Do fathers matter? The relative influence of fathers versus mothers on the development of infant and child anxiety
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CHAPTER 8

General discussion
The current dissertation aimed to investigate the role of fathers versus mothers in the development of child anxiety, viewed from an evolutionary perspective. This thesis focused on two parental factors that have been associated with anxiety in children: parenting behavior and social referencing. Parental anxiety was also taken into account when examining the associations between these parental factors and child anxiety. In addition, a validation study of a newly developed questionnaire for the DSM-5 was conducted to measure children’s anxiety symptoms in a dimensional way. In this final chapter, an overview of the key findings is presented, followed by an integration of the research findings according to the main themes of this dissertation. Moreover, limitations and recommendations for further research are formulated. The chapter ends with a refinement of the model that was presented in the General introduction of this thesis, the clinical implications of the research findings, and the main conclusions of this dissertation.

Overview of research findings

Chapter 2
In the review on the evolutionary basis of sex differences in parenting and its relationship with child anxiety in Western societies, it was shown that males and females developed different evolutionary based specializations as a result of facing different challenges in order to survive and reproduce. In short, men specialized in social competition and risk taking behavior, whereas women specialized in care, nurturing, and intimate bonding. The reviewed empirical evidence showed that these different roles are still reflected in fathers’ and mothers’ parenting behavior, with fathers encouraging taking chances and social competition in their children more than mothers, and with mothers being more protective and stimulating caring for others and intimate bonding more than fathers. Our review showed that both maternal and paternal parenting behavior play a role in the development of child anxiety. Sometimes effects were only found for mothers, and not for fathers, or vice versa. In addition, it was found that maternal and paternal parenting were sometimes even oppositely related to child anxiety, which suggests that specific parenting behaviors may be protective for anxiety if expressed by the parent of one sex, but a risk factor for anxiety if displayed by the parent of the other sex.

Chapter 3
In Chapter 3, differences in fathers’ and mothers’ social referencing role were investigated in children aged 8-13 years, using an experimental paradigm. Children had to read scripts in which they were confronted with ambiguous
situations in which we counterbalanced whether the mother or the father acted anxiously or confidently. Children had to indicate how anxious they would feel in these imagined situations. In Experiment 1, children were presented with non-social scripts. Half of these scripts were about evolutionary male-specific non-social situations (e.g., weapons), and the other half on evolutionary female-specific non-social situations (e.g., contaminated food). Experiment 2 focused on social scripts. Half of the scripts tested evolutionary male-specific social situations (e.g., giving a speech), and the other half of the scripts tested evolutionary female-specific social situations (e.g., handling a crying baby). In sum, the results of this study showed that both maternal and paternal social referencing signals are important for children’s anxious responses to ambiguous situations, irrespective of paternal and maternal evolutionary expertise, and irrespective of the level of children’s trait anxiety.

Chapter 4
In Chapter 4, it was investigated whether social referencing processes differed between mothers and their infants and fathers and their infants. The visual cliff paradigm was used to assess paternal and maternal expressed anxiety and encouragement, and infant expressed anxiety and avoidance. In the visual cliff task, parents were instructed to encourage their child to cross a glass-covered table divided into a shallow side under which a checkered pattern is placed right beneath the glass, and a deep side under which a similar pattern is placed 30 centimeters below the glass. Infants between 10 and 15 months were randomly assigned to participate in the visual cliff task with either their mother or father. It was found that more paternal, but not maternal, expressed anxiety was related to more infant expressed anxiety and avoidance. This suggests that (1) fathers play a more important role in the transmission of anxiety in exploring ambiguous situations; or (2) infants evoke more anxiety in fathers than in mothers in ambiguous situations.

Chapter 5
In Chapter 5, a questionnaire study, it was assessed how symptoms of specific anxiety disorders were related to mothers’ and fathers’ overinvolved and challenging parenting behavior and whether mothers’ and fathers’ parenting behaviors were differentially associated with infant anxiety. In sum, results indicated that (1) for mothers symptoms of generalized anxiety disorder were associated with less challenging parenting behavior and more overinvolvement, while for fathers symptoms of social anxiety disorder were related to less challenging parenting and more overinvolvement; and (2) paternal, but not maternal, challenging parenting behavior was associated with less infant anxiety, and paternal, but not maternal, overinvolvement with more infant anxiety.
Chapter 6
In Chapter 6, a meta-analysis on the differential associations between maternal and paternal parenting behavior and anxiety in children aged 0-5 years was presented. Five types of parenting behavior were investigated: overprotection, overcontrol, overinvolvement, autonomy granting, and challenging parenting behavior. Two meta-analyses were conducted, one for mothers ($k = 28, n = 5,728$), and one for fathers ($n = 12, k = 1,019$). Results of these meta-analyses showed small associations between parenting and child anxiety in this age group. Parental overprotection showed the strongest associations with child anxiety. Regarding differential associations between maternal and paternal parenting behavior and child anxiety, it was found that fathers’ challenging parenting behavior was associated with less anxiety in children, whereas mothers’ challenging parenting behavior was not related to child anxiety. In sum, these meta-analyses indicated that paternal parenting behavior is as important as maternal parenting behavior in early childhood anxiety.

Chapter 7
In Chapter 7, the psychometric properties and utility of the Dimensional Anxiety Scales, a newly developed questionnaire for the DSM-5 to measure children’s anxiety symptoms, was described. These Dimensional Anxiety Scales assess six anxiety disorders: agoraphobia, generalized anxiety disorder, panic disorder, separation anxiety disorder, social anxiety disorder, and specific phobia. The scales for each disorder are consistent in content and structure and assess core features of fear and anxiety that are shared across the anxiety disorders, within the specific context of each disorder. The Dimensional Anxiety Scales and the SCARED-71 (a well validated questionnaire to assess children’s symptoms of all anxiety disorders), were completed by a community sample of children aged 8-13 years, and their mothers and fathers. Results indicated a high level of internal consistency and moderate-to-high convergent validity. Preliminary support for the clinical sensitivity of the Dimensional Anxiety Scales was found as children who exceeded the SCARED cutoffs scored higher on the Dimensional Anxiety Scales than children who did not exceed these cutoffs. Level of parent-child agreement and mother-father agreement were comparable to the SCARED-71. To conclude, results of this validation study indicated that the Dimensional Anxiety Scales are a valid and reliable measure to assess anxiety symptoms in a community sample of children, and can be used to screen for child anxiety disorders.
Integration of research findings

Evolutionary basis of differences between mothers and fathers
In this dissertation, the role of fathers versus mothers in the development of child anxiety was investigated from an evolutionary framework. As men and women faced different challenges in terms of surviving and reproducing during the course of human evolution, men and women developed different specializations that are still reflected in their parenting behavior as fathers and mothers (Chapter 2).

When receiving reviewers’ feedback on the chapters of this thesis, we were confronted with several misunderstandings about evolutionary theory. These misunderstandings need to be clarified in order to understand the findings of this dissertation. A first common misunderstanding about evolutionary theory is that it implies that human behavior is unamenable to change (Buss, 2008). Evolutionary theory does not make the assumption that human behavior, or gender roles in particular, are fixed and immutable. As Buss (1990) aptly phrased it: “All adaptations, including evolved psychological mechanisms, develop only in the context of certain environmental inputs. Change those inputs, and you will change the result of development. (p. 279)” Thus, finding evolutionary based differences between men and women does not mean that their roles in society as parents are impervious to change, neither does this imply that men and women “should” behave according to those roles. Thus, if we are not satisfied with the roles that men and women have in our society, we are able to change them.

A second misunderstanding pertains to the dichotomies of “nature versus nurture” or “genetic versus learned”. Some researchers question the fact that human behavior is the result of evolution. Instead, they think that learning and socialization cause human behaviors. However, evolutionary psychology uses an interactionist framework (Confer et al., 2010): “Environmental selection pressures shape evolved mechanisms at the phylogenetic level [the development of species]. Environmental input influences their development at the ontogenetic level [the development of an individual from conception to maturity]. And the environment provides cues that activate psychological adaptations at the immediate proximal level [the mechanisms that directly cause behavior]. (p. 116)” Thus, where sociocultural theory assumes that sex differences in current behavior arose solely from historic sexual division of labor, evolutionary theory states that the division of labor is itself the result of evolutionary processes. This is supported by ample evidence from fossil records of human ancestors, (behavioral and genetic) comparisons with other species (including primates), comparisons
with preindustrial and extant traditional societies, and archeological records (Bjorklund et al., 2002). To conclude, evolutionary theory does provide an explanation for the factors that sociocultural theory considers as the origins of sex differences.

Fathers’ versus mothers’ social referencing signals in relation to child anxiety

In Chapter 3 and 4, it was examined whether paternal and maternal social referencing signals are differentially associated with children’s anxiety and whether evolutionary expertise of parents plays a role herein. With respect to the evolutionary expertise of fathers and mothers, we expected, following the theory of Bögels and Perotti (2011), that children would be influenced more by the signal of the parent that has the most evolutionary expertise with the potentially dangerous situation. No evidence for this hypothesis was found in Chapter 3. That is, in both experiments using scripts, fathers’ and mothers’ anxious signals did not differentially affect their child’s anxiety in situations that from an evolutionary point of view trigger “male-specific” and “female-specific” expertise. In contrast, results of our visual cliff study (Chapter 4) showed, as expected, that only paternal, but not maternal anxious signals, were associated with more child anxiety, as the visual cliff represents a threat (i.e., height, falling) in which males are thought to be more specialized than females (Bögels & Perotti, 2011). This finding provides preliminary evidence for the idea that fathers’ anxious signals are more important for infants when exploring a novel situation that corresponds with fathers’ expertise. More research using paradigms that are closer to real-life experiences are needed to test this theory further. Examples include virtual reality designs (e.g., Krijn, Emmelkamp, Olafsson, & Biemond, 2004; Vrijzen, Lange, Dotsch, Wigboldus, & Rinck, 2010) or risky play situations (e.g., challenging climbing frames, Kindleberger & Kuebli, 2007). In addition, to provide full support for the model of Bögels and Perotti (2011) it should be tested whether mothers’ anxious signals have more effect on infants when exploring a novel situation that corresponds with the expertise of mothers. Examples may be eating contaminated food or exposure to intimate social interactions (see Chapter 3).

There are several explanations for why we did not find a differential effect of paternal and maternal anxious social referencing signals on child anxiety in Chapter 3, and why we did find such a differential effect in Chapter 4. First, it may be that the use of scripts was not the most appropriate method to study whether the evolutionary expertise of parents influences children’s anxiety towards potentially dangerous situations. That is, although (1) the experimental method succeeded and children responded with more anxiety to scripts in which the parent reacted anxiously
compared to scripts in which the parent reacted confidently; (2) experts in the field of evolutionary psychology agreed about whether the stories in the different scripts represented a male-specific or female-specific situation; and (3) the parental reactions were ecologically valid (as evidenced by the finding that the discrepancy between the reaction of the imaginary father and the reaction that the real parent indicated s/he would give did not affect children’s anxiety), it is possible that the use of imaginary stories in text form may have caused the null findings. Possibly, children have to be exposed to parents’ real reactions towards an ambiguous situation. That is, it may be necessary for children to actually see and hear parents’ anxious reactions (as was the case during the visual cliff experiment, Chapter 4) towards threatening situations to connect the situation to their assumed innate knowledge about whether the mother or father is specialized in that situation (Bögels & Perotti, 2011). Second, it may be that differential social referencing effects are only found early in development (such as in infants who participate in the visual cliff task). That is, the younger the child, the less the child has yet been influenced by external circumstances. A child’s assumed innate knowledge about whether the mother or father knows best in certain situations, may be overruled by parents’ actual behavior when a child grows older. For example, if a child is repeatedly exposed to a mother who shows that she is not afraid of heights (a situation in which males are thought to be specialized), the child may rely also on mothers’ signals in such situations. A third explanation for the absence of a differential effect of paternal and maternal anxious social referencing signals on child anxiety is that children are more exposed to female than male social referencing figures. On average, children spend more time with their mothers than fathers (Geary, 2010) and have more female than male teachers (UNESCO Institute for Statistics, 2014). As a result, when children spend time in ‘male-specific’ situations (e.g., playing on high climbing frames, presenting for a group of people, competitive games during physical education) they may be much more often accompanied by female instead of male social referencing figures. Therefore, fathers may not have more effect on their children in the male-specific situations. However, this does not explain why we did not find that mothers have more effect in male-specific or female-specific situations.

The “specialized parent knows best” assumption only (partly) held for parents’ anxious signals, but not for the effect of parents’ confident/encouraging signals on children’s anxiety. That is, maternal and paternal confident signals did not differentially affect children’s anxiety (Chapter 3), and no difference between fathers and mothers in the association between encouraging signals and infants’ anxiety was found (Chapter 4). Moreover, in Chapter 4, it was even found that both maternal and paternal encouraging signals were not related to infants’ anxiety at
all. From an evolutionary point of view, it makes sense that anxious parental signals affect children more than encouraging parental signals, as anxious expressions can signal the presence of danger, and recognizing and detecting these threat-denoting signals is important for survival (Öhman & Mineka, 2001, 2003). In line, research has shown that children detect fearful faces more rapidly than happy (i.e., encouraging) faces (LoBue, 2009), and it takes children longer to disengage from looking at fearful faces than happy faces, which suggests that fearful expressions attract more attention (Georgiou et al., 2005; Peltola, Lappanen, Palokangas, & Hietanen, 2008). Another explanation for the absence of an effect of encouraging signals on decreasing children’s anxiety might be that encouraging signals are less credible, as parents may fake their encouragement by being exaggeratedly encouraging towards the child. It may be more credible for the child if the parent him/herself shows that a certain situation is safe instead of only encouraging the child to approach a stimulus or situation. For example, a parent that approaches a spider and picks it up (positive modeling), may have more effect on a child than a parent that encourages a child to approach the spider and pick it up. Future research should therefore also investigate whether paternal and maternal positive modeling has a different effect on the anxiety of their child and whether the evolutionary specializations of fathers and mothers plays a role herein.

In conclusion, although results of the studies presented in Chapter 3 and 4 only partly supported the theory of Bögels and Perotti (2011) with respect to the differential effects of paternal and maternal anxious signals on child anxiety, it was shown that fathers are equally important social referencing figures for their children as mothers are.

**Fathers’ versus mothers’ parenting behavior in relation to child anxiety**

In both a questionnaire study (Chapter 5) and a meta-analysis (Chapter 6) it was tested whether typical maternal and paternal parenting behaviors of mothers and fathers were differentially associated with child anxiety. As the questionnaire study was included in the meta-analysis, and as meta-analyses have stronger statistical power to draw conclusions, the focus in this paragraph will be on the results of the meta-analysis.

The only significant difference between fathers and mothers in the association between parenting behavior and child anxiety was found for challenging parenting behavior. Results showed that paternal challenging parenting behavior was associated with less child anxiety, whereas maternal challenging parenting was not significantly related to child anxiety, providing preliminary support for the model of
Bögels and colleagues (Bögels & Phares, 2008; Bögels & Perotti, 2011) that states that paternal challenging behavior may buffer the development of child anxiety. However, until today, only two studies examined the associations between parental challenging behavior and child anxiety, and only one study used a prospective design to unravel the direction of effects between challenging fathering and child anxiety (does paternal challenging behavior diminish children's anxiety, or do non-anxious children elicit more challenging fathering, or both). Thus, more prospective research in which the effect of early challenging fathering on later child anxiety, correcting for concurrent child anxiety, is investigated, and experimental research, in which challenging fathering is manipulated and the effect on child anxiety examined, is needed to answer this question.

Another important topic of future research is that mothers and fathers form a dynamic system in raising their children (Bögels & Phares, 2008). We should study whether the assumed positive effects of paternal challenging parenting behavior on child anxiety are dependent on the level of maternal care and protection. That is, challenging fathering may only have a buffering effect on the development of child anxiety if the child has a mother who provides the child with a safe and caring environment simultaneously (Bögels & Phares, 2008). As care and safety are the preconditions for exploration, if there is little maternal care and safety, paternal challenging may even have a detrimental effect on a child’s anxiety. To test this hypothesis, studies should be conducted in which both fathers’ and mothers’ parenting behavior is taken into account.

A related hypothesis is that challenging fathering only decreases children’s anxiety if the father is sensitive himself. As the role of the father is to “provide security through sensitive and challenging support as a companion when the child's exploratory system is aroused” (Grossmann et al., 2002, p. 311), it may be that encouraging the child to exhibit risky behavior, or behavior that pushes the child outside his/her comfort zone only diminishes the child's anxiety if the father takes into account the limits of the child. If a father is not able to perceive and accurately interpret a child’s signals, he may push too far, thereby even increasing a child’s anxiety. Thus, it is recommended that future studies on the association between challenging fathering and child anxiety also study the level of sensitivity of the father.

Results of our meta-analysis clearly showed that there is still a lack of studies on parenting and child anxiety that include fathers. The absence of a differential association between maternal and paternal overprotection and child anxiety may just be due to the fact that this behavior was only investigated in a limited
number of fathers compared to mothers. With respect to autonomy granting, even no studies were found that examined the relationship between this behavior in fathers and early childhood anxiety. Therefore, it seems too early to conclude that maternal and paternal parenting behaviors are not differentially associated with anxiety in children aged 0-5 years. Our own research shows that fathers are willing to participate in research. Researchers should therefore increase their efforts to include fathers in their studies, especially when examining the effects of autonomy granting on child anxiety.

In sum, our results show that both maternal and paternal parenting are important in the development of child anxiety, although the associations are small. Differences in the relation between maternal and paternal parenting and early childhood anxiety have not been found, except for challenging parenting behavior. Fathers’ challenging parenting stands out as an important parenting behavior that may decrease children’s anxiety.

The role of child gender
Results of this dissertation also provided information about whether mothers’ and fathers’ parenting behavior and social referencing have different effects on the anxiety of boys and girls. Results of our review (Chapter 2) showed contradictory evidence of different effects of maternal and paternal parenting on child anxiety for boys and girls. However, most studies assessing the relationship between parenting and child anxiety did not differentiate between mothers and fathers and only assessed how parents in general treat their boys and girls differently. Moreover, In Chapter 3 it was found that paternal and maternal confident and anxious signals in the scripts did not differentially affect boys and girls. Likewise, results of Chapter 4 showed that the associations between paternal and maternal encouraging and anxious signals and infant anxiety and avoidance of the visual cliff did not differ for boys and girls. Thus, results of this dissertation found no evidence for the theory that parental influence on child anxiety is stronger in same-sex parent-child dyads (Bögels & Perotti, 2011). It might be that boys and girls are not more susceptible to behavior of their same-sex parent, but more to behavior that fits with their evolutionary based role, regardless of the gender of the parent who expresses that behavior. In support of this notion, there is sound evidence that parents’ teach their sons and daughters gender-specific qualities. For example, parents encourage risk taking more in boys than girls and stress more perceived injury vulnerability among girls than boys (Morrongiello & Dawber, 1999), parents discuss emotional aspects of past events more with daughters than with sons (Fivush et al., 2000), and helping parents with tasks in the house...
is encouraged in girls and discouraged in boys (Fagot, 1978). It remains to be investigated whether boys are indeed more susceptible to male-typical behavior (such as risk-taking or social competition) and girls more to female-typical behavior (such as caring behaviors and emotional communication), and this is therefore an important area for further research.

**Parental influences on child anxiety: The role of parental anxiety**

Theoretical models state that high levels of anxiety in parents may cause anxiety-enhancing parenting (e.g., Chorpita & Barlow, 1998; Ginsburg & Schlossberg, 2002). That is, it is assumed that anxious parents will show more anxiety-provoking parenting behaviors, such as overprotection and overcontrol, and will display more anxious social referencing signals, such as anxious facial expressions. Hence, anxious parents may more easily enhance children’s anxiety. We tested this theory in Chapter 4 for social referencing and in Chapter 5 for parenting behavior.

No evidence for this theory was found in our visual cliff study (Chapter 4). That is, parental (both maternal and paternal) trait anxiety was not significantly associated with parental expressed anxiety during the visual cliff experiment. Thus, high anxious parents did not display more anxious social referencing signals. This suggests that parental anxiety does not interfere with the social referencing process between parents and their children. This result is supported by the meta-analytic finding of Van der Bruggen et al. (2008) that there is no significant relationship between parental anxiety and parenting, and our meta-analytic finding (Chapter 6) that whether the parent has an anxiety disorder or not does not moderate the association between parenting and child anxiety. Thus, it seems that parents are able to act relatively free from their anxiety in their own lives. It is important to recognize that there is not necessarily a one-to-one relationship between parents’ own anxiety and their anxiety that something might happen to their child. However, the absence of an association between parental trait anxiety and parents’ anxious social referencing signals in the visual cliff study may be due to the fact that we only assessed whether parents’ general level of trait anxiety was related to the anxiety they expressed during the visual cliff experiment. That is, possibly, only parents with height anxiety may express more anxiety, as the visual cliff triggers this specific form of anxiety. In support of this notion, Murray et al. (2007) found that mothers with social anxiety disorder showed parenting difficulties only in a social threat task, whereas mothers with generalized anxiety disorder primarily showed parenting difficulties in a non-social threat task. Thus, it is recommended to study how anxiety for specific situations affects parents’ expressed anxiety and parenting in these situations rather than focusing of parents’ general level of trait anxiety (Creswell, Murray, Stacey, & Cooper, 2011).
The absence of an association between parental anxiety and parenting variables may also be due to the fact that we did not differentiate between different anxiety disorders. Therefore, in Chapter 5, we examined whether symptoms of specific parental anxiety disorders were related to maternal and paternal parenting behavior. This was indeed found; for fathers, only social anxiety disorder was associated with more overinvolvement and less challenging parenting behavior, whereas for mothers, only generalized anxiety disorder was associated with more overinvolvement and less challenging parenting. Thus, results of this study showed that only parents with a certain type of anxiety displayed more anxiety-provoking parenting behaviors (overinvolvement) and less anxiety-diminishing parenting (challenging parenting). This issue of diagnostic specificity has received little attention in the child anxiety research field (Creswell et al., 2011; Murray et al., 2009). It is therefore recommended to distinguish between domains of anxiety (social, separation, illness, etc.) when assessing the associations between parental trait anxiety and parenting behavior/social referencing signals.

**Differential susceptibility to social referencing signals and parenting**

The differential susceptibility theory (Belsky & Pluess, 2009) proposes that anxious children are more responsive to environmental experiences in a ‘for better and worse’ fashion than non-anxious children. In Chapters 3 and 4, we therefore tested whether anxious children were more susceptible to both negative and positive parental influences.

No evidence for the differential susceptibility hypothesis was found in both chapters. In both experiments of Chapter 3, high anxious children were not more susceptible to either anxious (negative) or confident (positive) parental social referencing signals than non-anxious children. Moreover, in our visual cliff study (Chapter 4), infants with an anxious temperament did not respond with less anxiety and avoidance to both maternal and paternal encouraging signals than infants with a less anxious temperament. The results of Chapter 4 did provide partial support for the diathesis-stress (Zuckerman, 1999) and vulnerability-stress (Ingram & Luxton, 2005; Nigg, 2006) models, stating that anxious children would be especially vulnerable to negative parenting environments. That is, we found that for infants with a more anxious temperament, more expressed anxiety of the father was associated with more avoidance of the visual cliff. It is understandable that temperamentally anxious infants are more sensitive to anxious signals than infants without an anxious temperament, as they have an attentional bias for threat-related information (e.g., Puliafico & Kendall, 2006), and the quick detection of the presence of threat may help them to escape from dangers and survive to reproduce. However, infants
with an anxious temperament did not respond with less anxiety and avoidance to maternal anxious signals compared to infants with a less anxious temperament. This may be explained by the fact that height and falling are threats in which mothers are not thought to be specialized (Bögels & Perotti, 2011). Thus, infants in general seem to be more susceptible to fathers’ anxious signals than to mothers’ anxious signals in a male-specific situation, and infants with an anxious temperament are even more susceptible to the anxious signals of their fathers.

There are several explanations for why we found no evidence for differential susceptibility in our studies. First, it may be that differential susceptibility is a non-linear construct. Children at the low but also the high ends of the anxiety distribution may be less sensitive for parental signals, and instead rely more on their own observations when exploring novel and potentially dangerous situations. That is, on the one hand, children low in anxiety may not look for parental signals, as they do not experience uncertainty. On the other hand, children high in anxiety may have excessive levels of self-focused attention, and as a result are more aware of internally generated information that of externally generated information collected through sensory perceptions (Ingram, 1990), such as their parents’ signals. Alternatively, it may be that the way in which we tried to assess differential susceptibility was not optimal. That is, because we used a community sample of children the variance in children’s trait anxiety may have been too small. Therefore, there were not many children with a high level of trait anxiety.

Second, it may be that high trait anxious children or infants with an anxious temperament are more susceptible to social referencing signals and the parenting dimensions that we assessed, but that the differential susceptibility effects only become apparent after a longer period of time, and/or after many interactions. In our studies, children were exposed to parental anxious/confident responses in scripts (Chapter 3) and to a maximum of 10 minutes of anxious/encouraging social referencing signals (Chapter 4). Future research should therefore investigate differential susceptibility using longitudinal designs (e.g., parenting behavior measured at an earlier time point may predict more anxiety in temperamentally fearful children at a later point in time). For example, Lengua (2008) found that for high temperamentally fearful boys maternal inconsistent discipline was associated with less internalizing problems one year later, whereas for low temperamentally fearful boys maternal inconsistent discipline predicted more internalizing problems. Third, to adequately investigate differential susceptibility, not only the absence of negative outcomes should be studied, but also the presence of positive outcomes (Hankin et al., 2011). Belsky and Pluess (2009) indicated that only one study
Taylor et al., 2006) explicitly investigated whether susceptible individuals (individuals with allelic variations in the serotonin transporter promoter polymorphism, 5-HTTLPR) responded more poorly to adverse environmental conditions and functioned better under supportive environmental conditions than non-susceptible individuals. Thus, future studies investigating whether (temperamentally) anxious children are more susceptible to maternal and paternal social referencing signals and parenting behavior than non-anxious children should not only include anxiety as a negative outcome measure, but also include positive outcomes, such as children's self-esteem and academic competence (e.g., Bean, Bush, McKenry, & Wilson, 2003).

**Dimensional measurement of anxiety in children**

Because a side goal of this dissertation was to improve the measurement of child anxiety in the light of DSM-5 (APA, 2013), we investigated the psychometric properties of the newly developed Dimensional Anxiety Scales (Chapter 7). The scales demonstrated strong psychometric properties and showed promising utility for both child and parent report. Although the benefits of a dimensional approach over a traditional categorical approach are widely recognized (Helzer et al., 2006; Hudziak et al., 2007; Kraemer, 2007; Krueger et al., 2005), several obstacles (both real and perceived) have hindered the adoption of dimensional assessment measures in clinical practice (LeBeau, Bögels, Möller, & Craske, 2015). First, although the DSM-5 is already published for more than a year, awareness of the dimensional component in the DSM-5 and the dimensional measures that accompany it is still limited (LeBeau et al., 2015). Second, many clinicians do not value the psychometric properties of dimensional assessment tools, do not see their benefit over clinical judgment alone, and have doubts about the practicality of such measures (Jensen-Doss & Hawley, 2010). Thus, it is important that both researchers and clinicians become aware of the usefulness of this dimensional approach for assessing anxiety problems and the existence of the Dimensional Anxiety Scales. The scales can enhance the current diagnostic system by their increased utility and benefits in terms of communication between mental health professionals (LeBeau et al., 2015). With respect to their usefulness, the scales have been published online (http://www.psychiatry.org/practice/dsm/dsm5/online-assessment-measures) and can be downloaded for free, which makes them not only easily available to clinicians but also to parents and children. Moreover, the scales can be completed quickly as they are very brief. Concerning communication, when researchers and clinicians are using the same measure to assess severity, scores can be more easily interpreted and compared than when different measures with different cutoff scores and symptom domains are used (LeBeau et al., 2015).
In sum, although much more research on the Dimensional Anxiety Scales is needed, in particular with respect to their test-retest reliability, discriminant validity and (dis)agreement among clinicians, parents, and children, our findings argue for routine use of the scales in clinical practice. Moreover, the use of the Dimensional Anxiety Scales may also bridge the gap between community studies and clinical studies, as data can be better compared when this standardized dimensional measure is used to assess levels of child anxiety disorder. This is especially needed for research on young children, as almost no clinical studies exist for this age group.

**Limitations and future directions**

The results of this dissertation should be interpreted within the light of the following limitations, which in turn form a starting point for formulating several recommendations for further research.

First, for most studies included in this dissertation (except for the script study presented in Chapter 3), causality could not be inferred because of the cross-sectional and non-experimental nature of the studies. As parent-child interactions are bidirectional and reciprocal (Grusec & Davidov, 2007), parental behavior may have elicited anxious child behavior, but child anxiety may also have evoked certain parental behaviors. For example, with respect to our finding that paternal expressed anxiety was positively associated with infant expressed anxiety and avoidance to the visual cliff (see Chapter 4), it could be that paternal expressed anxiety caused infants to respond with more anxiety and avoidance to the visual cliff, but infants' anxious and avoidant behavior may also have caused fathers to react anxiously. Experimental studies are able to examine the causal effects of child anxiety and parental behavior on one another. Several experimental studies have already been conducted in which the level of parental anxiety or the type of parenting behavior were manipulated (e.g., De Rosnay et al., 2006; Gerull & Rapee, 2002; Thirlwall & Creswell, 2010). However, these studies only included mothers and not fathers. Recently, researchers have started to compare the effects of anxious versus confident or controlling versus autonomy-granting father and mother behavior in experimental paradigms (e.g., Bögels et al., 2011; Burstein & Ginsburg, 2010; Chapter 3 of this dissertation). Almost no studies have been conducted in which the level of child anxiety is manipulated. As an exception, Van der Bruggen and Bögels (2012b) manipulated both mothers’ and their daughters’ anxiety by exposing them to either a large, more threatening, or smaller and less threatening spider. Relatedly, Hudson et al. (2009) developed an innovative experimental design in which mothers of anxiety disordered children and mothers of children without an anxiety disorder were paired with a child from the same diagnostic group as their
own child (anxious or non-anxious) and with a child from a different diagnostic group as their child and observed them during a speech preparation task. More experimental studies are clearly needed to unravel the bidirectional associations between maternal and paternal behavior and child anxiety.

Second, as the goal of this dissertation was to test the model of Bögels and Perotti (2011) on the role of fathers versus mothers in the development of anxiety in children, the samples of our studies purposively consisted of two-parent families with a father and a mother and we did not include gay/lesbian families or single-parent families. As already mentioned in Chapter 6, the model of Bögels and Perotti (2011) can also be applied to gay/lesbian families or single-parent families. To recapitulate, with respect to same gender couples, even in parents of the same gender a task division may be apparent, in which one of the parents displays more playful and challenging behavior, whereas the other parent shows more caring and nurturing behavior (Bögels & Perotti, 2011). In addition, the anxiety level of the same gender parents may determine the role-differentiation, with the more anxious parent specialized more in caring (mothers’ role) and the less anxious parent specialized more in risk taking and challenging (fathers’ role) (Bögels & Perotti, 2011). Concerning single parents, there are two theories with respect to the role-differentiation in their parenting (Dufur et al., 2010). The first theory is that the parenting of single mothers and fathers will differ, as mothers will display their female parenting role (i.e., caring/nurturing), while fathers will enact their male way of parenting (i.e., risk taking, challenging). The second theory is that the parenting behavior of single mothers and fathers would not differ, as single mothers and fathers have to provide all the resources to their children (i.e., they have to adopt both the maternal and paternal role). Research shows that the parenting differences between single mothers and fathers are small (Dufur et al., 2010), supporting the latter theory. Future research should assess the associations between parental behavior and child anxiety in same gender parent couples and single parents.

Third, in this dissertation we assessed whether symptoms of specific anxiety disorders were related to maternal and paternal parenting behavior (Chapter 5), but we did not examine whether certain parenting characteristics are related to specific subtypes of child anxiety. This is still an understudied area of research (Murray et al., 2009). As an exception, Wood, Piacentini, Southam-Gerow, Chu, and Sigman (2006) compared the parenting behavior of parents with children with separation anxiety disorder with parents of children with other forms of anxiety (social anxiety disorder or generalized anxiety disorder) and found that parental
overprotection was significantly associated with child separation anxiety disorder but not with other anxiety disorders. It is recommended that future research assesses the associations between specific parenting behaviors and specific types of child anxiety.

Fourth, this dissertation focused on two single parental factors (social referencing and parenting behavior) that are associated with child anxiety. However, little is known about the interactive and accumulative effects of these parental factors in the etiology and maintenance of anxiety (disorders) in childhood. According to cumulative risk models (Rutter, 1979; Sameroff, 2000) risk factors tend to cluster in the same individuals, and the more risk factors are present in an individual, the larger the chance of problems in these persons. Thus, although the separate associations between anxious social referencing signals and child anxiety, and negative parenting behavior and child anxiety seem to be small, the associations may be larger when both risk factors are present. That is, it is conceivable that children will become more anxious when their parents not only frequently express anxiety, but also display overcontrolling and overprotective behavior. Thus, future research should assess the combined effects of social referencing and parenting behavior on child anxiety.

**Refinement of the model on the differential role of mothers and fathers in the development of child anxiety**

In the General introduction, a model was presented that described the main themes of this dissertation. Based on the results of this thesis and our recommendations for future research, the model can be refined (see Figure 1).

First, “parental anxiety” has been replaced by “specific forms of parental anxiety”, as this thesis showed that for mothers and fathers different dimensions of their anxiety were related to their parenting behavior. Rather than focusing on general levels of parental anxiety, we advise to investigate the associations between specific types of parental anxiety and parental influences on child anxiety.

Second, this issue of specificity also applies to child anxiety. Just as different dimensions of parental anxiety are differentially related to their parenting, parenting practices may also show different associations with specific subtypes of anxiety in the child. For example, harsh discipline seems to be specifically associated with generalized anxiety disorder and not with other anxiety disorders (Shanahan, Copeland, Costello, & Angold, 2008). For this reason, “child anxiety” has been replaced by “specific forms of child anxiety”.
Third, “age of the child” has been added to the model. As already mentioned, it may be that the differential role of mothers’ and fathers’ social referencing signals in the development of child anxiety is larger in younger children than in older children, as they have been influenced by external circumstances to a lesser extent, and as a result their presumed innate knowledge about whether the mother or father is specialized in certain situations may not yet be overruled by parents’ actual behavior. On the contrary, fathers’ and mothers’ parenting behavior may have larger effects over time, when children have been repeatedly exposed to this behavior. In addition, different behaviors of fathers and mothers may be important at various stages in children’s development (Bögels & Phares, 2008). For example, parental autonomy granting may become increasingly important during adolescence, when children strive for more independent decision-making. Thus, age of the child should also be taken into account when examining the different roles of mothers and fathers in the development of child anxiety.

Fourth, the interaction between parenting behavior and social referencing has been added to the model. As mentioned before, we have separately assessed...
the associations between parenting and child anxiety on the one hand, and social referencing and child anxiety on the other hand. However, these parental factors may have interactive and accumulative effects on the development, maintenance, and amelioration of anxiety problems in children, and these factors should therefore be assessed jointly.

Fifth, “time” has been added as a factor that may influence the associations between parental factors and child anxiety. Some findings of this dissertation may be explained by the fact that the children spend on average less time with their father than with their mother. For example, the association between parental expressed anxiety and infant anxiety and avoidance of the visual cliff (Chapter 4) may have been caused by the fact that because fathers spend less time with their children, they know the child less and therefore are more insecure in interacting with their children. In addition, results from our meta-analysis (Chapter 6) showed that studies that used both concurrent and prospective associations yielded the largest effect sizes for the association between parenting and child anxiety, suggesting that parenting behavior does exert its effects over time. Thus, time should be taken into account when studying the associations between parenting practices and anxiety in children.

Lastly, the interaction between mothers and fathers should be taken into account when studying the associations between maternal and paternal parenting and child anxiety, as mothers and fathers raise their children together. The effects of paternal parenting may be dependent on how the mother interacts with her children and vice versa (Bögels & Phares, 2008). In addition, rather than focusing on dyadic interactions between a parent and a child, children also spend time with both of their parents present (triadic interactions). It is therefore important to conduct studies in which the role of parenting practices in triadic interactions is examined. These studies may provide an answer to the following questions: (1) How do conflictual (i.e., one parent non-anxious, the other anxious; one parent challenging, the other overprotective) parenting practices affect child anxiety?; (2) Can a non-anxious parent compensate for an anxious parent?; or (3) Are anxiety signals or parenting behaviors displayed by the father or by the mother more influential?

Clinical implications
Taking into account both the fundamental nature of our research and the fact that more research is warranted to establish the direction of effects between maternal and paternal behavior and child anxiety, we may still speculate about possible clinical implications of our findings. Our findings that fathers’, but not mothers’,
anxious signals were related to more expressed anxiety/avoidance of infants, and that fathers’, but not mothers’, challenging parenting behavior was related to less infant anxiety hints to an important role of fathers in the prevention and treatment of child anxiety. Fathers may buffer the anxiety of their children if they do not display anxious social referencing signals in situations that are not dangerous, and in addition if they do challenge their children to push their limits. Our findings suggest that it might be worthwhile to include fathers in the prevention and treatment of child anxiety, which is important, given the fact that fathers are still included to a lesser extent than mothers in the psychological treatment of their children (Duhig, Phares, & Birkeland, 2002; Lazar, Sagi, & Fraser, 1991). First, clinicians may explain parent couples that fathers and mothers play a different role in the anxiety development of their children. Second, in prevention programs and interventions for child anxiety, clinicians may teach fathers to be more playful and challenging to their anxious child and to stimulate their child to take risks (Bögels & Phares, 2008). Third, because of their challenging role, fathers might be more able than mothers to guide their anxious child through exposures in cognitive behavioral therapy (Bögels & Phares, 2008).

Conclusions
This dissertation has provided important insights in the relative impact of fathers’ versus mothers’ parenting behavior and social referencing signals on children’s anxiety. A unique aspect of this dissertation was the evolutionary viewpoint that was used to explain and understand differences in maternal and paternal parenting and their different role in the development of child anxiety. Different types of studies and measures were used in different age groups to test the model of Bögels and Perotti (2011).

In conclusion, coming back to the title of this dissertation: “Do fathers matter?”, the answer to this question is: “Yes, they do.” Even though fathers are from an evolutionary viewpoint less important for the survival of their children (Sear & Mace, 2008), and fathers spend on average less time with their children than mothers (2010), results of this thesis clearly showed that fathers are as important social referencing figures as mothers, and that fathers’ parenting behavior is as important as mothers’ parenting behavior in childhood anxiety. There are even some indications that fathers’ anxious social referencing signals are more strongly related to children’s anxiety than mothers’ anxious signals and that fathers’ challenging parenting behavior plays a larger role in children’s anxiety than maternal challenging parenting.