# Future parents: Childhood experiences, oxytocin and emotion recognition skills

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# Chapter 1

## General Introduction

Infants depend on their caregiver for fulfillment of basic needs, and absent or inappropriate care can have profound consequences for the bio-physical and psycho-social development of the child (e.g., Alink, Cicchetti, Kim, & Rogosch, 2012). Not all caregivers are equally able to provide the care needed, and sometimes child abuse and/or neglect is the result. It is therefore crucial to get more insight in how and why individuals differ in their responses to infant signals and in how these differences may eventually interfere with parenting behavior. A better understanding of these individual differences in 'future parents' may allow us to identify those at risk for harsh parenting before they have children of their own, and to prevent this risk from materializing.

***Childhood maltreatment and risk for maltreating***

The prevention of child abuse and neglect should be one of the highest scientific and policy priorities considering the vast prevalence rates (Stoltenborgh, Van IJzendoorn, Euser, & Bakermans-Kranenburg, 2011) and the devastating consequences of child maltreatment (Alink et al., 2012; Buckingham & Daniolos, 2013; Cyr, Euser, Bakermans-Kranenburg, & Van IJzendoorn, 2010). To be able to effectively prevent child maltreatment, we should try to identify those families who are at risk, if possible even before children are born into these families. Earlier studies have reported various factors that put an individual at higher risk for becoming a maltreating parent, such as having a history of childhood maltreatment, low social economic status and having mental health problems (Black, Heyman, & Slep, 2001; E.M. Euser, Van IJzendoorn, Prinzie, & Bakermans-Kranenburg, 2010; S. Euser et al., 2013; Stith et al., 2009). However, not all individuals who have one or more risk factors become child abusers. In the longitudinal Minnesota study, Sroufe, Egeland, Carlson, and Collins (2005) report that of those adults who were abused as a child, 40% started to abuse their own children, 30% did not take sufficient care of their children and 30% did take adequate care of their children. This raises an important question: Why is it that some children who were abused in childhood start abusing their own children in adulthood, whereas others with the same childhood experiences become good-enough or even excellent parents?

For one, it may be that not everyone is equally influenced by their childhood experiences. Some individuals may be more susceptible to both positive and negative environmental influences (differential susceptibility theory; Belsky, Bakermans-Kranenburg, & Van IJzendoorn, 2007; Ellis, Boyce, Belsky, Bakermans-Kranenburg, & Van IJzendoorn, 2011) and several susceptibility factors such as genotype or temperament have been reported (e.g., Bakermans-Kranenburg & Van IJzendoorn, 2006; Van Zeijl et al., 2007). For example, when exposed to insensitive or low-quality care, children with difficult temperament showed more problem behavior than those with an easy temperament. But when the quality of care was high, these children with difficult temperament benefitted

more and showed even less problem behavior compared to the children with an easy temperament (Bradley & Corwyn, 2008; Pluess & Belsky, 2009). In addition, Aron, Aron, and Davies (2005) found that those with adverse childhood experiences were likely to be more shy and to show more negative affectivity than those without these experiences, but only if they were highly sensitive. These findings may indicate that temperament may play a moderating role in the intergenerational transmission of abuse.

Another factor explaining why some children with abuse experiences start abusing their own children in adulthood whereas others become adequate parents may be that different forms of child abuse may have different effects on later parenting. Different subtypes of child maltreatment can be distinguished, including sexual abuse, physical abuse, physical neglect, emotional abuse, and emotional and educational neglect (e.g., Sedlak et al., 2010). Although these subtypes often co-occur and the literature shows inconsistencies in defining subtypes of child abuse, it is important to try and examine the effects of these subtypes separately, as previous studies have suggested that the long-term effects of abuse may be depending on subtype (e.g., Gilbert et al., 2009). In Chapter 2 of this thesis we present a study in which we examined the relation between experiences of childhood maltreatment and the risk of becoming a perpetrator of child abuse in adulthood. We examined how different forms of childhood maltreatment relate to the risk for child abuse, and whether these associations are moderated by temperamental sensitivity. In addition, Chapter 5 presents a study which introduces a paradigm to assess sensitivity in response to infant crying, which can be used in individuals without children. This provides the opportunity to identify individuals at risk based on behavioral measures before they have children of their own.

***Interpreting infant signals and sensitivity***

An important aspect of caregiving is parental sensitivity. Sensitivity can be described as the ability of a caretaker to accurately perceive and interpret the infant's (implicit and explicit) signals, and to respond to these signals appropriately (Ainsworth, Bell, & Stayton, 1974, p. 127). One way to assess parental sensitivity is by using the Ainsworth Sensitivity Scales (Ainsworth et al., 1974). The Ainsworth Sensitivity Scale was developed for extensive naturalistic observations (Ainsworth et al., 1974) and while long-term observations are still used (Higley & Dozier, 2009; Van IJzendoorn & Hubbard, 2000), more time-efficient methods such as the observation of play sessions have grown popular (e.g., McElwain, Cox, Burchinal, & Macfie, 2003; Vereijken, Riksen-Walraven, & Kondo-Ikemura, 1997). However, these play sessions are often limited in their opportunities to observe parental behavior in response to infant distress. In addition, when infant distress occurs, the level of infant distress varies between dyads, creating different and potentially incomparable challenges

for the parents who are observed. As the responsiveness to infant distress is an essential dimension of sensitivity and crucial to the prediction of attachment security (Bowlby, 1969, 1984; Goldberg, Grusec, & Jenkins, 1999; Thompson, 1997), this is an important limitation. With the LISSA (Chapter 5) we aimed at introducing a standardized experimental setting for the assessment of sensitive parenting, in which several opportunities are presented to observe sensitivity in response to standardized distressed infant cues.

When infants are in the preverbal stage of their development, they have limited ways of communicating their needs to their caregiver. For infants, crying is one of the most effective ways to communicate (Zeifman, 2001). Crying evokes empathic emotional responses which in turn induces sensitive caregiving to meet the needs of the child (Dix, Gershoff, Meunier, & Miller, 2004). However, not all caregivers respond in this way, as crying can also evoke negative emotional reactions potentially leading to harsh caregiving responses (Dix et al., 2004). A nation-wide epidemiological study in the Netherlands showed for example that 6% of the parents had smothered, slapped, or shaken their infant in response to its crying already in the first year after birth (Reijneveld, Van der Wal, Brugman, Sing, & Verloove-Vanhorick, 2004). In addition to these differences in emotional and behavioral responses, caregivers may also differ in their ability to interpret infant signals. Research focusing on the more subtle infant signals such as facial emotional expressions show that when viewing a picture of an infant's face, abusive fathers perceived the infant emotions in a more negative light than non-abusive fathers (Francis & Wolfe, 2008) and that neglecting mothers were more inaccurate in labeling the infant emotions than non-neglecting mothers (Hildyard & Wolfe, 2007). These studies underline the importance of getting more insight in the mechanisms underlying differences in emotion recognition, since an appropriate caregiving response starts with accurate interpretation of the infant signals.

***Oxytocin and parenting***

An important role in sensitive parenting is attributed to the neuropeptide oxytocin. Oxytocin is well known for its role in pregnancy, lactation and initiation of maternal care in animals (Carter, 1998). A growing body of research also suggests an important role of oxytocin in human caregiving (e.g., Feldman, Weller, Zagoory-Sharon, & Levine, 2007; Galbally, Lewis, Van IJzendoorn, & Permezel, 2011). For example, it has been shown that higher levels of maternal oxytocin across pregnancy predict higher quality of postpartum maternal behavior (Feldman et al., 2007). Neuropeptides have shown to cross the blood-brain barrier after intranasal administration (Born et al., 2002; Neumann, Maloumby, Beiderbeck, Lukas, & Landgraf, 2013) and effects of intranasal oxytocin on social behavior and neural activity have been reported in several studies (see for reviews Guastella & MacLeod, 2012; Van IJzendoorn & Bakermans-Kranenburg, 2012). These studies showed that oxytocin stimulates a range

of social behaviors, including trust, empathy and sensitive parenting. However, the effects of oxytocin may not be the same for everyone and under all circumstances (Bartz, Zaki, Bolger, & Ochsner, 2011). For example, intranasally administered oxytocin only decreased the use of excessive handgrip force when listening to infant crying in subjects with few or no harsh caregiving experiences in childhood (Bakermans-Kranenburg, Van IJzendoorn, Riem, Tops, & Alink, 2012). In addition, in a study using event-related potentials (ERPs) oxytocin enhanced the processing of emotional faces with a larger increase in participants who experienced low levels of maternal love withdrawal compared to those who experienced higher levels of maternal love withdrawal (Huffmeijer et al., 2013).

Increased performance in emotion recognition tasks after intranasally administered oxytocin has been reported in earlier studies (e.g., Domes, Heinrichs, Michel, Berger, & Herpertz, 2007; Fischer-Shofty, Shamay-Tsoory, Harari, & Levkovitz, 2010; Marsh, Yu, Pine, & Blair, 2010) suggesting that oxytocin may enhance the underlying process of emotion recognition. Indeed, brain regions important for the processing of facial emotional stimuli (e.g., Kesler-West et al., 2001; Lenzi et al., 2009; Prochnow et al., 2013) such as the amygdala, insula, inferior frontal gyrus, and the superior temporal lobe are also reported to be affected by intranasally administered oxytocin (for a review see Rilling, 2013). In two of the studies presented in this thesis we used functional magnetic resonance imaging (fMRI) to get more insight in the effects of oxytocin on neural activity during emotion recognition.

***Focus and outline of the thesis***

The general aim of the current thesis is to gain more insight into individual differences that influence parenting skills and that are already present *before* the start of parenthood. We examine the long-term effects of adverse childhood experiences on future parenting on the one hand, and the associations between oxytocin, the experiences of maternal love withdrawal, emotion recognition skills and neural activation in response to infant stimuli on the other. Next to providing more insight in these mechanisms underlying parenting behavior, we introduce a behavioral measure of parental sensitivity that can be used to identify individuals at risk before they have children of their own.

To shed more light on the intergenerational transmission of child abuse we describe in Chapter 2 how different types of childhood maltreatment relate to child abuse potential in adulthood, and whether these relations are moderated by temperamental sensitivity. Chapter 3 and 4 of this thesis focus on the effects of intranasally administered oxytocin, as well as the potentially moderating role of experiences of maternal love withdrawal on neural activity during the processing of emotional facial stimuli using fMRI. Chapter 3 focuses on the neural activation during inferring mental states from pictures of the eye region of adult faces. The study presented in Chapter 4 extends the findings of the study in Chapter 3 by

examining the neural activation during emotion recognition from pictures of infant faces. Chapter 5 concerns the measurement of sensitivity in parents-to-be. More specifically, we present and test the validity of a new paradigm for the standardized observation of sensitive care giving, the Leiden Infant Simulator Sensitivity Assessment (LISSA). In the last chapter, the findings of the studies are discussed and implications of the studies are presented.

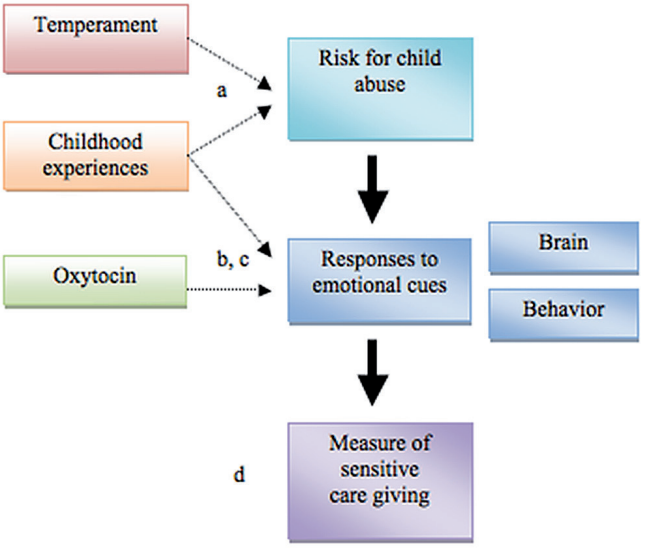


*Figure 1.* Graphic representation of the topics in this thesis. In Chapter 2 we examine the relation of childhood maltreatment with child abuse potential in adulthood and the possible moderating role of temperament (a). In Chapter 3 and 4 we present studies testing the effect of oxytocin on performance and neural activity during emotion recognition, and the potential moderation of the effect of oxytocin by childhood experiences (b,c). Chapter 5 describes a study in which we introduce a paradigm that allows for observation of sensitive behavior in response to standardized infant signals (d).

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