



Infant interest in their mother's face is associated with maternal psychological health[☆]



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ABSTRACT

Early experience can alter infants' interest in faces in their environment. This study investigated the relationship between maternal psychological health, mother–infant bonding, and infant face interest in a community sample. A visual habituation paradigm was used to independently assess 3.5-month old infants' attention to a photograph of their mother's face and a stranger's face. In this sample of 54 healthy mother–infant pairs, 57% of mothers ($N = 31$) reported symptoms of at least one of stress response to trauma, anxiety, or depression. Interest in the mother-face, but not stranger-face, was positively associated with the mother's psychological health. In regression analyses, anxiety and depression predicted 9% of the variance in looking to the mother-face. Anxiety was the only significant predictor within the model. No direct associations were found between mother–infant bonding and infants' face interest. Taken together, these findings indicate that infant's visual engagement with their mother's face varies with maternal symptoms of emotional distress, even within a community sample.

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Shortly after birth, infants show a preference for looking at their mother's face compared to the face of a female stranger (Barrera & Maurer, 1981; Bushnell, Sai, & Mullin, 1989; Field, Cohen, Garcia, & Greenberg, 1984; Pascalis, de Schonen, Morton, Deruelle, & Fabre-Grenet, 1995). A preference for the stranger emerges at around 4–5 months as infants become increasingly interested in novelty (Bartrip, Morton, & de Schonen, 2001). Whilst considerable attention has been devoted to understanding how infants learn to recognize their mother, individual differences in infants' face interest have rarely been explored. The initial mother-face preference is thought to be important as it may enhance bonding and provide the infant with a reliable source of comfort and affect regulation (Blass & Camp, 2003). Thus, associations may exist between infant interest in the mother's face, maternal psychological health, and the mother–infant relationship.

Experience with different faces in the visual environment impacts on the development of the face processing system. For example, 3-month-old infants show a visual preference for faces that match the gender of their primary caregiver (Quinn, Yahr, Kuhn, Slater, & Pascalis, 2002) and for faces of their own ethnic group (e.g., Bar-Haim, Ziv, Lamy, & Hodes, 2006; Kelly et al., 2005). Infants are proposed to begin life with a general mechanism dedicated to processing faces that subsequently becomes “tuned” to human faces as a direct consequence of the facial input received within the first months of life (Nelson, 2001). According to this account, the infant begins life with a crude and unspecified face representation that is then subject to modification as a result of the category of facial input received. North American infants experience a

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significantly greater amount of interaction with female individuals relative to male individuals (Rennels & Davis, 2008), which would explain the female preference typically observed at 3 months of age. In contrast, infants whose primary caregivers are male have a preference for male instead of female faces (Quinn et al., 2002). Thus, differential experience with male and female faces results in a spontaneous preference for the more familiar face type. The typical mother-face preference may then be interpreted as a consequence of the amount of time infants have spent with their mother and/or the quality of their face-to-face interactions. The purpose of the current research is to explore potential associations between maternal factors and infants' interest in the face of their mother and a stranger.

Within the general population there is extensive variation in maternal psychological health, with clinical levels of anxiety and depression observed in around 8–18% of mothers post childbirth (e.g., Cooper, Campbell, Day, Kennerley, & Bond, 1988; Davies, Slade, Wright, & Stewart, 2008; Scott, Couser, Schilder, O'Hara, & Gorman, 1998). Maternal psychological health impacts on early mother–infant bonding (Carter, Garrity-Rokous, Cahzan-Cohen, Little, & Briggs-Gowan, 2001; Stanley, Murray, & Stein, 2004) and is associated with later infant cognitive development, with postpartum depression being related to poorer infant cognitive scores at 18 months of age (Righetti-Veletma, Bousquet, & Manazo, 2003). In addition, a further group of mothers are likely to be affected by sub-clinical levels of emotional disorders which may impact on her interactions with, or perceptions of, her child.

For some women, childbirth itself can be a traumatic event, even when the result of this experience is a healthy baby. The prevalence of childbirth related post-traumatic stress disorder (PTSD) is reported to be between 1.25% and 3% (e.g., Ayers & Pickering, 2001; Czarnocka & Slade, 2000; Söderquist, Wijma, & Wijma, 2006), with up to a third of mothers from a community sample reporting partial post-traumatic stress (PTS) symptoms of intrusive thoughts, avoidance, or hyperarousal (e.g., Maggoni, Margola, & Filippi, 2006). Although the prevalence of child-birth related PTS symptoms is usually measured within the first 6 months, some women experience clinically significant levels up to 2 years postpartum (McDonald, Slade, Spiby, & Illes, 2011). Mothers with full or partial PTSD symptoms at 6 weeks have also reported viewing their infant as more emotionally demanding and disturbing (“invasive”) and less warm than non-symptomatic mothers (Davies et al., 2008). Early PTS symptoms have also been associated with later parenting distress (McDonald et al., 2011). Given the prevalence of psychological symptoms in mothers postnatally, there is cause to consider the potential associations between maternal psychological health, early infant development and bonding, and infant interest in interacting with his or her mother.

Recently, researchers have begun to examine the effects of maternal depression on infants' mother face interest. These studies have shown that infants of clinically depressed mothers appear to be less responsive to the combined presentation of faces and voices (for review see Field, Diego, & Hernandez-Reif, 2009). For example, maternal depression is associated with increased infant arousal and reduced attention when 3-month-old infants are tested in a live interaction involving a face/voice stimulus (Hernandez-Reif, Field, Diego, & Ruddock, 2006; Hernandez-Reif, Field, Diego, Vera, & Pickens, 2006). To date, however, only one study (Hernandez-Reif, Field, Diego, & Largie, 2002) has considered the association between maternal psychological health and infant interest in their mother's face compared to a stranger's face. In this study, 1- to 3-day old infants of mothers experiencing clinical depression showed less interest in their mother's face compared to infants of non-depressed mothers. The conclusions of this study are, however, limited for three key reasons. First, this study used a very small sample size of ten mothers in each of the depressed and control groups. Second, infants were tested at 1- to 3-days of age when mother–infant interactions and bonding remain limited. Third, infant behavior was assessed within the context of the mother–infant interaction and, thus, may have been influenced by maternal responsiveness. The inclusion of verbal interaction with the infant, which may in itself have been affected by maternal mood, was also part of the stimulus presentation and may have guided the infant's visual attention more than the faces. The use of photographed stimuli, as used extensively in the face perception literature (Pascalis et al., 1995; Bartrip et al., 2001) to assess infant interest in the mother-face, would allow assessment without the confound of mother–infant interaction within the testing session.

The current study investigated the potential association between maternal psychological health, bonding (as measured by maternal perception of their infant), and infant interest in the mother-face and stranger-face within a community sample of mothers and their 3.5-month-old infants. Given that the mother-face represents a special stimulus for the young infant (Blass & Camp, 2003), and the proposal that maternal symptoms of psychological distress may impact on the mother–infant relationship and on the infant's development or behavior (Ayers & Pickering, 2001), we predicted that maternal psychological health and bonding would be associated with interest in the mother's face than the stranger's face. Specifically, we predicted that infants would show longer looking at their mother's face if the mother reported no symptoms of psychological distress, than if she reported symptoms of depression, anxiety, PTS symptoms, or lower levels of mother–infant bonding. Based on the assumption that attention to the stranger's face is driven by attraction to novelty (Bartrip et al., 2001), we hypothesized that interest in the stranger face would stay constant, regardless of maternal well-being or the mother–infant relationship.

1. Method

1.1. Participants

The final sample consisted of 54 infants (28 male, 26 female) aged 3.5 months (± 10 days) and their mothers. Mothers had a mean age of 32.7 years ($SD = 5.35$ years) and were drawn from a community sample recruited from the local maternity ward. No infants were born more than 14 days before their expected due date or had experienced any birth complications. Infants were Caucasian (92%) and Asian (8%), and all were from families of moderate to high socio-economic status. An

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