Brief Report

Maternal alexithymic traits, prenatal stress, and infant temperament

T. Kantonen [a], L. Karlsson [a,b,*], S. Nolvi [a], M. Karukivi [a,c], M. Tolvanen [a,d], H. Karlsson [a,e]

[a] FinnBrain Birth Cohort Study, Turku Brain and Mind Center, Institute of Clinical Medicine, University of Turku, Turku, Finland
[b] Turku University Hospital and University of Turku, Department of Child Psychiatry, Turku, Finland
[c] Satakunta Hospital District, Psychiatric Care Division, Harjavalta, Finland
[d] Department of Community Dentistry, Institute of Dentistry, University of Turku, Turku, Finland
[e] University of Turku and Turku University Hospital, Department of Psychiatry, Turku, Finland

A R T I C L E   I N F O

A B S T R A C T

We aimed at investigating, whether maternal alexithymia or prenatal anxiety influences infant temperament (Infant Temperament Questionnaire, IBQ) at six months. Maternal alexithymic trait of "Difficulty in Identifying Feelings" predicted higher infant "Duration of Orienting". "Fear of Bearing a Handicapped Child" predicted lower infant "Activity Level".

Temperament refers to the individual differences in activity, affectivity, attention, and self-regulation resulting from interplay between biological dispositions and environment (Shiner et al., 2012). In Rothbart's (1981) theoretical framework, two major temperament dimensions in infants have been identified: negative emotionality referring to the intensity of fearfulness (fear) and anger proneness (distress to limitations); and positive emotionality including tendency to smile (smiling and laughter), attention span (duration of orienting), motor activity (activity level) and the effectiveness of the soothing techniques after negative affect (soothability). The importance of assessing infant temperament lies partially in its predictive characteristics. Temperament dimensions predict cognitive and emotion regulatory trajectories with developmentally specific characteristics: e.g. infant positive emotionality relates to later toddler effortful control, while positive emotionality later in childhood is more in the continuum of adult personality dimensions of extraversion and positive emotionality. High orienting capacity or attention is generally associated with later effortful control (Rothbart & Putnam, 2002). Infant negative emotionality is thought to be rather stable and predict adult negative emotionality and neuroticism (Deater-Deckard & Wang, 2012).

* Corresponding author at: FinnBrain Birth Cohort Study, Turku Brain and Mind Center, Institute of Clinical Medicine, University of Turku, Turku, Finland. Tel.: +358 407445052.
E-mail address: linnea.karlsson@utu.fi (L. Karlsson).

There is evidence, that maternal prenatal stress, i.e. symptoms of stress, anxiety or depression during pregnancy, is associated with increased infant negative affectivity (e.g. Baibazarova et al., 2013; Davis et al., 2007). Pregnancy-specific anxiety (PSA) predicts higher reactivity and lower goal-directedness, indicative of lower level of attention, in three- and eight-month-old infants (Buitelaar, Huizink, Mulder, de Medina, & Visser, 2003). Further, maternal PSA experienced during mid-gestation has been linked with child negative affectivity at two years of age (Blair, Glynn, Sandman, & Davis, 2011). In general, maternal PSA has been shown to be stronger predictor of birth outcomes compared to trait anxiety (e.g. Blair et al., 2011). Finally, maternal stress or PSA in specific, seems to contribute to the early programming of the brain, and has been linked with e.g. decreased brain gray matter volume in the prefrontal cortex of infants (Buss, Davis, Muftuler, Head, & Sandman, 2010) and neurocognitive outcomes (Buss, Davis, Hobel, & Sandman, 2011; Huizink, Robles de Medina, Mulder, Visser, & Buitelaar, 2003). However, research using infant temperament as an outcome of prenatal stress, is relatively scarce, so far.

Alexithymia is defined as multifaceted personality construct characterized by several deficiencies in emotional processing (Sifneos, 1973). Alexithymia is associated with difficulties in identifying and describing feelings, problems in distinguishing between bodily sensations and feelings, scarity of fantasies and externally oriented cognitive style. Alexithymia is also present in the context of several psychiatric disorders and somatic illnesses (Mattila, 2009). The role of parental alexithymia on infant development and temperament remains unknown. To our knowledge, prospective data on the associations of maternal alexithymia and child temperament or cognitive skills are not available, while some reports on the association between difficulties in identifying emotions and lower neurocognitive functioning (e.g. executive function) exist in adults (Koven & Thomas, 2010).

In this study, we wanted to examine the effects of maternal alexithymic traits and PSA on maternal report of infant temperament emphasizing the role of alexithymic traits, as this area has not been covered by earlier research. We expected, that both maternal PSA and alexithymic features would predict infant temperament characteristics at six months.

The present study population is derived from the first phase of the FinnBrain Birth Cohort Study (www.finnbrain.fi). The recruitment took place during the first trimester of pregnancy. The sample was recruited between May and December 2010. Initially, altogether 203 families agreed to enter the study, and of these $n = 153$ (75.4%) families actually returned the first questionnaires. Of these, the present sample comprises the mothers ($n = 102$; 66.7%), who returned the six-month study questionnaires. The mothers who dropped out, had significantly higher depression symptom scores ($p = 0.016$) and were more likely to have lower level of education ($p < 0.001$) than those remaining in the study (see measures below).

The background variables or potential confounders measured included maternal age, education (low < 10 years schooling, medium = 10–15 years schooling & high > 15 years schooling), smoking during pregnancy (yes/no), and infants gender and gestational weight. The level of education was distributed as follows: low 22.1% ($n = 21$), medium 26.3% ($n = 25$), and high 51.6% ($n = 49$). The mean length of gestation was 39.4 weeks (SE = 0.22), mean age was 29.8 years (SE = 0.49) and the mean gestation weight of the babies was 3480 grams (SE = 62.7). There were $n = 47$ girls (48.9%) and $n = 49$ boys (51.0%, data on sex was missing $n = 6$) in the sample. All of the subjects gave their written informed consent. The Joint Ethics Committee of the University of Turku and the Hospital District of South-West Finland has approved the study protocol.

Maternal prenatal depression was assessed as a potential confounder, by using the Edinburgh Postnatal Depression Scale (EPDS) (Choi et al., 2012; Cox, Holden, & Sagovsky, 1987) at gestational weeks 18–22 and 32–34. EPDS consists of 10 questions scored on a four-point Likert scale with 0–3 points/item. A single variable (EPDS mean score, simple average value) was created from the two prenatal EPDS scores.

IBQ (Infant Behavior Questionnaire; Rothbart, 1981) was used to assess infant temperament at the age of six months. The IBQ is a reliable and valid measure for infant temperament assessment (Rothbart, 1986) and it consists of 96 items measuring the threshold, intensity and activity of the child temperament traits in six subscales *Activity level*, *Smiling and laughter*, *Fear*, *Distress to Limitations*, *Soothability* & *Duration of Orienting*. In each question, mothers are asked to assess their infant's behavior in different everyday situations based on the past week. Both individual item scores and subscale total scores range between 1 and 7.

PRAQ-R (Pregnancy-Related Anxiety Questionnaire Revised) was used in gestational weeks 32–34 to assess maternal PSA. The PRAQ-R is a 10-item self-report and the scores on each item range from 1 (definitely not true) to 5 (definitely true), and has shown good internal consistency and correlation between the three dimensions (Huizink, Mulder, Robles de Medina, Visser, & Buitelaar, 2004). The PRAQ-R measures three dimensions of PSA: *Fear of Giving Birth* (factor 1), *Fear of Bearig a Handicapped Child* (factor 2) and *Concern about One's own Appearance* (factor 3).

Alexithymia was measured at gestational weeks 18–22 using the 20-item Toronto Alexithymia Scale (TAS-20) (Bagby, Parker, & Taylor, 1994; Bagby, Taylor, & Parker, 1994). Each item is scored by using a five-point Likert-type scale ranging from "strongly disagree" to "strongly agree" (theoretical range 20–100). TAS-20 consists of three factors representing alexithymia dimensions: *Difficulty in Identifying Feelings* (factor 1), *Difficulties in Describing Feelings* (factor 2) and *Externally Oriented Thinking* (factor 3). The psychometric properties of the scale, including its Finnish version, have been proven satisfactory in several populations (Taylor, Bagby & Parker, 2003; Mattila, 2009).

IBQ variables were normally distributed (for mean values see Table 1), but TAS-20 (range 23–68, mean 39.3, median 38.0, SD 9.53) and PRAQ-R (range 10–50, mean 23.4, median 23.0, SD 7.88) were asymmetrical. Associations between TAS-20 factor scores and PRAQ-R factor scores and IBQ-dimensions were evaluated with Spearman correlation coefficients (Table 1). Based on correlations, regression models with manual backward elimination for the temperament dimensions of *Duration of Orienting* and *Activity Level* were conducted with TAS-20 and PRAQ-R factor scores as independent variables. With the