulation of their children's emotions, intrusion on children's autonomous activity, or restriction of their children's range of experiences (Barber & Harmon, 2002; Hastings, Utendale, & Sullivan, 2007). *Overprotection* reflected the extent to which the parent, being overly concerned with the child's safety or health, behaves overly cautious towards the child (for instance by responding overly solicitous when the child is anxious and giving in to the child's wish to avoid ambiguous situations, or by warning the child for objectively minor dangers), and in this way limits exposure to new objects, people, or situations (Bögels & Van Melick, 2004; Edwards, Rapee, & Kennedy, 2010). Thus, overcontrolling parents display intrusive behavior, make excessive use of commands or

instructions, and restrict children's behavior, whereas overprotective parents express excessive cautious and protective behaviors without a significant objective cause of threat or reason for safety concern (Ginsburg & Schlossberg, 2002). *Overinvolvement* was coded when no distinction could be made between overprotection and overcontrol. In that case, we coded this parenting behavior as overinvolvement instead of as overcontrol or overprotection. For *autonomy granting*, we used the same definition as McLeod et al. (2007, p. 162): "parental encouragement of children's opinions and choices, acknowledgement of children's independent perspectives on issues, and solicitation of children's input on decisions and solutions of problems". Lastly, we included *challenging parenting behavior*, characterized by behaviors in which the parent playfully encourages the child to exhibit risky behavior or to go outside his/her comfort zone (Majdandžić et al., 2014). Thus, we distinguished between five types of parenting behaviors that are likely to be of special relevance for the development of child anxiety: overprotection, overcontrol, overinvolvement, autonomy granting, and challenging parenting behavior. We did not include parental rejection, as three reviews concluded that there is less evidence for the association between child anxiety and parental rejection than overcontrol (DiBartolo & Helt, 2007; McLeod et al., 2007; Wood et al., 2003), and because the focus of the paper was on five dimensions more assumed to be more exclusively relevant to child anxiety development. Following the model of Bögels et al. (Bögels & Perotti, 2011; Bögels & Phares, 2008), we hypothesized that the association of more autonomy granting and challenging parenting behavior with less child anxiety would be stronger for fathers than for mothers. Likewise, a stronger positive association between overprotection and child anxiety was expected for fathers than for mothers. For overcontrol and overinvolvement, we had no hypothesis on whether these behaviors would be associated with more child anxiety if they were shown by mothers or fathers.

1.5. Possible moderators of the association between parenting behavior and child anxiety

Another goal of our meta-analysis was to identify moderators of the association between parenting behavior and child anxiety. Different types of moderators were investigated, including sample characteristics (e.g., child gender, age of the child) and design and measurement characteristics (e.g., measurement method of parenting and child anxiety).

First, we investigated the moderating role of child gender. It was expected that parenting would have a larger influence on girls in general, as parenting has a larger influence on children high in anxiety sensitivity (Belsky, Hsieh, & Crnic, 1998; Kochanska & Aksan, 2006), which is higher in girls than in boys (Silverman, Goedhart, Barrett, & Turner, 2003). Indeed, Van der Bruggen et al. (2008) found that the association between parenting (overcontrol) and child anxiety was stronger in studies with an overrepresentation of girls. McLeod et al. (2007), however, did not find a moderating effect of child gender.

Next, age of the child could influence the strength of the association between parenting and child anxiety. As it is suggested that parents have a larger influence on younger children than older children (Connell & Goodman, 2002), parenting effects on anxiety may be larger in early childhood. On the other hand, when children grow older the effects of parenting may accumulate, as children have been exposed longer to parents. Meta-analyses so far found divergent results; Van der Bruggen et al. (2008) found larger effect sizes for older children, and McLeod et al. (2007) found no moderating effect of age. Note, however, that our age range (0–5) is much smaller than the age ranges of McLeod et al. (2007) and Van der Bruggen et al. (2008) (0–18). As larger effects sizes could be found for both younger and older children, we did not formulate a specific hypothesis on the age of the child as a moderator.

We also investigated whether method of assessment of parenting and child anxiety (e.g., questionnaire, observation, interview) moderated the association between parenting and child anxiety. It can be hypothesized that the use of questionnaires will result in higher effect sizes, as questionnaires assess longer periods of parenting and child anxiety than observations. Moreover, questionnaires assess more stable trait-like dispositions compared to observations, which assess more state-like characteristics and can be influenced more easily by the context. On the other hand, observations may result in higher effect sizes, as they are more objective than questionnaires. McLeod et al. (2007) found higher effect sizes for observational parenting measures than for questionnaire and interview parenting measures. Measurement method of child anxiety was not investigated in their meta-analysis. As both questionnaires and observations of parenting and child anxiety could result in larger effect sizes, we did not formulate a specific hypothesis on the moderating effect of method of assessment of parenting and child anxiety.

Diagnostic status of the parent was also included as a moderator. Theoretical models state that high levels of parental anxiety may lead to more anxiety-enhancing behavior in parents (e.g., Chorpita & Barlow, 1998; Ginsburg & Schlossberg, 2002). Thus, as parents with an anxiety disorder may display more anxiety-provoking parenting behaviors and less anxiety-diminishing parenting behavior than parents without an anxiety disorder, regardless of the level of anxiety of the child, it was hypothesized that higher effect sizes would be found for studies assessing the parenting-child anxiety relationship in anxiety-disordered parents.

Some types of research designs provide stronger evidence for the association between parenting and child anxiety than others (Restifo & Bögels, 2009). Strongest evidence is provided by experimental studies in which parenting is manipulated (i.e., parents are instructed how to behave), and thus causal relationships can be tested. Longitudinal studies lead to stronger evidence than concurrent cross-sectional studies, as not only associative, but also sequential relationships can be examined. Therefore, we included study design as a moderator, distinguishing experimental, longitudinal, and concurrent designs. Experimental and longitudinal studies were not included in the meta-analysis of McLeod et al. (2007), and Van der Bruggen et al. (2008) included some longitudinal studies ($n = 4$), but did not test whether different effect sizes were found between concurrent and longitudinal studies. Largest effect sizes were expected for experimental studies.

Several moderators that were not included in previous meta-analyses, such as the observational setting of parenting/child anxiety, were also examined. Regarding the observational setting of parenting and child anxiety, stronger effect sizes may be found for studies observing these concepts in the home or at school compared to lab observations, in view of higher ecological validity. On the other hand, effect sizes for the parenting-child anxiety association may be larger in studies using lab observations, as the tasks in the lab can be designed in such a way that they evoke more child anxiety and/or parenting that is assumed to be anxiety-enhancing (i.e., more overinvolvement, overprotection and overcontrol, and less challenging parenting behavior and autonomy granting).

1.6. Aims of the current meta-analyses

In sum, the present meta-analysis had two goals. Our first goal was to assess differential associations between maternal and paternal parenting behaviors and young child's anxiety, focusing on five types of parenting behavior, namely overprotection, overcontrol, overinvolvement, autonomy granting, and challenging parenting behavior. Child anxiety was defined broadly, including child anxiety symptoms, child anxiety disorders, but also precursors of anxiety (i.e., fearful temperament, behavioral inhibition, and shyness). Additionally, we investigated whether anxiety symptoms, anxiety disorders, and each of the precursors of anxiety (behavioral inhibition, fearful

temperament, and shyness) were differently associated with mothers' and fathers' parenting behavior. The second goal was to examine whether sample characteristics (child gender, age of the child) and design and measurement characteristics (method of assessment of parenting and child anxiety, diagnostic status of the parent, study design, observational setting of parenting and child anxiety) of the studies moderated the association between parenting behavior and child anxiety.

2. Method

2.1. Literature search

To identify all relevant studies, literature searches were conducted in four bibliographic databases (search date: 24 March 2014): Education Resources Information Center, PsycINFO, PubMed, and Isi Web of Knowledge. The following search terms were used: (*parenting or rearing or socializ* or parent-child interaction or mother-child interaction or father-child interaction or parent-infant interaction or mother-infant interaction or father-infant interaction*) and (*anxi* or fear* or panic or phobi* or worr* or inhibit* or shy**). If possible in the search engine, we used filters to restrict our search to human studies, studies with children, and studies published in the English language. Next, reference sections of the meta-analyses of McLeod et al. (2007) and Van der Bruggen et al. (2008) and of recent reviews on parenting and/or child anxiety (Bögels & Perotti, 2011; Bögels & Phares, 2008; Degnan, Almas, & Fox, 2010; DiBartolo & Helt, 2007; Drake & Ginsburg, 2012; Epkins & Heckler, 2011; Kiff, Lengua, & Zalewski, 2011; Murray et al., 2009; Rapee, 2012; Rapee, Schniering, & Hudson, 2009) were examined for additional studies. Fig. 1 shows the flow chart of the selection process.

2.2. Inclusion and exclusion criteria

To be included, a study had to meet the following criteria: (a) the reported mean age of the children was below 6 years; (b) the study was published in a peer-reviewed journal; (c) the study was published in the English language; (d) the study included a direct measure of parenting behavior (overinvolvement, overcontrol, overprotection, autonomy granting, or challenging parenting behavior) directed at the target child; (e) the study included a measure of child anxiety; (f) child anxiety was measured at the same time or later than parenting behavior, as our main interest is to assess the effect of parenting on child anxiety; (g) the association between parenting and child anxiety was tested statistically.

Studies were excluded if the study did not meet inclusion criteria, or if (a) parenting styles instead of parenting behaviors were measured (e.g., authoritative or authoritarian parenting); (b) the study included children with diseases (e.g., children with asthma or diabetes) or children with other primary disorders (e.g., children with ADHD or ODD and comorbid anxiety disorders); (c) child anxiety was measured too broadly (e.g., internalizing problems, anxious-depressed behaviors); (d) only Posttraumatic Stress Disorder (PTSD) or Obsessive Compulsive Disorder (OCD) were measured, as PTSD and OCD are no longer under the umbrella of the anxiety disorders in DSM-5 (American Psychiatric Association [APA], 2013); (e) the study included parents with diseases or parents had a form of psychopathology other than anxiety (e.g., substance abuse, depression); (f) the study was an intervention study and no baseline data were reported; (g) the study retrospectively assessed child anxiety and/or parenting.

2.3. Sample of studies

Applying the above-mentioned in- and exclusion criteria resulted in 31 studies being included in our meta-analyses. These studies were published from 1997 to 2015 and reported on 28 overall effect sizes for mothers and 12 for fathers. The included studies examined

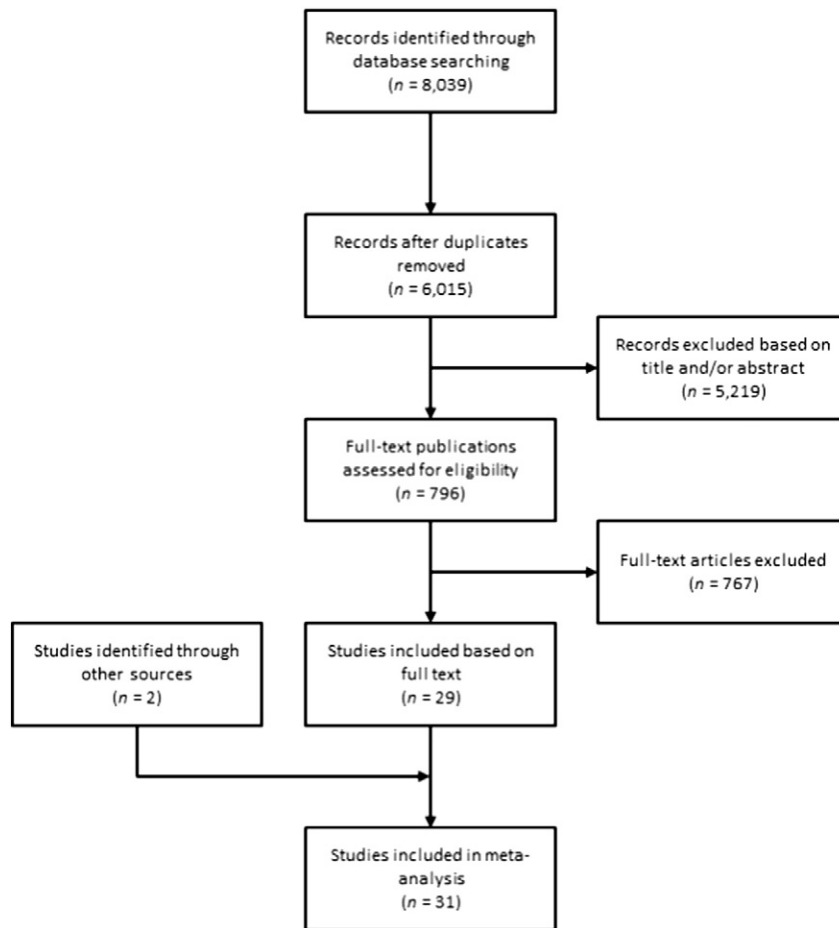


Fig. 1. Flowchart for included studies.

parenting behavior and child anxiety in samples of children between .20 and 5.86 years of age ($M = 2.86$, $SD = 1.68$) and reported on 5,728 mothers and children and 1,019 fathers and children. The included studies are marked with an asterisk in the References section. Table A.1 in Appendix A summarizes the characteristics of the included studies, and in Table A.2 effect sizes of each study are depicted.

2.4. Coding of the studies

Two separate meta-analyses were conducted, and thus two sets of effect sizes were computed. In the first meta-analysis, we assessed the association between maternal parenting behavior and child anxiety ($k = 28$) and in the second meta-analysis between paternal parenting and child anxiety ($k = 12$). For each study in each meta-analysis, effect sizes could be calculated for overcontrol, overprotection, autonomy granting, and challenging parenting behavior. When no distinction could be made between overprotection and overcontrol, an effect size was calculated for overinvolvement. In addition, an overall effect size (averaging the effect sizes of all used parenting dimensions in a study) was calculated.

When more than one measure to assess a given parenting dimension and/or child anxiety was used, a single arithmetic mean of all relevant effect sizes was calculated. For example, if a study included both an observational and a questionnaire measure of overcontrol, and child anxiety was measured via a questionnaire, we calculated one effect size for the observation of overcontrol and child anxiety, and one separate effect size for the self-reported overcontrol and child anxiety. These two effect sizes were then averaged to obtain an overall effect size for overcontrol. When a parenting dimension and/or child anxiety was measured at multiple time points, we again calculated a mean of effect

sizes. For example, when overcontrol was measured at ages 2 and 4, and child anxiety was measured at ages 2 and 4, we calculated: one effect size for overcontrol at age 2 and child anxiety at age 2, one effect size for overcontrol at age 2 and child anxiety at age 4, and one effect size for overcontrol at age 4 and child anxiety at age 4. We then averaged these three effect sizes to obtain an overall effect size for overcontrol. Note that the effect size for child anxiety at age 2 and overcontrol at age 4 is not included, as we were mainly interested in the effect of parenting on child anxiety, and not in the effect of child anxiety on parenting.

When a sample was used in more than one publication, we included for each parenting behavior dimension the most comprehensive paper, based on the number of time points, number of child anxiety measures, and whether both fathers and mothers were included. For example, we included the two most comprehensive papers of Kiel and Buss (2009, 2011), and excluded three of Kiel's papers because they were less comprehensive (Kiel & Buss, 2012, 2013; Kiel & Maack, 2013). When a publication contained more than one sample, effect sizes for each sample were included in the meta-analysis (e.g., Chen, Hastings, & Rubin, 1998).

Studies were coded with a standardized coding system. In the coding protocol, very clear definitions of each parenting behavior were described (see also the Introduction of the manuscript). The first author coded all the studies and in case of doubt, she consulted the other co-authors to discuss which parenting behavior should be coded. Of all the data, 30% studies were double coded by the second author to make sure that the first author coded each parenting behavior and moderator correctly. The other 70% of studies were discussed in case of doubt. In that case, the first author consulted the co-authors and the coding of this particular study was then discussed until agreement was reached. Reliability for the effect sizes and continuous moderators

was calculated using cross-correlation coefficients. Inter-rater reliability for the parenting effect sizes was .76, indicating a sufficient level of agreement. For the continuous moderators (percentage boys and child age) inter-rater reliability was 1.00. For the categorical moderators, the average reliability was $\kappa = .93$ (range .80–1.00). Discrepancies in coding by the first and second author were then resolved through discussion, until an inter-rater reliability of 1.00 was reached.

2.5. Coding of child anxiety symptoms, anxiety disorders, and precursors of anxiety

As our meta-analyses not only included child anxiety, but also precursors of anxiety, we tested post-hoc whether anxiety symptoms, anxiety disorders, and each of the precursors of anxiety (behavioral inhibition, fearful temperament, and shyness) were differently associated with parenting behavior. This was done separately for mothers' and fathers' parenting behavior. The studies that investigated fearful temperament in the relation to parenting used questionnaires to assess temperament (e.g., IBQ, CBQ) and observations of early negative reactivity. The studies that examined BI in relation to parenting used standardized lab battery tasks with novel objects and strangers to measure BI as a precursor of child anxiety, such as the Lab-TAB (Goldsmith, Reilly, Lemery, Longley, & Prescott, 1999). Shyness was measured as observed inhibited behaviors in social interaction tasks with peers or strangers, such as the Play Observation Scale (POS; Rubin, 2001) and questionnaires (e.g., shyness subscale of the Colorado Child Temperament Inventory; Buss & Plomin, 1984). Anxiety symptoms were mostly assessed with questionnaires, such as the Preschool Anxiety Scale-Revised (PAS-R; Edwards, Rapee, Kennedy, & Spence, 2010) or the Spence Children's Anxiety Scale (SCAS-P; Spence, 1999). Finally, anxiety disorders were assessed with clinical interviews, such as the Anxiety Disorders Interview Schedule Parent Version (ADIS-P; Silverman & Albano, 1996) or the Preschool Age Psychiatric Assessment (PAPA; Egger, Ascher, & Angold, 1999). In Table A.3, it is listed which anxiety constructs were assessed per study.

2.6. Moderator analyses

For moderation analyses, we coded the following information for each study:

2.6.1. Sample characteristics

Sample size was coded as the average sample size (number of fathers or mothers) based on all used calculated correlations in a study. For example, if we used three correlations with different sample sizes to assess the association between maternal parenting and child anxiety, e.g., $n = 80, 84,$ and 90 , the average maternal sample size was coded as 85 . If only total sample sizes were mentioned in a study, this value was used. Furthermore, we coded the percentage of boys, mean age of the children, parental ethnicity (coded as percentage Caucasian), and the continent in which the study was conducted (defined as Europe, North-America, Australia or other continents).

2.6.2. Design and measurement characteristics

Measurement method of parenting (questionnaire, observation, interview, other, two or more measures) was coded as a potential moderator. For observational studies, observation setting of parenting (lab, home, other, two or more settings) was also coded. Measurement method of child anxiety was coded as questionnaire, observation, interview, other, or two or more measures (e.g., questionnaire and observation, observation and interview etc.). If the measurement method of child anxiety was observational, we coded the number of observational tasks that was used to measure child anxiety and the observation setting of child anxiety (lab, home, other, two or more settings). Clinical status of the parents was coded as without anxiety disorder, with

anxiety disorder, or mixed sample. Experimental design was coded as yes, no. Lastly, we coded the study design as prospective, concurrent, or mixed. If the study design was prospective or mixed, we also coded the average time period (in months) between the measurement of parenting and child anxiety.

2.6.3. Publication characteristics

Year of publication and impact factor (ISI Journal Citation Reports 2013) were included to control for publication characteristics of the studies.

2.7. Meta-analytic procedures and analyses

Effect sizes were put in the same metric using Pearson's product-moment correlation (r), as correlations are easily interpretable (Rosenthal, 1994; Rosenthal & DiMatteo, 2001). If studies did not report correlations, means and standard deviations were used to calculate the effect size. Effect sizes were converted using Fisher's r -to- z transformation. For display and interpretative purposes, these weighted mean effect sizes were converted back to r using Fisher's z -to- r transformation. The effect sizes were interpreted following Cohen's (1988) guidelines: effect sizes below .10 indicate a small effect, effect sizes of at least .24 a medium effect, and effect sizes above .37 a large effect.

Random effect models were used, as we assumed that the studies in our meta-analyses were sampled from a population of studies, and we wanted to make unconditional inferences about these studies (Hedges & Vevea, 1998). In a random effect model, effect sizes are assumed to vary as a result of both within-study sampling error and random variability in effect sizes between studies (Hedges & Vevea, 1998).

Homogeneity analyses were conducted to examine whether characteristics of the studies moderated the overall association between parenting behavior and child anxiety. Due to power problems and to improve readability of this paper, homogeneity analyses were calculated for the overall association between parenting behavior and child anxiety, not for mothers and fathers separately, and not for the five specific parenting behaviors. Homogeneity among the study effect sizes was assessed through the Q statistic (Hedges & Olkin, 1985). A statistically significant Q statistic indicates a heterogeneous distribution of effect sizes, and thus suggests that certain moderators may be related with systematic differences among effect sizes. For heterogeneous effect sizes, we investigated moderation by running mixed models. First, we performed single mixed models for each categorical and continuous moderator. Next, a multiple regression model was run with all significant moderators predicting the overall association between parenting and child anxiety. All analyses were conducted in R version 3.1.0 (R Core Team, 2014) using the metafor package (Viechtbauer, 2010).

2.8. Publication bias

A common problem in meta-analyses is that studies may remain unpublished because of non-significant findings, whereas studies with significant findings have a higher chance of getting published (Song et al., 2010). Thus, the sample of included studies in our meta-analyses could be incomplete and not representative of the population of studies, as a result of which we may over- or underestimate the effects of parenting behavior on child anxiety. Therefore, we determined in two ways whether such possible publication bias exists. First, we created funnel plots, in which the effect sizes are plotted against their standard errors. We visually inspected whether data points were spread symmetrical within the funnel. Second, we used the trim-and-fill-method (Duval & Tweedie, 2000), which is a method to estimate the number and outcomes of missing studies, and which adjusts the meta-analysis to incorporate the missing studies, based on the asymmetry in the funnel plot.

The studies outside the trim-and-fill method were not removed from the analyses initially reported. The trim-and-fill-method was used to estimate the number of studies missing from our meta-analyses due to the suppression of the most extreme results on one side of the funnel plot and to subsequently correct the meta-analyses by imputing the presence of missing studies to yield an unbiased pooled estimate.

2.9. Data analytic plan

First, we conducted two separate meta-analyses (one for mothers, one for fathers) to investigate the associations between maternal/paternal parenting behavior (overcontrol, overprotection, overinvolvement, autonomy granting, and challenging parenting behavior) and child anxiety (including child anxiety symptoms, child anxiety disorders, fearful temperament, behavioral inhibition, and shyness). Next, we tested whether paternal and maternal parenting behaviors were differentially associated with child anxiety. Second, we tested post-hoc whether anxiety symptoms, anxiety disorders, and each of the precursors of anxiety (behavioral inhibition, fearful temperament, and shyness) were differently associated with parenting behavior. This was done separately for maternal and paternal parenting behavior. Third, we conducted moderator analyses for the overall association between parenting behavior and child anxiety (including child anxiety symptoms, child anxiety disorders, fearful temperament, behavioral inhibition, and shyness).

3. Results

3.1. Meta-analyses of the association between parenting behavior and child anxiety

3.1.1. The association between maternal parenting behavior and child anxiety

The effect size for the overall association between maternal parenting and child anxiety was small but significant, $r = .06$ (95% CI = [.01, .10], $k = 28$), with more anxiety-enhancing parenting (i.e., more overinvolvement, overprotection and overcontrol, and less challenging parenting behavior and autonomy granting) associated with more child anxiety. For maternal overinvolvement, no significant association with child anxiety was found, $r = .08$ (95% CI = [−.02, .19], $k = 5$). A non-significant effect size was also found for maternal overcontrol, $r = .04$ (95% CI [−.01, .09], $k = 15$). The effect size for the association between maternal overprotection and child anxiety was $r = .12$ (95% CI = [.03, .21], $k = 11$), indicating a small and significant effect, with more maternal overprotection associated with more child anxiety. The effect size for the association between maternal autonomy granting and child anxiety was non-significant, $r = .08$ (95% CI = [−.08, .23], $k = 5$). Lastly, no significant effect size was found for the association between maternal challenging parenting behavior and child anxiety, $r = .06$ (95% CI = [−.09, .22], $k = 2$).

For maternal overcontrol, maternal overprotection, and maternal autonomy granting, publication bias was found. For maternal overcontrol, the trim-and-fill-method indicated that six studies were added below the average effect size, resulting in a substantial reduction of the effect size, $r = .00$ (95% CI = [−.05, .05]). For maternal overprotection, three studies were trimmed below the average effect size, resulting in a slightly lower (and now non-significant) effect size of $r = .07$ (95% CI = [−.02, .16]). For maternal autonomy granting, one study was added below the average effect size, resulting in a slightly lower and still non-significant effect size of $r = .04$, (95% CI = [−.11, .18]). Thus, the data may have overestimated the association between these three maternal parenting behaviors and child anxiety. Publication bias was not found for the overall association between maternal parenting and child anxiety and for the association between maternal overinvolvement and child anxiety. Publication bias could not be

calculated for maternal challenging parenting behavior as our meta-analysis only included two studies to assess the association between challenging parenting behavior and child anxiety.

3.1.2. The association between paternal parenting behavior and child anxiety

The effect size for the overall association between paternal parenting and child anxiety was non-significant, $r = .03$ (95% CI = [−.08, .15], $k = 12$), indicating that paternal parenting behavior and child anxiety were unrelated. For the association between paternal overinvolvement and child anxiety, a non-significant effect size was found, $r = .11$ (95% CI = [−.11, .31], $k = 4$). Paternal overcontrol was also not significantly associated with child anxiety, $r = −.07$ (95% CI = [−.20, .06], $k = 5$). The effect size for the association between paternal overprotection and child anxiety was not significant, $r = .20$ (95% CI = [−.03, .40], $k = 3$). The effect size for the association between paternal challenging parenting behavior and child anxiety was significant, $r = −.19$ (95% CI = [.03, .33], $k = 2$), with more paternal challenging parenting behavior associated with less child anxiety. As no studies assessed the association between paternal autonomy granting and child anxiety, no effect size could be calculated.

Publication bias was found for the overall association between paternal parenting and child anxiety, and for paternal overinvolvement and paternal overprotection. For the overall association between paternal parenting and child anxiety, the trim-and-fill-method indicated that four studies were added above the average effect size. This resulted in a fairly higher, but still non-significant effect size of $r = .12$ (95% CI = [−.01, .24]). For paternal overinvolvement, one study was added above the average effect size, resulting in a slightly higher but still non-significant effect size, $r = .16$ (95% CI = [−.05, .36]). For paternal overprotection, two studies were added above the average effect size, resulting in a fairly higher, and significant effect size for paternal overprotection, $r = .27$ (95% CI = [.16, .37]). Thus, the data may have underestimated the association between these three paternal parenting behaviors and child anxiety. No publication bias was found for paternal overcontrol. Publication bias could not be calculated for paternal challenging parenting behavior as only two studies were included assessing the association between challenging parenting behavior and child anxiety.

3.1.3. Differential associations between maternal and paternal parenting behaviors and child anxiety

To test whether paternal and maternal parenting behaviors were differentially associated with child anxiety, correlations of maternal versus paternal parenting behavior with child anxiety were statistically compared with a Fisher r -to- z test. First, the overall association between parenting behavior and child anxiety did not differ for mothers ($r = .06$, $n = 5,728$) and fathers ($r = .03$, $n = 1,019$), $z = .64$, $p = .522$. Second, the correlation between overinvolvement and child anxiety also did not significantly differ for mothers ($r = .08$, $n = 739$) and fathers ($r = .11$, $n = 300$), $z = −.34$, $p = .734$. Third, the correlation between overcontrol and child anxiety significantly differed for mothers and fathers, $z = 2.25$, $p = .024$. Mothers' overcontrol was, although non-significantly, related to more child anxiety ($r = .04$, $n = 3,558$), whereas fathers' overcontrol was (non-significantly) related to less child anxiety ($r = −.07$, $n = 442$). Fourth, the correlation between overprotection and child anxiety did not significantly differ for mothers ($r = .12$, $n = 1,697$) and fathers ($r = .20$, $n = 277$), $z = −1.19$, $p = .234$. Fifth, the association between challenging parenting behavior and child anxiety was significantly different for mothers and fathers, $z = 2.26$, $p = .024$. Mothers' challenging parenting behavior was not significantly related to child anxiety ($r = .06$, $n = 165$), whereas fathers' challenging parenting behavior was significantly related to less child anxiety ($r = −.19$, $n = 161$).

3.2. Associations between parenting behavior, child anxiety symptoms, anxiety disorders, and precursors of anxiety

3.2.1. Associations between maternal parenting behavior and child anxiety symptoms, anxiety disorders, and precursors of anxiety

The effect size for the association between child behavioral inhibition and maternal parenting behavior was non-significant, $r = .06$ (95% CI = $[-.02, .13]$, $k = 12$). The effect size for the association between child fearful temperament and maternal parenting behavior was also non-significant, $r = .07$ (95% CI = $[-.03, .16]$, $k = 9$). A non-significant effect size was also found for the association between child shyness and maternal parenting behavior, $r = .05$ (95% CI = $[-.02, .13]$, $k = 11$). The effect size for the association between child anxiety symptoms and maternal parenting behavior was significant, $r = .14$ (95% CI = $[-.05, .22]$, $k = 8$). Lastly, a non-significant effect size was found for the association between child anxiety disorders and maternal parenting behavior, $r = .06$ (95% CI = $[-.03, .15]$, $k = 3$).

To test whether maternal parenting behavior was differentially associated with the five child anxiety constructs (behavioral inhibition, fearful temperament, shyness, anxiety symptoms, and anxiety disorders), correlations between maternal parenting behavior and these five anxiety constructs were statistically compared with a Fisher r -to- z test. Maternal parenting behavior was more strongly correlated with child anxiety symptoms than with child behavioral inhibition ($z = 2.46$, $p = .014$), child fearful temperament ($z = 2.15$, $p = .032$), and child shyness ($z = 2.25$, $p = .024$). The correlation between maternal parenting behavior and child anxiety symptoms did not significantly differ from the correlation between maternal parenting behavior and child anxiety disorders ($z = 1.96$, $p = .050$).

3.2.2. Associations between paternal parenting behavior and child anxiety symptoms, anxiety disorders, and precursors of anxiety

A non-significant effect size was found for the association between child behavioral inhibition and paternal parenting behavior, $r = -.08$ (95% CI = $[-.31, .17]$, $k = 7$). The effect size for the association between child fearful temperament and paternal parenting behavior was non-significant, $r = .04$ (95% CI = $[-.12, .21]$, $k = 5$). A non-significant effect size was also found for the association between child shyness and paternal parenting behavior, $r = .04$ (95% CI = $[-.06, .14]$, $k = 5$). The effect size for the association between child anxiety symptoms and paternal parenting behavior was significant, $r = .28$ (95% CI = $[-.16, .38]$, $k = 3$). Lastly, a non-significant effect size was found for the association between child anxiety disorders and paternal parenting behavior, $r = -.03$ (95% CI = $[-.19, .13]$, $k = 2$).

Correlations between paternal parenting behavior and the five anxiety constructs (behavioral inhibition, fearful temperament, shyness, anxiety symptoms, and anxiety disorders) were statistically compared with a Fisher r -to- z test, to investigate whether paternal parenting behavior was differentially associated with these five child anxiety constructs. Paternal parenting behavior was more strongly correlated with child anxiety symptoms than with child behavioral inhibition ($z = 4.75$, $p < .001$), child fearful temperament ($z = 3.15$, $p = .002$), child shyness ($z = 3.04$, $p = .002$), and child anxiety disorders ($z = 3.05$, $p = .002$).

3.2.3. Differential associations between maternal and paternal parenting behaviors and child anxiety symptoms

Paternal and maternal parenting behaviors were both significantly associated with child anxiety symptoms. To test whether paternal and maternal parenting behaviors were differentially associated with child anxiety symptoms, correlations of maternal versus paternal parenting behavior with child anxiety symptoms were statistically compared with a Fisher r -to- z test. The association between parenting behavior and child anxiety symptoms was stronger for fathers ($r = .28$, $n = 277$) than for mothers ($r = .14$, $n = 1,513$), $z = 2.34$, $p = .019$.

Table 1

Single moderation analyses for categorical variables in the overall association between parenting behavior and child anxiety.

Variable	k	r	95% CI	z	Q
Measurement method of parenting					$Q(2) = 9.17^*$
Questionnaire	9	.12	[.01, .19]	3.08**	
Observation	14	.00	[-.17, .17]	-2.45*	
Two or more measures	5	.15	[-.06, .34]	.48	
Measurement method of child anxiety					$Q(2) = 5.96^\dagger$
Questionnaire	12	.11	[.04, .17]	3.24**	
Observation	5	-.04	[-.22, .14]	-2.41*	
Two or more measures	11	.05	[-.11, .20]	-1.27	
Type of association					$Q(2) = 4.81^\dagger$
Prospective	3	-.10	[-.25, .05]	-1.31	
Concurrent	16	.06	[-.24, .36]	2.02*	
Mixed	9	.08	[-.23, .38]	2.16*	

Note. $^\dagger p < .10$, * $p < .05$, ** $p < .01$. Continuous moderators are mentioned in the text.

3.3. Moderator analyses for the overall association between parenting behavior and child anxiety

The effect size for the overall association between parenting and child anxiety was small but significant, $r = .06$ (95% CI = $[-.01, .10]$, $k = 28$), with more anxiety-enhancing parenting associated with more child anxiety. Because there was significant heterogeneity in the effect sizes for the overall association between parenting behavior and child anxiety, $Q(27) = 84.61$, $p < .001$, the possibility of moderation was examined. In Table 1 results for the (borderline) significant categorical moderators of the single mixed models are depicted (continuous moderators are reported in the text). Next, to account for possible inter-correlations between these moderators, we performed a multiple meta-regression. Results of the multiple meta-regression can be found in Table 2.

Single moderation analyses indicated first that the percentage of boys significantly moderated the parenting-child anxiety association, $Q(1) = 3.90$, $p = .048$. The results indicated that for an increase of 1% in the percentage of boys, the effect size for the relationship between parenting and child anxiety dropped with $-.002$ (95% CI $[-.005, .00]$). Second, measurement method of parenting was a significant moderator in the overall association between parenting behavior and child anxiety, $Q(2) = 9.17$, $p = .010$. Strongest effect sizes were found for studies using two or more different measures ($r = .15$), followed by studies using questionnaires ($r = .12$), whereas observational studies resulted in lowest associations ($r = .00$). Third, measurement method of child anxiety was a borderline significant moderator of the association between parenting behavior and child anxiety,

Table 2

Multiple meta-regression analyses for the overall association between parenting behavior and child anxiety.

Variable	r	95% CI	z
Intercept	.13	[-.08, .34]	1.18
Measurement method of parenting			
Observation	.10	[-.19, .37]	-.77
Two or more measures	.25	[-.07, .52]	2.14*
Measurement method of child anxiety			
Observation	-.05	[-.36, .26]	-3.38***
Two or more measures	.00	[-.27, .28]	-3.36***
Type of association			
Concurrent	.19	[-.16, .51]	.90
Mixed	.25	[-.11, .55]	1.68 †
Percentage boys	-.001	[-.003, .001]	-1.36

Note. $^\dagger p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

$Q(2) = 5.96, p = .057$. Highest effect sizes were found for studies that used questionnaires to measure the anxiety of the child ($r = .11$), followed by studies using two or more measures ($r = .05$). In studies that used observations, there was a small negative association between parenting and child anxiety ($r = -.04$). Fourth, study design emerged as a borderline significant moderator, $Q(2) = 4.81, p = .090$. Studies that used a combination of prospective and concurrent associations resulted in highest effect sizes ($r = .08$), followed by studies using only concurrent associations ($r = .06$). In prospective studies, more anxiety-enhancing parenting was associated with less child anxiety ($r = -.10$). Fifth, the number of observational tasks that was used to measure child anxiety appeared to moderate the association between parenting and child anxiety, $Q(1) = 8.76, p = .003$. The results indicated that for each extra task to measure child anxiety, the effect size for the relationship between parenting and child anxiety dropped with $-.01$ (95% CI $[-.02, -.00]$).

Next, one multiple meta-regression was conducted with the effect sizes for the overall association between parenting and child anxiety as the dependent variable and measurement method of parenting, measurement method of child anxiety, study design, and percentage of boys as predictors. Number of observational tasks to measure child anxiety was not included as predictor, as this was an additional variable that was only coded for the observational studies. The moderator model was significant, $Q(7) = 41.08, p < .001$. Combined, measurement method of parenting, measurement method of child anxiety, and study design explained 87.66% of the variance in the effect sizes. No residual heterogeneity was left, $Q(20) = 23.85, p = .249$. Controlling for the intercorrelations between the four moderators, studies using two or more measures to assess parenting behavior yielded the largest effect sizes, compared to studies using only questionnaires or observations. Regarding the measurement method of child anxiety, it was found that observational studies resulted in negative effect sizes, whereas questionnaire studies yielded positive effect sizes. In studies using two or more measures to assess child anxiety, the association was absent. Regarding the study design, studies using a combination of prospective and concurrent associations resulted in the highest effect sizes (borderline significant), followed by concurrent and prospective studies. The percentage of boys that was included in a study was not a significant moderator anymore, suggesting that the other moderators accounted for gender differences in effect sizes.

4. Discussion

The primary aim of this meta-analysis was to examine whether maternal and paternal parenting behaviors are differentially associated with anxiety and its precursors in children aged 0–5. The main findings are that: (1) parenting behavior plays only a small role in early childhood anxiety; (2) paternal parenting behavior is important in the development of child anxiety; (3) fathers' challenging parenting behavior is associated with less child anxiety, whereas mothers' challenging parenting behavior is not associated with child anxiety; (4) maternal and paternal parenting behaviors are more strongly related to child anxiety symptoms than to precursors of anxiety; (5) fathers' parenting behavior is more strongly associated with child anxiety symptoms than mothers' parenting behavior.

Maternal and paternal overcontrol (i.e., needlessly helping or interfering with the child's behavior or feelings) were both not significantly related to child anxiety. An explanation for the absence of a significant association between parental overcontrol and child anxiety is that overcontrol is less salient for the development of anxiety in this early period of children's development. Overcontrol may become more important as children grow older, and have more negative effects in adolescence, when striving for autonomy and separating from the parents becomes a salient task (Bögels & Phares, 2008). In line, Van der Bruggen et al.

(2008) found that parental overcontrol was associated with more anxiety when children were older.

Results of our meta-analysis show that both mothers' and fathers' overprotection (i.e., overly cautious behavior towards the child as the parent is overly concerned with the child's health/safety) is significantly associated with child anxiety in early childhood. Following Bögels and Perotti (2011), we expected paternal overprotection to be more strongly associated with child anxiety than maternal overprotection, as it is fathers' assumed role to open children to the outside world, encourage independence, and stimulate risk taking, whereas mothers are more specialized in caring, nurturing, and protective behavior. Thus, if fathers engage in overprotective behaviors, instead of encouraging independence behaviors, this would lead to a larger increase in child anxiety, than when mothers display overprotective behavior (Bögels & Perotti, 2011). However, paternal overprotection was not more strongly associated with child anxiety than maternal overprotection. A possible explanation comes from the results of the trim-and-fill-method which indicated that the data may have underestimated the relationship between paternal overprotection and child anxiety and overestimated the association between maternal overprotection and child anxiety. Therefore, more research is needed to assess the effects of paternal overprotection on child anxiety.

The results of our meta-analysis point to the importance of distinguishing between overcontrol and overprotection, as maternal and paternal overcontrol were not significantly associated with child anxiety, whereas maternal and paternal overprotection were significantly related to more anxiety in the child. Parental overprotection may be more salient in this developmental phase. That is, as young children are quite vulnerable and dependent on their parents, they may more easily elicit parental protective behaviors. Excessive protective and cautious behaviors of parents may then maintain or exacerbate child anxiety. It is therefore recommended that future studies separately assess the effects of overcontrol and overprotection on the development and maintenance of child anxiety rather than using the broad construct of overinvolvement, including both overcontrolling and overprotective parenting behaviors. This could be done both by using questionnaires and observations that tap into these specific constructs. For example, the Comprehensive Parenting Behavior Questionnaire (Majdandžić, De Vente, & Bögels, 2015) contains both an overprotection scale (e.g., 1-year version: "I keep an eye on my child in case something dangerous happens"), and an overcontrol scale (e.g., 2.5-years version: "I cannot stand it when my child suddenly wants something else than what we had planned"). These measures should be tailored to the age of the child, as the extent to which parenting behavior is 'overprotective or 'overcontrolling differs significantly in this age group (e.g., a certain protective behavior towards an infant can be appropriate given the age of the child, whereas the same behavior could be 'overprotective when expressed to a toddler).

Regarding autonomy granting, we hypothesized that the negative relationship between autonomy granting and child anxiety would be stronger for fathers than for mothers, as fathers are assumed to open children to the outside world and to encourage independence (Bögels & Perotti, 2011). Unfortunately, this hypothesis could not be tested as no studies investigated the relationship between paternal autonomy granting behavior and early childhood anxiety. In the meta-analysis of McLeod et al. (2007) autonomy granting showed the strongest association of all parenting dimensions tested ($r = -.42$) with anxiety in children aged 0–18 years, but our findings do not support this result for mothers and their young children. That is, maternal autonomy granting behavior was not significantly associated with child anxiety. It is possible that maternal autonomy granting becomes important if children grow older and start exploring their environment more outside the scope of mother's presence. As the role of paternal autonomy granting in young children's anxiety has not yet been investigated, this is an important area for future research.

As expected, it was found that paternal challenging parenting behavior was associated with less child anxiety, whereas maternal challenging parenting was not significantly related to child anxiety. This is in accordance with the theory of [Bögels and Perotti \(2011\)](#) that states that, as it is the father's assumed role to challenge his children and to encourage risk taking, paternal challenging parenting behavior may decrease children's anxiety as it pushes the child's limits. Thus, lack of paternal challenging behavior is associated with more child anxiety. This finding may have implications for the treatment of anxious children. That is, as fathers are more specialized in encouraging, challenging, and risk taking behavior, and mothers more in caring, nurturing, and protective behavior, when fathers challenge their children to take risks, this may help their children overcome their anxiety to a greater extent than challenging behavior of mothers. However, as our meta-analysis included only two studies assessing the role of challenging parenting behavior, more research is clearly needed to assess the consequences of challenging parenting behavior on children's development of anxiety.

An important note should be made with regard to the interpretation of the differential associations between maternal and paternal parenting and child anxiety. That is, for several parenting behaviors, publication bias was present. The effect sizes for several maternal parenting behaviors (overcontrol, overprotection, and autonomy) were overestimated, whereas for fathers, some parenting behaviors were underestimated (overall association between parenting and child anxiety, overinvolvement, and overprotection). This suggests that the differential associations between maternal and paternal parenting and child anxiety may be larger for some parenting behaviors than the currently available data shows.

Post-hoc analyses revealed that both mothers' and fathers' parenting behaviors are more strongly related to anxiety symptoms in children than to the precursors of child anxiety, namely fearful temperament, BI, and shyness. Although these anxiety precursors have been identified as a major risk for later anxiety, not all fearful, inhibited, and shy children become anxious or develop an anxiety disorder ([Rapee & Coplan, 2010](#)). Correlations between precursors of anxiety and anxiety symptomatology range from .30 to .50 suggesting that, although overlapping, these constructs are different ([Coplan & Armer, 2005](#); [Lemery, Essex, & Smider, 2002](#); [Van Brakel, Muris, Bögels, & Thomassen, 2006](#)). Since anxiety symptoms are typically measured at a later age than the precursors of anxiety, it is possible that parenting behaviors have accumulating influence or matter more for child anxiety at a later age compared to infancy and early childhood. It also could be that parenting is more important for the unique and specific features of anxiety that are not included in the conceptualization of fearful temperament. For example, [Rapee and Coplan \(2010\)](#) argue that anxiety measures focus on cognitive characteristics (such as worry and appraisal of threat), physical symptoms of anxiety, and fears of specific objects or situations, whereas fearful temperament refers to more general behaviors, such as reactivity and comfort in novel situations. Another explanation is that temperament is less susceptible to environmental influences than anxiety symptoms ([Rapee & Coplan, 2010](#)), and is therefore less affected by parenting behaviors.

Notably, child anxiety disorders were not significantly related to parenting behavior. A first explanation for this somewhat unexpected finding, as one may expect severe anxiety to be more strongly related to parenting than milder anxiety, is that anxiety disorders were assessed as a categorical variable in the coded studies, as a result of which the power is lower compared to when continuous measures are used ([Cohen, 1983](#)). A second explanation for the absence of an association between child anxiety disorders and parenting behavior is the difficulty to reliably and validly assign diagnoses in preschool children, because children may experience difficulty with communicating information about their internal states ([McCarthy & Spence, 1991](#)), and because diagnostic assessment measures of child anxiety are not very sensitive to developmental issues (i.e., rapid changes in anxiety over the course of children's development) ([Schniering, Hudson, & Rapee, 2000](#)). To

compare, in the meta-analysis of [McLeod et al. \(2007\)](#), higher effect sizes for the association between anxiety-enhancing parenting and child anxiety were found for children diagnosed with an anxiety disorder than for non-clinical children. Moreover, [Van der Bruggen et al. \(2008\)](#) found that the association between parental control and child anxiety was higher in studies using group contrasts (i.e., comparing clinical and normal samples) than for correlational studies. As we found only three studies on children with anxiety disorders, more research is needed on the role of parenting in young (clinical) children with anxiety disorders.

Child anxiety symptoms were more strongly related to paternal than to maternal parenting, in the direction that more anxiety-enhancing fathering was associated with more child anxiety. This finding fits with the presumed different role of fathers and mothers in the development of child anxiety ([Bögels & Perotti, 2011](#)). That is, assuming that fathers are specialized in opening children to the outside world ([Bögels & Perotti, 2011](#)), anxiety-enhancing parenting behavior of fathers is expected to be a stronger signal to their child that the world is a dangerous place than that of mothers, thereby increasing children's anxiety.

A second aim of this meta-analysis was to identify moderators that affected the strength of the association between parenting behavior and child anxiety. Several variables were found to moderate the relation between parenting and early child anxiety. We discuss them in turn.

First, number of observational tasks that were used to measure child anxiety was a moderator. Higher effect sizes were found for studies that included fewer observational tasks. One explanation may be that by using a larger number of tasks, extreme anxious reactions of a child to one task are attenuated by less extreme reactions of this child to other tasks. Relatedly, some tasks may be more relevant than others for the measurement of child anxiety (e.g., [Buss \(2011\)](#) found that some tasks are more useful for identifying children at risk for anxiety). Another explanation concerns publication bias. That is, as significant findings have a higher chance of getting published than non-significant results ([Song et al., 2010](#)), authors may search their data for significant associations ('fishing-for-significance') between parenting and child anxiety and only include the tasks that found such an association. As a larger number of observational tasks should lead to a more reliable estimation of parenting behaviors, the finding that more tasks produce a lower association suggests that the true relation between parenting and child anxiety may be lower than assumed.

The second moderator was measurement method of parenting behavior, with the use of multiple measures to assess parenting resulting in the largest effect sizes, and lower effects for studies using questionnaires or observations. By the use of multiple measures, also known as "between methods triangulation" ([Mathison, 1988](#)), researchers compensate for the flaws of one method with the strengths of another method ([Denzin, 1978](#)). For example, questionnaires provide a subjective view on parenting, whereas observations more objectively assess parenting. Thus, the use of multiple measures may lead to a more valid and more complete estimation of parenting behavior. Future research should therefore include both observations and questionnaires to obtain a broad picture of parenting behavior.

The third moderator was measurement method of child anxiety. As expected, studies using questionnaires to measure child anxiety found that more anxiety-enhancing parenting was associated with more child anxiety. However, studies using observations to assess child anxiety found that more anxiety-enhancing parenting was associated with less child anxiety. The findings for questionnaire studies may reflect a "real" association between parenting and child anxiety, but may also result from rater bias, reflecting parents' negativity bias which may also influence their perceived and actual parenting. That is, if parents perceive their child as more anxious, they may show or report more negative parenting behavior. In contrast, when child anxiety is observed, child's actual anxiety may not be related to parents' perceptions of their child's anxiety, and thus also not connected to their parenting. The finding that observational and questionnaire measures of child

anxiety relate oppositely to parenting may stem from the fact that different measures of child anxiety (i.e., observations vs. self- or other-reports) do not strongly correlate with each other. Several studies have indeed found that correspondence between laboratory observations and parental reports of children's anxiety is only modest to moderate (e.g., Gartstein & Marmion, 2008; Majdandžić, Van den Boom, & Heesbeen, 2008; Mian, Carter, Pine, Wakschlag, & Briggs-Gowan, 2015). Therefore, it seems that observational and questionnaire reports of child anxiety measure unique aspects of the same construct and that these different aspects differently relate to parenting. Another explanation for the counterintuitive finding that only the less objective child anxiety measurement (i.e., questionnaires) produced the expected direction of association between child anxiety and parenting, is that questionnaire assessment of anxiety measures child anxiety over a series of situations and over time, and therefore may be closer to the "true" child anxiety. Relatedly, observation of anxiety is a state measure while questionnaire measures of anxiety can be viewed as trait measures, and parenting may affect trait anxiety more than state anxiety. The finding that observational and questionnaire methods to assess child anxiety appeared to result in opposite findings, has important implications for future research. As questionnaires and observations seem to measure unique aspects of the same construct, it is important to use multiple methods (i.e., both questionnaires and observations) when assessing children's anxiety and to investigate these unique aspects of child anxiety in more depth.

The fourth moderator was study design, with highest effect sizes for studies that used a combination of concurrent and prospective associations to measure the parenting-child anxiety relationship. The finding that studies using concurrent designs resulted in lower effects sizes compared to studies that used both concurrent and prospective associations suggests that parenting behavior does have its effects over time. However, there were only three studies that used a complete prospective design and those studies found very small associations between parenting and child anxiety. Moreover, no studies used an experimental design (the one experimental study by Thirlwall and Creswell (2010) only measured maternal parenting behavior). More longitudinal and experimental studies are clearly needed.

Several sample and methodological characteristics did not moderate the association between parenting and child anxiety. First, gender and age of the child did not influence the strength of the association, possibly because our meta-analysis was restricted to young children (0–5). In addition, diagnostic status of the parent and length of time between the measures of parenting and of child anxiety did not appear as significant moderators, possibly because of the lack of studies including parents with diagnosis and studies using prospective designs.

It should be noted that the examined parenting behaviors played only a small role in explaining anxiety in young children. The two previous meta-analyses found larger effect sizes for the association between parenting and child anxiety ($r = .21$ for McLeod et al., 2007; $r = .28$ for Van der Bruggen et al., 2008), but these meta-analyses included children aged 0–18, whereas our meta-analysis only included children aged 0–5. We recalculated effect sizes for the associations between parenting behavior and child anxiety for both of those meta-analyses, using only the studies that included children below the age of 6 years. This resulted in lower effect sizes: $r = .15$ ($k = 9$, $n = 682$) for McLeod et al. (2007) and $r = .18$ ($k = 6$, $n = 422$) for Van der Bruggen et al. (2008), supporting our finding that parenting behavior plays a small role in anxiety in young children. The difference in inclusion criteria between our and both other meta-analyses (e.g., McLeod et al. (2007) included parental rejection and Van der Bruggen et al. (2008) included children's internalizing problems), could also partially explain a difference in findings.

There are several other explanations for the small associations between the examined parenting behaviors and child anxiety. First, our meta-analysis included almost no studies with clinical anxiety-disordered parents and/or children. Parenting may play a larger role in

anxiety-disordered samples, as it has been shown that the estimated heridity of anxiety disorders is smaller (around .30) than the estimated heridity of anxious predispositions (around .50; Kendler, Neale, Kessler, Heath, & Eaves, 1992), leaving more room for environmental factors, such as parenting, influencing children's anxiety. Second, parenting may become more important over time. That is, the effects of parenting may accumulate as children grow older, as parents and children mutually influence each other over the course of time (e.g., Maccoby, 1992). A related explanation is that as anxiety problems increase with age (Kessler et al., 2005) and the associations between parenting and child anxiety are bidirectional (Murray et al., 2009), older anxious children may more easily elicit negative parenting (i.e., more overinvolvement, overprotection and overcontrol, and less challenging parenting behavior and autonomy granting) than younger children. Third, the measurement level of parenting may affect effect sizes. Just as McLeod et al. (2007) found stronger associations with child anxiety for subdimensions (such as autonomy-granting) than for broader dimensions of parenting behavior (such as control), it may be that even smaller parenting dimensions may be more strongly associated with child anxiety. For example, overprotection can be divided into caution and shielding, whereas challenging parenting behavior can be divided into teasing, rough-and-tumble-play, encouragement of risk taking, social daring, and competition (Majdandžić et al., 2015). Future research could therefore examine the associations between child anxiety and smaller dimensions of parenting. Relatedly, it may be that other parenting behaviors that were not investigated in this meta-analysis are more important for the development of anxiety, such as emotional flexibility (Van der Giessen et al., 2015), or mindful parenting (Bögels, Lehtonen, & Restifo, 2010). The last explanation is that parenting is not very important for child anxiety, and may be more influential for other child emotions and problems such as depression. In line, McLeod, Weisz, & Wood (2007) found in their meta-analysis that parenting accounted for 8% of the variance in child depression, compared to only 4% of the variance that was found in their other meta-analysis on childhood anxiety (McLeod et al., 2007).

The small associations between parenting and early childhood anxiety raise the question whether parenting is at all important in the etiology and maintenance of child anxiety, and whether researchers should continue to invest in research on parenting as it relates to child anxiety. Before concluding that parenting does not matter for young children's anxiety, more longitudinal research should take place, because effects of parenting might become apparent over time. In addition, it may be useful to focus on specific groups of children that may be more susceptible to effects of parenting than other groups of children. That is, parenting seems to affect emotionally reactive children to a larger extent than other children (Belsky & Pluess, 2009; Pluess & Belsky, 2010). The small role of parenting in early childhood anxiety also has clinical implications. That is, we may cast doubt on attempts to alter parents' parenting behavior in prevention and treatment programs (e.g., teaching them not to behave overprotective) in order to diminish young children's anxiety. On the positive side, negative parenting behaviors (i.e., more overinvolvement, overprotection and overcontrol, and less challenging parenting behavior and autonomy granting) do not immediately have deteriorative effects on children's anxiety.

Although this meta-analysis is the first systematic attempt to study differential associations between maternal and paternal parenting behaviors and early childhood anxiety, the results should be interpreted with the following limitations taken into account. First, most studies made use of non-anxious parents from community samples of Caucasian origin from middle to high socioeconomic backgrounds. This clearly limits the generalizability of our findings to other groups of parents and children. It is therefore recommended that future studies assess these relations in parents and children from more diverse backgrounds. Second, our discussion of the theory on the different parenting behaviors of mothers and fathers mostly focused on two-parent families with a father and a mother present, although in current Western societies a

significant portion of children grow up in single parent families or with parents of the same gender. It is therefore important that future research assesses the associations in single parent and same gender couple households. Third, causality cannot be inferred from our results, as our meta-analysis did not include many longitudinal studies and only one experimental study. Thus, the associations between parenting behavior and childhood should be interpreted bidirectionally (e.g., overcontrolling parenting may evoke child anxiety, but child anxiety may also elicit overcontrolling parenting; Hudson, Doyle, & Gar, 2009). The field would clearly benefit from studies using designs that allow for causal conclusions (e.g., Thirlwall and Creswell (2010)). Fourth, all studies included in this meta-analysis that assessed both parents' parenting behavior focused on dyadic interactions between a child and a parent, without the other parent being present. Although these studies are an important first step in studying the differential associations between fathers' and mothers' parenting and childhood anxiety, they only give us insight in parenting in dyadic interactions. However, mothers and fathers form a dynamic system in raising their children (e.g., Bögels & Perotti, 2011; Majdandžić, De Vente, Feinberg, Aktar, & Bögels, 2012), and it is therefore important to additionally examine the role of parenting behavior in child anxiety in triadic interactions.

To conclude, this comprehensive quantitative meta-analysis demonstrates that fathers' parenting is at least as important as maternal parenting (Bögels & Phares, 2008). Our results show that although the examined parenting behaviors play only a small role in early childhood anxiety, some maternal and paternal parenting dimensions are even differentially associated with child anxiety; that is, fathers' challenging parenting is associated with less child anxiety, whereas mothers'

challenging parenting is not associated with child anxiety. Research is needed to determine whether challenging fathering can prevent the development of child anxiety.

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Contributors

Authors Eline Möller, Mirjana Majdandžić, and Susan Bögels designed the study and wrote the coding protocol. Author Eline Möller conducted literature searches. Author Eline Möller and Milica Nikolic coded the studies and conducted the statistical analysis. Author Eline Möller wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

Conflict of interest

All authors declare that they have no conflicts of interest.

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Appendix A

Table A.1

Characteristics of the studies included in the meta-analyses.

Study	Meta-analysis	N	% boys	Child age (years)	Continent	P method	Observation P	CA method	Number CA tasks	Observation CA	CA disorder	PA disorder	Design
Blair et al. (2008)	M	1093	51	.63	NA	O	H	Q	–	–	N	N	C
Chen et al. (1998)	M	118	54	2.05	O	Q	–	O	4	L	N	N	C
Coplan, Prakash, O'Neil, and Armer (2004)	M	125	54	4.36	NA	Q	–	Q	–	–	N	N	C
Coplan, Arbeau, and Armer (2008)	M	160	52	5.34	NA	Q	–	MM	1	O	N	N	MIX
Crockenberg and Leerkes (2006)	M	64	59	.50	NA	O	L	Q	–	–	N	N	P
De Vente, Majdandžić, Colonesi, and Bögels (2011)	M	103	46	.99	EU	Q	–	Q	–	–	N	MIX	C
	F	98	46	.99	EU	Q	–	Q	–	–	N	MIX	C
Dougherty et al. (2013)	M	490	54	3.62	NA	O	L	MM	3	L	MIX	MIX	C
	F	34	54	3.62	NA	O	L	MM	3	L	MIX	MIX	C
Edwards, Rapee, & Kennedy (2010)	M	632	50	3.95	AUS	Q	–	Q	–	–	N	N	MIX
	F	249	50	3.95	AUS	Q	–	Q	–	–	N	N	MIX
Eggum et al. (2009)	M	179	55	1.48	NA	O	L	MM	2	L	N	N	MIX
Feng, Shaw, and Moilanen (2011)	M	224	100	1.50	NA	O	L	Q	–	–	N	N	C
Ginsburg, Grover, and Jalongo (2004)	M	50	48	5.86	NA	O	L	Q	–	–	N	MIX	P
Hastings et al. (2008)	M	133	46	3.50	NA	MM	H	MM	2	MS	N	N	C
	F	105	46	3.50	NA	MM	H	MM	2	MS	N	N	C
Hudson, Dodd, and Bovopoulos (2011)	M	201	50	4.00	AUS	MM	L	MM	4	L	MIX	MIX	C
Karremans, De Haas, Van Tuijl, Van Aken, and Deković (2010)	M	72	54	3.00	EU	O	H	Q	–	–	N	N	C
	F	72	54	3.00	EU	O	H	Q	–	–	N	N	C
Kertes et al. (2009)	M	231	45	3.97	NA	O	L	MM	2	L	N	N	C
	F	30	45	3.97	NA	O	L	MM	2	L	N	N	C
Kiel and Buss (2009, 2011)	M	93	55	2.06	NA	MM	L	MM	1	L	N	N	MIX
Majdandžić et al. (2014)	M	94	56	3.44	EU	O	L	MM	1	L	N	N	MIX
	F	94	56	3.44	EU	O	L	MM	1	L	N	N	MIX
Mills (1998)	M	107	0	3.81	NA	Q	–	Q	–	–	N	N	C
Möller et al. (2015)	M	71	49	.99	EU	Q	–	Q	–	–	N	N	C
	F	67	49	.99	EU	Q	–	Q	–	–	N	N	C
Murray, Cooper, Creswell, Schofield, and Sack (2007); Murray et al. (2012)	M	187	45	0.20	EU	O	H	MM	4	MS	N	MIX	MIX
Park, Belsky, Putnam, and Crnic (1997)	M	125	100	1.25	NA	O	H	O	21	L	N	N	P
	F	125	100	1.25	NA	O	H	O	21	L	N	N	P

(continued on next page)

Table A.1 (continued)

Study	Meta-analysis	N	% boys	Child age (years)	Continent	P method	Observation P	CA method	Number CA tasks	Observation CA	CA disorder	PA disorder	Design
Rubin, Nelson, Hastings and Asendorpf (1999), Rubin, Burgess and Hastings (2002), Chen et al. (1998) (Canadian sample)	M	91	50	2.08	NA	MM	L	O	6	L	N	N	MIX
Thirlwall and Creswell (2010)	M	23	39	4.50	EU	MM	H	MM	1	H	N	N	C
Van Bakel and Riksen-Walraven (2002)	M	128	52	1.26	EU	O	MS	Q	–	–	N	N	C
Van der Mark, Bakermans-Kranenburg, and Van Ijzendoorn (2002)	M	125	0	1.33	EU	O	H	O	8	L	N	N	MIX
Van der Sluis, Van der Bruggen, Brechman-Toussaint, Thissen, and Bögels (2012)	M	25	46	5.58	EU	Q	–	Q	–	–	Y	N	C
Vreeke, Muris, Mayer, Huijding, and Rapee (2013)	F	19	46	5.58	EU	Q	–	Q	–	–	Y	N	C
	M	136	54	4.54	EU	Q	–	MM	–	–	MIX	N	MIX
Wichstrøm, Belsky, and Berg-Nielsen (2013)	F	9	54	4.54	EU	Q	–	MM	–	–	MIX	N	MIX
	M	648	49	4.42	EU	O	L	MM	–	–	MIX	N	C
	F	117	49	4.42	EU	O	L	MM	–	–	MIX	N	C

Note. For meta-analysis: M = mother, F = father. N = number of mothers or fathers included in the effect size estimate. P method = measurement method of parenting, O = observation, Q = questionnaire, MM = multiple measures. Continent = continent in which the study was conducted, AUS = Australia, EU = Europe, NA = North America, O = other continents. Observation P = observation setting of parenting, H = home, L = lab, M = multiple settings. CA method = measurement method of child anxiety, O = observation, Q = questionnaire, MM = multiple measures. Number of CA tasks = Number of observational tasks to measure child anxiety. Observation CA = observation setting of child anxiety, H = home, L = lab, O = other, MS = multiple settings. NS = non-social, S = social, MIX = mixed. CA disorder = presence of anxiety disorders in the children, N = no, Y = yes, MIX = mixed. PA disorder = presence of anxiety disorders in the parents, N = no, MIX = mixed. Design = study design, C = concurrent, P = prospective, MIX = mixed.

Table A.2

Effect sizes of the included studies.

Study	Meta-analysis	N	Overall ES	OI ES	OC ES	OP ES	AG ES	CPB ES
Blair et al. (2008)	M	1093	.15	–	.15	–	–	–
Chen et al. (1998) (Chinese sample)	M	118	–.08	–	–	.03	.18	–
Coplan et al. (2004)	M	125	.21	–	–	.21	–	–
Coplan et al. (2008)	M	160	.05	–	–	.05	–	–
Crockenberg and Leerkes (2006)	M	64	.07	–	.07	–	–	–
De Vente et al. (2011)	M	103	.09	.09	–	–	–	–
	F	98	.08	.08	–	–	–	–
Dougherty et al. (2013)	M	490	.05	–	.05	–	–	–
	F	34	–.31	–	–.31	–	–	–
Edwards, Rapee, & Kennedy (2010)	M	632	.17	–	–	.17	–	–
	F	248	.27	–	–	.27	–	–
Eggum et al. (2009)	M	179	.00	–	.00	–	–	–
Feng et al. (2011)	M	224	.04	–	.04	–	–	–
Ginsburg et al. (2004)	M	50	.01	–	.06	–	.05	–
Hastings et al. (2008)	M	133	.10	.10	–	–	–	–
	F	105	.02	.02	–	–	–	–
Hudson et al. (2011)	M	201	.21	.21	–	–	–	–
Karreman et al. (2010)	M	72	.11	–	.11	–	–	–
	F	72	.10	–	.10	–	–	–
Kertes et al. (2009)	M	231	–.05	–.05	–	–	–	–
	F	30	–.16	–.16	–	–	–	–
Kiel and Buss (2009, 2011)	M	93	.25	–	.14	.32	–	–
Majdandžić et al. (2014)	M	94	.02	–	.01	–	–	.06
	F	94	.08	–	.00	–	–	–.16
Mills (1998)	M	107	.23	–	–	.23	–	–
Möller et al. (2015)	M	71	–.00	.07	–	–	–	.07
	F	67	.31	.39	–	–	–	–.23
Murray et al. (2007, 2012)	M	187	.05	–	.05	–.15	–.16	–
Park et al. (1997)	M	125	–.23	–	–.23	–	–	–
	F	125	–.21	–	–.22	–	–	–
Rubin et al. (1999, 2002), Chen et al. (1998) (Canadian sample)	M	91	.08	–	.10	.22	.12	–
Thirlwall and Creswell (2010)	M	23	.16	–	.17	.13	–	–
Van Bakel and Riksen-Walraven (2002)	M	128	–.22	–	–	–	.22	–
Van der Mark et al. (2002)	M	125	.03	–	.03	–	–	–
Van der Sluis et al. (2012)	M	25	.18	–	–	.18	–	–
	F	19	.05	–	–	.05	–	–
Vreeke et al. (2013)	M	136	.04	–	–	.04	–	–
	F	9	–.24	–	–	–.24	–	–
Wichstrøm et al. (2013)	M	648	–.03	–	–.03	–	–	–
	F	117	–.01	–	–.01	–	–	–

Note. For meta-analysis, M = mothers, F = fathers. N = number of mothers or fathers included in the effect size estimate. Overall ES = the effect size for the overall association between parenting and child anxiety. OI ES = effect size for overinvolvement. OC ES = effect size for overcontrol. OP ES = effect size for overprotection AG ES = effect size for autonomy granting. CPB ES = effect size for challenging parenting behavior.

Table A.3

Anxiety constructs measured in the included studies.

Study	Meta-analysis	BI	FT	SN	AS	AD
Blair et al. (2008)	M		X			
Chen et al. (1998)	M	X				
Coplan et al. (2004)	M			X		
Coplan et al. (2008)	M			X	X	
Crockenberg and Leerkes (2006)	M		X			
De Vente et al. (2011)	M			X		
	F			X		
Dougherty et al. (2013)	M	X				X
	F	X				X
Edwards, Rapee, & Kennedy (2010)	M	X			X	
	F	X			X	
Eggum et al. (2009)	M	X	X	X		
Feng et al. (2011)	M			X		
Ginsburg et al. (2004)	M				X	
Hastings et al. (2008)	M		X	X		
	F		X	X		
Hudson et al. (2011)	M	X			X	
Karremans et al. (2010)	M		X			X
	F		X			
Kertes et al. (2009)	M	X		X		
	F	X		X		
Kiel and Buss (2009, 2011)	M	X		X	X	
Majdandžić et al. (2014)	M	X		X		
	F	X		X		
Mills (1998)	M		X			
Möller et al. (2015)	M		X			
	F		X			
Murray et al. (2007, 2012)	M		X		X	
Park et al. (1997)	M		X			
	F		X			
Rubin et al. (1999, 2002), Chen et al. (1998) (Canadian sample)	M	X		X		
Thirlwall and Creswell (2010)	M				X	
Van Bakel and Riksen-Walraven (2002)	M			X		
Van der Mark et al. (2002)	M	X				
Van der Sluis et al. (2012)	M	X			X	
	F	X			X	
Vreeke et al. (2013)	M	X			X	
	F	X			X	
Wichstrøm et al. (2013)	M		X			X
	F		X			X

Note. For meta-analysis: M = mother, F = father. BI = behavioral inhibition. FT = fearful temperament. SN = shyness. AS = anxiety symptoms. AD = anxiety disorders.

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