Do fathers matter? The relative influence of fathers versus mothers on the development of infant and child anxiety
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CHAPTER 1

General introduction
Anxiety disorders in children

Anxiety disorders have been shown to be among the most common psychological disorders in childhood (Costello, Egger, & Angold, 2005; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Merikangas, Nakamura, & Kessler, 2009). The life time prevalence of childhood anxiety disorders is around 15-20% in community samples (Beesdo, Knappe, & Pine, 2009). Childhood anxiety disorders are associated with impairments in the social, familial, and academic domain (Essau, Conradt, & Petermann, 2000; Ezpeleta, Keeler, Erkanli, Costello, & Angold, 2001; Kendall, Safford, Flannery-Schroeder, & Webb, 2004; Strauss, Frame, & Forehand, 1987). In addition, anxiety disorders are persistent if left untreated, and are associated with the later development of other disorders, such as other anxiety disorders, depression, and externalizing disorders (Bittner et al., 2007; Cole, Peeke, Martin, Truglio, & Seroczynski, 1998). Moreover, the direct and indirect costs of families with a clinically anxious child place a burden on society (Bodden, Dirksen, & Bögels, 2008). For all these reasons, it is imperative to improve knowledge on the factors that are involved in the development, maintenance, and amelioration of anxiety (disorders) in children.

Role of parents in the development of child anxiety

Anxiety disorders have significant familial aggregation (Hettema, Neale, & Kendler, 2001). Strong associations have been found between anxiety disorders of parents and anxiety disorders in their children (Last, Hersen, Kazdin, Francis, & Grubb, 1987; Last, Hersen, Kazdin, Orvaschel, & Perrin, 1991; Lieb et al., 2000; Turner, Beidel, & Costello, 1987). Heritability plays only a modest role in explaining individual differences in levels of anxiety (Gregory & Eley, 2007), with heritability estimates around 30-40% (Hettema et al., 2001). Environmental factors seem to be more pronounced in the transmission of anxiety (disorders) from parents to children (e.g., Bögels & Brechman-Toussaint, 2006) and parental factors seem to play an important role in the development and maintenance of child anxiety (e.g., Murray, Creswell, & Cooper, 2009; Rapee, Schniering, & Hudson, 2009). Two of these parental factors are studied in this dissertation: social referencing and parenting behavior. As parents especially exert a powerful influence on the development of their children in early childhood (Fox, Henderson, Marshall, Nichols, & Ghera, 2005), and as it is known that anxiety is common in the preschool years (Egger & Angold, 2006) and has a lifelong course (Bittner et al., 2007), identifying parental risk factors early in children's development is important for prevention and intervention efforts.
Therefore, in this dissertation the focus lies mainly on the role of social referencing and parenting behavior in early childhood anxiety.

**Social referencing**

Social referencing is a communication process in which children acquire information from experienced others, mostly their parents, to guide their interpretation and behavior when confronted with novel or ambiguous situations (Feinman & Lewis, 1983). This capacity emerges around the age of 10 months (Feinman, Roberts, Hsieh, Sawyer, & Swanson, 1992). There is strong empirical evidence that anxious social referencing signals by parents lead to anxiety in children (e.g., Aktar, Majdandžić, De Vente, & Bögels, 2013b, 2014; De Rosnay, Cooper, Tsigaras, & Murray, 2006; Gerull & Rapee, 2002; Murray et al., 2008). To study social referencing, researchers expose young children to unfamiliar persons or unfamiliar toys. The most well-known SR paradigm is the visual cliff, a glass-covered surface providing invisible support over an apparent ‘drop’ (Sorce, Emde, Campos, & Klinnert, 1985; Walk, 1966). In older children, social referencing can also be studied using vignettes, i.e., short stories in which the child is confronted with an ambiguous situation and his/her parent reacts in either an anxious or confident way (Bögels, Stevens, & Majdandžić, 2011). These two paradigms (vignettes in Chapter 3 and the visual cliff in Chapter 4) are used in this dissertation to investigate the association between parental social referencing signals and child anxiety.

**Parenting behavior**

Theoretical models on the etiology of child anxiety disorders propose that parenting characterized by overcontrol/overprotection (also referred to as overinvolvement) is associated with more anxiety in children (e.g., Chorpita & Barlow, 1998, Hudson & Rapee, 2004; Rapee, 1997). An overinvolved parent excessively regulates a child’s activities, discourages independence of the child, interferes in how the child should behave and feel, and is overly concerned with the health and safety of the child (e.g., Barber, 1996; Chorpita & Barlow, 1998; Majdandžić, De Vente, & Bögels, 2014a). As the parent limits the child’s exposure to new objects, people, or situations, the parent communicates to the child that the world is an unsafe place (Rubin, Coplan, & Bowker, 2009). Moreover, as children of overinvolved parents are limited in acting independently, these children may not develop coping skills to deal with challenges, thereby increasing their anxiety (Wood, 2006). Oppositely, it is hypothesized that parental granting of autonomy decreases a child’s anxiety, as the child is encouraged to act and think independently, which may enhance the child’s perceived control over events (e.g., Mattanah, 2001, Morris et al., 2001). Another parenting behavior that is assumed to diminish children’s anxiety is
challenging parenting behavior. This is a newly developed concept that refers to behaviors in which the parent playfully encourages the child to exhibit risky behavior or to go outside his/her comfort zone, thereby keeping an eye on the safety and security of the child (Majdandžić et al., 2014a; Majdandžić, Möller, De Vente, Bögels, & Van den Boom, 2014b). Theoretical models have proposed that challenging parenting behavior may form a buffer against the development of child anxiety as this behavior pushes the child’s limits (Bögels & Perotti, 2011; Bögels & Phares, 2008). Two previous meta-analyses (McLeod, Wood, & Weisz, 2007; Van der Bruggen, Stams, & Bögels, 2008) have investigated the relationship between parenting behavior and child anxiety, and found a small, but significant, association between parenting and anxiety in children aged 0-18 years. However, while parents especially in early childhood exert a powerful influence on the development of their children (Fox et al., 2005), the association between parenting behavior and child anxiety in early childhood is still an understudied area of research. For that reason, this dissertation includes a study assessing the relationship between parenting behavior and anxiety in infants (Chapter 5), and a meta-analysis examining this association in parents and their children between 0 and 6 years (Chapter 6). Moreover, in this thesis attention is given to the presumed protective role of challenging parenting behavior in young children’s anxiety (Chapter 5 and 6).

Different role of fathers and mothers in the development of child anxiety

Fathers have been largely ignored in research on the role of parental influences on child anxiety. However, recent theories and reviews suggest that fathers and mothers may differentially affect the development and overcoming of child anxiety (Bögels & Perotti, 2011; Bögels & Phares, 2008). Bögels and Perotti (2011) state that during the course of human evolution, males and females have developed different specializations: “men have specialized in confronting the external environment, managing the encounters with potentially dangerous animals and unfamiliar humans, and social competition when resources became scarce, whereas women have specialized in ‘internal’ care tasks, such as feeding and soothing” (p. 173). They argue that these different roles are reflected in mothers’ and fathers’ parenting behavior, with mothers having a caring and nurturing role, and with fathers challenging their children and stimulating risk taking. Moreover, Bögels and Perotti (2011) hypothesize that as mothers and fathers have different evolutionary based roles, they will have a comparative advantage over their partner in their own domain of expertise. With respect to social referencing,
the authors hypothesize that if the parent who is specialized in a certain situation displays anxiety in that situation, children will interpret it as a more strong negative signal, and will become more anxious than if the other non-specialized parent would express anxiety in that situation. Regarding parenting behavior, Bögels and Perotti (2011) expect that parenting behavior will differentially affect children’s anxiety according to whether the mother or the father is specialized in that behavior. Thus, as encouraging, challenging, and risk taking behavior is fathers’ expertise, and mothers are specialized more in caring, nurturing, and protective behavior, challenging parenting behavior of fathers would decrease children’s anxiety to a larger extent than that of mothers.

The theory of Bögels and Perotti (2011) has not yet been empirically tested. The main goal of this dissertation was therefore to investigate the relative impact of fathers’ versus mothers’ parenting behavior and anxious social referencing signals on children’s anxiety. Chapter 2 of this dissertation presents an elaborate literature review providing evolutionary evidence for the different roles of mothers and fathers in the development and maintenance of child anxiety. Moreover, a series of studies was conducted to empirically test the model of Bögels and Perotti (2011). In Chapter 3 and 4, it is examined whether paternal and maternal social referencing signals have a different effect on children’s anxiety and whether evolutionary expertise of parents plays a role herein. Chapter 5 and 6 test whether typical maternal and paternal parenting behavior of mothers’ and fathers are differentially associated with child anxiety.

Parental anxiety

It has been suggested that high levels of parental anxiety may lead to anxiety-enhancing behavior in parents (e.g., Chorpita & Barlow, 1998; Ginsburg & Schlossberg, 2002). That is, anxious parents are presumed to display more anxiety-provoking parenting behaviors. In addition, as anxious parents report to show anxious behavior more frequently (Muris, Steerneman, Merckelbach, & Meesters, 1996), it is assumed that children of anxious parents will be more often exposed to anxious social referencing signals than children of non-anxious parents. In this way, parents that suffer from anxiety disorders may enhance children’s fear more easily than non-anxious parents. However, the evidence for an association between parents’ own anxiety levels and anxiety-enhancing parenting, such as certain parenting behaviors and anxious social referencing, is inconsistent. With respect to parenting behavior, although some studies found significant
associations between parental anxiety and more negative parenting (e.g., Hudson & Rapee, 2002; Krohne & Hock, 2001; Moore, Whaley, & Sigman, 2004), the meta-analysis by Van der Bruggen et al. (2008) indicated a non-significant relation between anxiety in parents and parental overcontrol, a parenting dimension that is assumed to be anxiety enhancing ($d = .08$). Concerning social referencing, the evidence for an association between parental anxiety disorders and the display of anxious social referencing signals is also mixed. For example, Murray et al. (2008) found that mothers with social anxiety disorder expressed more anxiety during a social referencing task than mothers without social anxiety, whereas Aktar et al. (2013b) only found a significant association between parental anxiety disorders and increased expressed anxiety for parents with social anxiety disorder, and not for parents with other anxiety disorders. Therefore, in this dissertation, the level and type of parental anxious symptoms is taken into account in Chapter 4 and 5 when examining the association between parental influences and child anxiety.

Bidirectional influences and differential susceptibility

Parent-child interactions have a transactional nature, and children actively contribute to the interaction with their parents (Chess & Thomas, 1984). Thus, negative (e.g., overcontrolling, overprotective) parenting behavior and anxious parental social referencing signals may not only cause child anxiety, child anxiety may also evoke these behaviors in parents. For example, a study by Rubin, Nelson, Hastings, and Asendorpf (1999) demonstrated that parental perceptions of shyness in two-year-old children predicted more parental control at age four, but parental control at age two did not predict child shyness at the age of four.

Anxious children may also be more susceptible, for better and worse, to parental influences than non-anxious children (Belsky & Pluess, 2009). According to this differential susceptibility theory (Belsky & Pluess, 2009), anxious children may not only be more vulnerable to negative rearing environments, they may also profit more from adaptive rearing. There is some evidence confirming this theory (e.g., Feldman, Greenbaum, & Yirmiya, 1999; Klein Velderman, Bakermans-Kranenburg, Juffer, & Van IJzendoorn, 2006; Van den Boom, 1994). In Chapter 3 and 4 of this dissertation, it is therefore examined whether anxious children are more susceptible to both negative and positive parental behavior.
Measurement of child anxiety for DSM-5

This dissertation aims to better understand the development of child anxiety. To assess children’s anxiety symptoms, questionnaires are widely used by researchers and therapists. Over the last two decades several reliable questionnaires have been developed that assess symptoms of all DSM-IV-TR (American Psychiatric Association [APA], 2000) defined anxiety disorders in children, such as the Screen for Child Anxiety Related Emotional Disorders (SCARED; Bodden, Bögels, & Muris, 2009; Bögels & Van Melick, 2004). The arrival of the DSM-5 in 2013 (APA, 2013) did not only bring along changes concerning the content of the different anxiety disorders, but also changed the way in which anxiety disorders were conceptualized. That is, in DSM-5 the traditional categorical approach is supplemented by the addition of a dimensional rating of severity. However, the existing questionnaires that are used to screen for child anxiety do not include such a dimensional component. Therefore, in this dissertation, a study is included that evaluated the psychometric properties and utility of a set of brief dimensional anxiety scales for children (Chapter 7). These Dimensional Anxiety Scales can benefit the clinical assessment of anxiety disorders in children as they are much more tied to the diagnostic criteria than the currently available questionnaires to measure children’s anxiety problems. Moreover, as it is common practice to gather information from multiple informants to identify child anxiety symptoms (Hudziak, Achenbach, Althoff, & Pine, 2007; Jensen et al., 1999; Kendall & Flannery-Schroeder, 1998), a parent version of these dimensional scales was also developed and parent-child and father-mother agreement was investigated.

Outline of this thesis

The main goal of this thesis was to examine the role of fathers versus mothers in the development of anxiety in children, viewed from an evolutionary perspective. Different types of studies (literature review, meta-analysis, quasi-experimental design, experimental design, and cross-sectional design) and measures (questionnaires, scripts, observations) were used to assess the associations between child anxiety and maternal and paternal social referencing and parenting behavior in different age groups: infants between 10-15 months (Chapter 4 and 5), children aged 0-5 years (Chapter 6), and children aged 8-13 years (Chapter 3). In addition, one study (Chapter 7) describes the development of a new questionnaire, developed for the DSM-5, to assess children’s anxiety by both child self-report and father and mother report. Figure 1 depicts the main themes that were investigated in this dissertation.
Chapter 2 presents a literature review on evolutionary based differences in paternal and maternal parenting behavior in Western societies which is applied to the intergenerational transmission of anxiety. The aim of this review was to demonstrate that an evolutionary perspective on parenting and differences between fathers and mothers can be helpful in explaining their different role in the development of child anxiety.

Chapter 3 describes two experimental studies testing the relative influence of paternal and maternal social referencing signals on child anxiety. Children between the ages of 8 and 13 years were presented with scripts of novel and ambiguous, and potentially dangerous, situations (non-social situations in Experiment 1, $n = 129$; social situations in Experiment 2, $n = 124$) in which either the mother or the father reacted anxiously or confidently. Children had to indicate how anxious they would feel in these situations.

Chapter 4 reports on a quasi-experimental observational study investigating whether social referencing processes between fathers and their infants ($n = 41$) differ from those between mothers and their infants ($n = 40$). This was the first study known to investigate the differential associations between paternal and maternal anxious behavior and infant anxious using a visual cliff paradigm.
In Chapter 5, a questionnaire study on differential associations between parental anxiety, parenting behavior, and infant anxiety is described, using the same sample of 81 infants (10-15 months) and their parents. The goal of this study was twofold: first, we investigated whether symptoms of different parental anxiety disorders are differentially associated with parenting behavior towards infants, and second, we examined whether maternal and paternal parenting behaviors are differentially associated with infant anxiety. In this study, attention was given to the role of challenging parenting behavior in anxiety in infants.

In Chapter 6, a meta-analysis on the differential effects of maternal and paternal parenting behavior on anxiety in young children is described. Two meta-analyses were conducted, one for mothers ($k = 28$, $n = 5,728$), and one for fathers ($k = 12$, $n = 1,019$). Five types of parenting behavior that have been associated with child anxiety were studied: overcontrol, overprotection, overinvolvement, autonomy granting, and challenging parenting behavior.

Chapter 7 describes a validation study of a newly developed questionnaire for the DSM-5 to measure children’s anxiety symptoms, the Dimensional Anxiety Scales. Different from other questionnaires measuring child anxiety, the Dimensional Anxiety Scales are consistent in content and structure and assess core features of fear and anxiety that are shared across the anxiety disorders. To investigate the psychometric properties of this questionnaire, a community sample of children aged 8-13 years ($n = 382$), and their mothers ($n = 285$) and fathers ($n = 255$) completed the Dimensional Anxiety Scales and the Screen for Child Anxiety Related Emotional Disorders (SCARED-71), a validated questionnaire to measure child anxiety symptoms.

Chapter 8 integrates the findings of Chapter 2, 3, 4, 5, 6, and 7. Insights from the different studies are combined to progress towards a better understanding of the relative influence of fathers and mothers on the development of infant and child anxiety. Moreover, clinical implications and recommendations for further research are presented.