Infant, maternal, and familial predictors and correlates of regulatory problems in early infancy: The differential role of infant temperament and maternal anxiety and depression

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A B S T R A C T

Abstract background: Excessive infant crying, feeding and sleeping problems are likely to emerge from the complex interplay of various factors.
Aims: To investigate the role of infant (e.g., temperament), maternal (e.g., anxiety and depressive disorders), and familial (e.g., social support) factors as potential precursors of infant regulatory problems.
Study Design: Prospective-longitudinal study.
Subjects: 286 mother-infant dyads were investigated from early pregnancy until 16 months postpartum via questionnaires and interviews.
Outcome measures: Regulatory problems at 2, 4 and 16 months postpartum assessed by standardized diagnostic interviews.
Results: Fussy infant temperament and maternal anxiety disorders were associated with excessive infant crying (OR=1.16, 95%CI:1.05-1.29, OR=3.28, 95%CI:1.16-9.26) and feeding problems (OR=1.05, 95%CI:1.01-1.11, OR=2.27, 95%CI:1.36-3.80) whereas maternal depressive disorders were associated with infant sleeping problems (OR=2.55, 95%CI:1.06-6.11). Moreover, high maternal age (OR=0.86, 95%CI:0.75-0.98) was associated with a lower risk for excessive crying and being a single mother (OR=0.16, 95%CI:0.03-0.73) and cognitive reappraisal to regulate emotions (OR=0.59, 95%CI:0.36-0.96) was associated with a lower risk for sleeping problems.
Conclusion: Excessive infant crying and feeding problems may be related to interactional deficits of anxious mothers who perceive their infants as "difficult" during soothing or feeding situations. Sleeping problems may be transmitted already during pregnancy by an altered sleep-wake-rhythm of mothers with a history of depression or by a genetic predisposition. Therapeutic interventions should focus on maternal anxiety and depression, behavior management techniques to cope with difficult situations with "fussy" infants and potential protective factors (e.g. favorable maternal emotion regulation) to address crying, feeding and sleeping problems.

1. Introduction

Approximately a fourth of all infants suffer from regulatory problems such as excessive infant crying, feeding or sleeping problems during the first three years of life [1,2]. These problems evoke significant distress in parents [3,4] and represent the most frequent reasons for pediatric consultation [2,5]. Although regulatory problems constitute transient problems in many cases, they persist in some infants and especially multiple regulatory problems are considered as powerful precursors of adverse social-emotional/behavioral development and subsequent mental disorders [6–8]. Albeit different infant, maternal, and familial factors were described as potential predictors/
correlates for excessive infant crying, feeding and sleeping problems, specific risk constellations for the respective regulatory problems remain to be determined.

According to current classification systems and guidelines [9], regulatory problems in early infancy are defined as unfavorable (i.e., distorted) interaction between infants and their parents and characterized by a symptom triad, including characteristics of the infant, the mother and the mother-infant dyad. Accordingly, maternal anxiety and depressive symptoms/disorders are considered as prominent risk factors for regulatory problems in infants [10,11]. However, it has been proposed that further factors of the infant (e.g., intrauterine exposure to nicotine and alcohol [12,13], low gestational age and/or low birth weight [1], infant temperament [14], male gender [15], and tension/ blockades (dysfunction of the musculoskeletal system) [16]), as well as other maternal factors (e.g., unplanned pregnancy [2], low education [13], impaired bonding [13], unfavorable emotion regulation strategies [18], low levels of optimism, self-efficacy and self-esteem [19,20], personality [20]), along with genetics (see discussion) and other factors of the family (e.g., unplanned pregnancy [20], parental partnership problems [20], low social support [20]) may also increase the risk for the development of regulatory problems. However, the specific associations of these variables with the particular regulatory problem remain to be elucidated (see Fig. 1).

The initial aim of the Maternal Anxiety in Relation to Infant Development (MARI) study was the investigation of the prospective associations of maternal anxiety and depressive disorders prior to, during and after pregnancy and early infant development. As already reported by Petzoldt and colleagues [11], maternal anxiety disorders were specifically associated with infant crying and feeding problems, whereas maternal depressive disorders were specifically related to infant sleeping problems [11]. The present publication further investigates the specific relations of additional infant, maternal, and familial factors with particular infant regulatory problems to clarify their multifactorial etiology. We aim to investigate risk patterns for the development of excessive infant crying, feeding and sleeping problems. As protective factors were largely neglected in prior research, a-priori predictions could not be readily formulated. Nonetheless, a lower risk for regulatory problems was expected, when mothers indicated favorable characteristics (e.g., favorable emotion regulation strategies, high levels of self-efficacy).

Thus far, many studies used a retrospective design, neglecting the distinction between partially overlapping concepts of regulatory problems. Thus, we use prospective methodological sound multi-wave assessments (e.g., standardized diagnostic interviews, validated questionnaires) to investigate the associations of risk and protective factors with particular regulatory problems in a non-selective community sample.

2. Methods

2.1. Procedure

The prospective-longitudinal Maternal Anxiety in Relation to Infant Development-Study (MARI, 01/2009–09/2012 [21]) was designed to examine expectant mothers and their infants from early pregnancy until 16 months postpartum (T1:10–12 weeks of gestation; T2:22–24 weeks of gestation; T3:35–37 weeks of gestation; T4:10 days postpartum; T5:2 months postpartum; T6:4 months postpartum; T7:16 months postpartum), using standardized diagnostic interviews, questionnaires and observations. All participants provided written informed consent after the study aims were fully explained. The study was carried out in accordance with the American Psychological Association (APA) ethical standards and has been approved by the Ethics Committee of the Medical Faculty of the Technische Universität Dresden (No: EK 94042007). Further information on methods and design of the study is published elsewhere [21].

2.2. Participants

A total of 533 pregnant women were approached by the study team in gynecological outpatient settings in the area of Dresden (Germany) and screened for inclusion and exclusion criteria. Fifty women were excluded based on the exclusion criteria, which were as follows: gestational age < 12 weeks (n = 8), younger than 18 or older than 40 years (n = 8), multiple pregnancy (n = 2), history of > 3 spontaneous abortions/(induced) terminations of pregnancy/ stillbirths or infant impairment (n = 2), invasive fertility treatment (n = 9), severe physical disease/microsomia/skeletal malformation (n = 6), substance abuse or heroin substitution during the past 6 months (n = 0), severe psychiatric illness (n = 2), expectation to leave the area of Dresden (n = 6), and insufficient mastery of German language (n = 7). Additional 9 women did not participate due to spontaneous abortion before baseline interview (T1), 10 due to lacking consent of partner, 154 due to lacking time, and 4 due to unknown reasons [21].

Overall, data of 306 women were eligible for the MARI study. As reported by Martini and colleagues [22], the sample was representative with respect to monthly household income, but the participating women reported a higher educational level (high school: 35.9% vs. 15.2%), parity (1.09 vs. 0.97), age (39.9 ± 6.7 vs. 37.0 ± 5.4 years) and poor health (2.4% vs. 7.4%) as compared to the general female population of Saxony (Germany). Infants of the study were comparable with regard to sex and type of delivery. However, a higher proportion of mothers were primiparous (58.2% vs. 51.5%, Z = 2.33, p = 0.020), less often born preterm (3.9% vs. 7.8%, Z = 2.13, p = 0.011) with a birth weight lower than 2500 g (2.1% vs. 5.1%, Z = 2.24, p = 0.017). The distribution of infants’ birth weight above 2500 g was comparable to reference data [22].

![Fig. 1. Predictors of regulatory problems according to current classification systems and guidelines [9].](image-url)
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