Exposure to parents' negative emotions in early life as a developmental pathway in the intergenerational transmission of depression and anxiety
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GENERAL INTRODUCTION
General introduction

The evidence on the effects of early adversity in maltreated children has been bitter illustrations of how the effects of early experiences can extend to later functioning and constitute vulnerability for the development of psychopathology (Cicchetti & Toth, 1995; Cicchetti & Toth, 2005). The focus of this dissertation is on less severe, but more prevalent forms of deviations in infants' early socio-emotional environment: depression and anxiety in parents. The main goal of the thesis is to investigate how exposure to clinical and non-clinical forms of parental depression and anxiety in the early years of life may affect infants' socio-emotional development.

Depression and anxiety disorders are among the most prevalent psychopathology in childhood (Kashani & Orvaschel, 1990) and adulthood (Bijl, Ravelli, & Van Zessen, 1998; Kessler, Chiu, Demler, & Walters, 2005). Depression and anxiety aggregate in families: the presence of a diagnosed parent is linked to two-to-six-fold increase in the risk of depression and anxiety disorders in the offspring (Beardslee, Gladstone, & O’Connor, 2011; Beidel & Turner, 1997; England & Sim, 2009; Hettema, Neale & Kendler, 2001). Along with the inherited biological/genetic dispositions, environmental exposure to parents’ anxious and depressed behavior in daily interactions contributes to the intergenerational transmission of depression and anxiety (Goodman & Gotlib, 1999; Murray, Creswell & Cooper, 2009). The current dissertation focuses on exposure to parents’ negative emotions as a developmental pathway in the intergenerational transmission of depression and anxiety.

Vulnerabilities that co-occur on the side of the parents and of the offspring make the early years of life a key developmental phase in the investigation of exposure effects within the context of intergenerational transmission of depression and anxiety. Becoming a parent is a major developmental transition that requires reorganization and reconstruction of parents' life around the needs of the new member of the family (Selder, 1989). Due to the new demands and responsibilities, the early years of parenthood may be experienced as an overwhelming and stressful time (Nyström, & Öhrling, 2004). This explains why this is a vulnerable period for the development, maintenance or relapse of depression and anxiety disorders in parents (O’Hara & Swain; 1996; Matthey, Barnett, Howie, & Kavanagh, 2003; Ross & McLean, 2006). In turn, the rapid rate of experience-dependent development in the infant brain explains why the impact of early environmental adversity, including exposure to depressed and/or anxious moods of parents, would be most pronounced on the offspring's adaptation in the early years of life (Goodman & Gotlib, 1999; Heim & Nemeroff, 1999; Kaufman, Plotsky, Nemeroff, & Charney, 2000; Leppänen, 2011; Leppänen & Nelson, 2009). The current dissertation focuses on the early years of life to investigate exposure effects in the intergenerational transmission of depression and anxiety.
Parents' expressions of emotion constitute the basis for infants' expression and regulation of emotion in early parent-infant interactions, while the specific function of parents' emotional expressions seem to change from dyadic parent-infant interactions in the first half-year to triadic parent-infant-object interactions in the second half-year. Parents' expressions of positive affect serve as a ‘frame’ for infants' expression and regulation of affect in early dyadic parent-infant interactions (Als, Tronick, & Brazelton, 1979; Cohn & Tronick, 1987; Tronick, 1989). Infants learn to initiate and reciprocate positive affect by tuning to parents' expressions of positive affect. In turn, parents' emotional expressions and reactions serve as safety/threat signals in the face of novel/ambiguous stimuli in triadic parent-infant-object interactions (so-called social referencing, Feinman, 1982). In contrast to previous evidence that predominantly focused on the effects of mothers' psychopathology in early development, the current dissertation addresses infants' early exposure to emotional expressions both from mothers and fathers as the most prominent and influential figures in infants' environment.

Infants' temperament, defined by withdrawn, fearful, or distressed responses to ambiguous/novel stimuli (Fox, Henderson, Marshall, Nichols, & Ghera, 2005) constitutes a biologically determined source of individual differences in infants' emotional expressions, reactivity and arousal in early interactions. Negative temperamental dispositions are more common in the offspring of parents with (vs. without) depression and anxiety, and depression and anxiety are more common among children with (vs. without) negative temperamental dispositions (Biederman, Rosenbaum, Chaloff, & Kagan, 1995; Bruder-Costello et al., 2007; Rosenbaum et al., 1993). Moreover, temperamental dispositions are considered to constitute vulnerability for the effects of adverse rearing environments on later outcomes (Ingram & Luxton, 2005; Nigg, 2006). This dissertation addresses the effect of infants' temperamental dispositions as a potential moderator of the link between exposure to parents' depression and anxiety and infant outcomes.

Three aspects of early socio-emotional development are the focus of the current dissertation. These are infants' (I) emotional expressions, (II) behavioral and emotional reactions to novelty, and (III) attention to emotional stimuli. These three aspects are relevant to the investigation of the effects of exposure to parents' depression and anxiety, as increases in negative expressions and reactions (American Psychiatric Association [APA], 2013), and in attention/vigilance to negative emotion characterizes childhood and adulthood forms of depression and anxiety disorders (Leppänen, 2006; Van Bockstaele et al., 2004). The current dissertation addresses depression- and/or anxiety-related alterations in infants' interactive behavior (emotional expressions and reactions), and in their attention to emotional stimuli as early outcomes that may be potentially linked to later forms of psychopathology.
General introduction

Outline of The Thesis
The central aim of this dissertation is to investigate how exposure to parents’ depression and anxiety, and infants’ temperament are linked to infants’ emotional and behavioral reactions in early interactions with parents, and to their attention to emotional expressions.

First, the links between parents’ and infants’ emotional expressions and behavioral reactions were examined in naturalistic observations of parent-infant and parent-infant-object interactions (Chapter 1, 2, 3, & 4) in infants and parents with vs. without anxiety and/or depression. Next, the links between infants’ attention to emotional stimuli (Chapter 1, 5, & 6) and parents’ depression and anxiety symptoms were examined.

The dissertation starts with a literature review in Chapter 1 on the effects of exposure to parental depression and anxiety in the first postnatal year. The aim of this review was to provide an overview of available evidence on the associations between exposure to parental negative emotions in the first year of life and offspring’s socio-emotional development.

Chapter 2 describes a study investigating the effect of parental depression and anxiety and infants’ negative temperament on parents’ and infants’ expressions of emotions in parent-infant face-to-face interactions. First-born infants (n = 101) were observed at 4-months of age during naturalistic parent-infant face-to-face interactions with mothers and fathers with and without lifetime depression and/or anxiety diagnoses. Parents’ lifetime depression and anxiety diagnoses and symptoms were assessed prenatally via semi-structured clinical interviews, while infants’ negative temperamental dispositions were investigated when the infants were 4 months old via standardized observational paradigms.

Chapter 3 is an observational study investigating the associations of maternal and paternal anxiety (expressed parental anxiety as well as lifetime anxiety disorders) and of infants’ temperament with 12-month-old infants’ fear and avoidance during encounters with social and nonsocial novel stimuli in a social referencing paradigm. The sample consisted of 122 mothers and fathers (with and without social and/or other types of anxiety) and their infants. Parents’ expressions of anxiety and infants’ fear and avoidance were observed during confrontations with a stranger and a remote-control robot toy. Parents’ lifetime depression and anxiety diagnoses and symptoms were assessed prenatally via semi-structured clinical interviews, while infants’ negative temperamental dispositions were investigated via standardized observational paradigms at 12 months.

Chapter 4 is a follow-up study of the sample investigated in Chapter 3 in toddlerhood (i.e., at 30 months). This study investigated the cross-sectional and longitudinal associations of maternal and paternal anxiety (expressed parental anxiety at 12 and
30 months and lifetime anxiety disorders) and of temperament at 12 months with children’s fear/avoidance at 30 months (n = 117). Parents’ expressions of anxiety and infants’ fear/avoidance of novelty were observed during encounters with social and nonsocial novel stimuli (i.e., a stranger and a remote-control robot toy) at 30 months in a social referencing paradigm.

Chapter 5 describes a study investigating the associations of infants’ sad and fearful temperament and of parents’ depression and anxiety with 13-to-16-month old infants’ attention allocation to facial expressions of emotion in typical development. Infants’ (n = 57) attention was measured during the presentation of fearful, sad, angry, and happy (vs. neutral) facial expressions with an eye-tracker. The duration of infants’ fixations to positive and negative facial expressions was used as a behavioral index of infants’ attention, while infants’ pupil responses to positive and negative expressions were used as a physiological index of attention and arousal in this study. Information on parents’ negative affect, depression and anxiety, and infants’ temperament was obtained via questionnaires filled in by both parents.

Chapter 6 is a study investigating the associations of infants’ sad and fearful temperament and of parents’ negative affect, depression and anxiety with 14-to-17-month old infants’ attention to unfamiliar objects paired with positive and negative (vs. neutral) facial expressions. Infants’ pupil responses (n = 57) were measured with an eye tracker during the presentation of unfamiliar objects alone, before and after being paired with sad, fearful, and happy (vs. neutral) expressions heading/gazing towards (vs. away) from the object. Negative affect, depression and anxiety in parents, sad and fearful temperament in infants were measured via questionnaires filled in by both parents.

The dissertation ends with a discussion and integration of the research findings from the Chapters 1 through 6, followed by limitations, future directions and clinical implications.