

Title: Prevalence, comorbidity, and factors associated with sleeping, crying and feeding problems at 1 month of age: A community based survey.

Running head: Sleeping, crying and feeding problems at 1 month of age

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Authors' contributions

Dr Cook contributed to the conceptualization and design of the study, drafted the manuscript, acted as program manager during data collection and carried out data analysis in conjunction with Dr Mensah. Dr Mensah oversaw data analysis and contributed to drafting the manuscript. Dr Bayer contributed to the conceptualization and design of the study and contributed to drafting the manuscript. Professor Hiscock conceptualized and designed the study and contributed to drafting the manuscript.

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Competing interests

The authors have no competing interests to report.

Abstract

Aim: To examine in a community cohort of healthy 1-month-old infants, (1) the prevalence of early infant sleeping, crying and feeding problems, (2) the extent to which they co-exist and (3) infant and mother characteristics associated with each problem alone and with comorbid problems. **Method:** A survey at four weeks of infant age examined presence of infant sleeping, crying and feeding problems (yes/no), parenting self-efficacy, rating of self as a tense person and doubt about parenting at bedtime. **Results:** 770 mothers (39% of those approached) with a total of 781 infants (11 twins) took part. Infant sleep, crying and feeding problems were reported by 38.5%, 27.4% and 25.2% of mothers, respectively. On comorbidity, 25.5% reported one problem, 20.5% reported two, and 7.3% reported all three problems. Mothers of first born infants reported more crying problems and comorbid problems. Mothers who described themselves as a 'tense person' reported more infant feeding problems. Maternal doubt and low self-efficacy were consistently associated with each type of infant problem, and comorbid problems (adjusting for other factors). **Conclusion:** Mothers expressing doubt and low parenting self-efficacy may benefit from **additional support and guidance on normal infant behaviour**.

Keywords: Sleeping, crying, feeding, regulatory problems, comorbidity

Word count: 2500

What is already known on this topic?

- Infant regulatory problems (sleeping, crying and feeding problems) are common in the first year postpartum (~15-30%).
- Infant regulatory problems are associated with poor emotional and behavioural outcomes during childhood.
- Little is known about the prevalence or comorbidity of these problems in the first few weeks of life, a time when targeted intervention or universal prevention, may be appropriate.

What this paper adds.

- First-time mothers are more likely to report infant crying problems, and tense mothers are more likely to report infant feeding problems
- Mothers experiencing doubt about their parenting and reporting poor self-efficacy are more likely to report infant regulatory problems, with doubt increasing and efficacy decreasing for each additional problem reported.

- Mothers experiencing infant regulatory problems, who also report feeling tense, have doubts about their parenting, low parenting self-efficacy, and/or are first-time mothers, require support.

INTRODUCTION

Unsettled infant behaviour is common during the first few months postpartum. Around 15-35% of parents report that their infants sleep is a problem, with concerns typically focused on frequent night waking and/or difficulties initiating sleep. (1,2) Waking at night to feed is normal, and it may be several months before sleep consolidates into longer settled periods.(3) Despite this, many parents report that their infant has a sleep problem, often seeking help from multiple sources including the internet, general practitioners, health nurses, or residential parenting centres ('sleep-schools').(4,5)

Infant crying problems are also common (14-28%), with parents reporting frustration and guilt when crying is inconsolable.(6,7) Evidence suggests persistent infant crying occurs despite high quality maternal care.(8) These infants are likely following the typical pattern of infant crying, involving a slight peak in crying duration at around 6 weeks of age (often during the evening), which rapidly declines by around 3 months of age.(9) Many parents seek help for their infant's crying in the belief that there is a physiological explanation that requires treatment. Excessive crying is often attributed to gastroesophageal reflux, however, research indicates no association between the two, and anti-reflux medications such as proton-pump inhibitors and ranitidine have no benefit over a placebo in infants with excessive crying.(10,11) It is estimated that only 5% of infants with excessive crying have an organic cause.(12)

Problems with infant feeding are common (~20%)(13) and linked to parent stress and increased health service use.(14) Infant feeding problems typically relate to inadequate attachment to the breast, issues with suckling, and frequent vomiting. Together, infant sleeping, crying and feeding problems are termed 'regulatory problems'. There is evidence that regulatory problems can have long term negative impacts on toddler eating and feeding behaviour and increase risk of later child sleep and behaviour problems.(15,16)

While clinicians and parents alike tend to report some co-occurrence of sleeping, crying and feeding problems,(17) there is little empirical evidence documenting rates of comorbidity during very early infancy. This is despite mounting evidence that these comorbid problems in infancy can be associated with childhood emotional and behavioural difficulties.(15,18) The earliest examination of comorbid problems found by the authors focused on infants at 5 months of age.(17) At 5 months around 20% of parents reported either sleeping, crying or feeding problems, with 14.6% reporting two or more of these problems. Despite a majority of these behaviours being part of normal infant development, parent perception of a problem may drive health care use in the first few months postpartum.(4,5) This raises concerns regarding (1) long wait times, (2) costs to the health care system and to the families, (3) misdiagnosis of a medical cause for the behaviour and (4) unnecessary stress felt by parents. If education about normal infant behaviours and strategies for their management is provided to parents, evidence shows that maternal depressive symptoms can be reduced,(19,20) as can maternal report of infant sleep and crying problems(21). Identification of characteristics associated with single or comorbid occurrence of infant sleep, crying and feeding problems, may indicate ‘at risk’ families for targeted early intervention. If there are no such identifying characteristics, universal prevention strategies may be warranted. No study has examined the prevalence of comorbidity and factors related to co-occurring infant sleep, crying and feeding problems during the first month postpartum, a time when universal prevention or targeted intervention may be helpful.

In a community sample of very young infants, we aimed to document the (1) prevalence of infant sleep, crying and feeding problems by parent report, (2) extent to which they co-occur and (3) maternal characteristics associated with each problem and with comorbid problems. We hypothesized that parent report of infant sleeping, crying and feeding problems would be common at this early age, that these would frequently co-exist, and would be associated with increased maternal doubt, lower parenting self-efficacy and with being a tense person.

METHOD

Setting

This study took place in four (blinded) metropolitan local government areas (LGAs). Recruitment was carried out via the Maternal and Child Health (MCH) nursing service. This is a universal free service offered to all (blinded) families with scheduled visits covering 93% of all births post-partum. From February 2009 to May 2011, MCH nurses asked all parents of newborn infants at the first home visit (day 7-10 post-partum) if they would like to participate. Families were posted an information statement, consent form and a survey for the mother to complete. Parents with insufficient English, with infants born before 32 weeks gestation, or with a serious health concern, were excluded. Ethical approval for this research was obtained from (blinded) and the (blinded).

Participants

MCH nurses invited 1957 mothers to take part, of which 770 returned survey data (39.35%). Those who took part **lived in areas of less socioeconomic disadvantage (as indicated by the Socio-economic Indices for Areas (SEIFA) index of relative socio-economic disadvantage)** than those who declined participation (12.7% vs 9.1% from the highest SEIFA quintile). Compared to adults residing in the same state (blinded), participating parents were more likely to have a tertiary degree (71% vs 64%) and speak English as the main language (90% vs 72%).(22) As presented in Table 1, the sample comprised of 781 infants who were average birth weight, mostly born on time, and around 4 weeks of age. Most infants (92%) were receiving some breast milk. While most were first born, there was a range of 2nd-4th born infants. Mothers were on average aged 33 years (SD=4.5), mostly born in Australia (69%), spoke English as a first

language (90%), were married/de facto (97%), and tertiary educated (71%). Around a quarter of mothers (26.8%) considered themselves ‘a tense person.’

Measures

Items in the survey included: ‘Are any of the following a problem for you now? Your baby’s feeding (yes/no), sleeping (yes/no) and crying (yes/no).’(23) Data were gathered regarding infant gender, age (weeks), birth weight (grams), birth order, gestation, type of milk being given, and place of sleep (parents’ bed, own cot/bed in other room, own cot/bed in parents’ room or ‘other’). Caregiver characteristics included the ‘doubt’ subscale of the Maternal Cognitions about Infant Sleep Questionnaire,(24) which measures doubt about parenting at bedtime, and mothers were also asked to rate themselves as being a relaxed or tense person on a ten point Likert scale (Sayers, unpublished thesis, 2004). We dichotomised the latter score to ‘tense’ (i.e. scoring 7 or higher) or ‘not tense’ (a higher score is associated with greater infant irritability at nine weeks of age; Sayers, unpublished thesis, 2004). Mothers completed an item on self-efficacy: ‘How do you feel about yourself as a parent?’ with 1 indicating ‘not very good’ to 5 indicating ‘a very good parent’. Maternal sociodemographic data were collected and an Index of Relative Disadvantage score was allocated based on home postcode using the Socio-Economic Indexes for Areas (SEIFA)(22) in which higher scores indicate less socioeconomic disadvantage.

Analysis

Analyses were carried out using STATA version 14.0. Summary statistics were generated and bivariate tests were carried out (Chi-squared tests and t-tests) to examine associations between infant characteristics (gender, birth order, gestation, feeding type, birth weight and age at baseline), maternal characteristics (education, rating of self as a tense person, language

spoken, age, self-efficacy, doubt about parenting and socioeconomic disadvantage) and report of infant sleeping, crying and feeding problems. Bivariate tests were also carried out to examine associations between infant and maternal factors and report of comorbid infant problems. Factors showing a significant association with report of infant single or comorbid problems were further investigated using logistic regression. Potential confounding factors were identified a priori through review of the literature (infant age, gender, birth order and birth weight; maternal education, socioeconomic disadvantage, rating of self as a tense person, self-efficacy and parenting doubt) and both unadjusted and adjusted analyses were carried out.

RESULTS

Sleeping, crying and feeding problems were reported by 38.5%, 27.4% and 25.2% of the sample, respectively (Table 1). In total, over 53% of parents reported an infant regulatory problem at one month of age. While 46.7% of mothers reported no infant regulatory problems, 25.5% reported one problem, 20.5% reported two, and 7.3% reported all three problems. For mothers reporting only one regulatory problem, sleep (11.9%), followed by crying (5.5%) were most common. Most mothers reporting two problems reported sleep+crying problems (11.7%), followed by sleeping+feeding problems (6.9%).

Sleeping and crying problems were reported at greatest frequency by mothers of first-born infants (Table 2). Infant feeding problems were reported more often by mothers who were classified as being a 'tense person'. Mothers reporting sleeping problems had infants of slightly lower birth weight and each of the three problems were more likely to be reported when mothers had doubt about their parenting and poorer parenting self-efficacy (Table 2). Report of one infant problem was more likely in mothers with higher education, who felt they were a 'tense person', and who had infants of lower birth weight (Table 3). Report of two infant problems was more

likely for mothers of first born infants, and mothers' poor self-efficacy and doubt about their parenting ability predicted report of one, two and three infant problems (Table 3).

As indicated in Table 4, maternal self-efficacy and doubt were associated with each infant problem even after adjusting for other variables. In the adjusted analyses, maternal report of being a 'tense person' remained a significant predictor of infant feeding problems, and having a first born infant predicted report of crying problems. Birth order and birth weight were no longer related to report of sleep problems in the adjusted analyses.

Adjusted regression analyses indicated that mothers' poor self-efficacy and increased doubt remained associated with report of one, two, and three infant problems; and being first born was associated with report of two infant problems (Table 4). Infant birth weight, mother report of being a 'tense person' and mother's education were no longer associated with report of one infant problem.

DISCUSSION

Following an extensive search of the available literature, we believe this is the first community based cohort study of very young infants to examine prevalence, comorbidity and factors associated with maternal report of infant sleeping, crying and feeding problems. Overall, findings suggest that first time mothers are more likely to report that their infant has a crying problem, and tense mothers are more likely to report problems with feeding their infant. Mothers reporting greater doubt about their parenting and poorer self-efficacy are more likely to report problems with infant sleeping, crying and feeding. Almost 30% of mothers reported comorbid infant regulation problems.

First time mothers report more infant crying problems and comorbid problems, even when adjusting for other factors. Prior research has indicated that average crying frequency and

duration tends not to vary depending on birth order.(25,26) First time mothers may interpret normal unsettled infant behaviour as problematic because they are not familiar with typical infant behaviour. Support groups for new mothers could provide information on the normal peak in infant crying duration and strategies to both manage the infant behaviour and mothers' distress.

Mothers who rated themselves as a 'tense person' were at increased risk of reporting infant feeding problems after accounting for other factors. It is unclear whether maternal tension is a pre-existing issue that might be targeted for intervention prior to birth, or whether feeding problems created this tension. Prior research indicates that maternal stress can impact on suckling induced oxytocin release and cause problems with the supply of breastmilk.(27) Maternal stress, low self-esteem(28) and anxiety(29) have been shown to interfere with breast feeding. Providing social support and strategies that promote relaxation and reduce anxiety may be particularly beneficial for these mothers.(30)

Mothers with doubt about their parenting and low parenting self-efficacy were more likely to report individual and comorbid infant sleeping, crying and feeding problems. A dose-response relationship was observed, with doubt increasing and self-efficacy decreasing for each additional infant problem reported. These mothers may benefit from programs that (1) bolster parenting confidence through strategies such as positive self-talk and mindfulness, (2) use an anticipatory guidance approach to inform mothers about normal infant behaviour, and (3) provide evidence-based advice for managing unsettled infant behaviour.(20,21)

The proportion of the sample reporting infant sleeping (38.5%), crying (27.4%), feeding (25.2%) and comorbid (27.8%) problems was substantially higher than reported previously(17) (1995; 21.8%, 20.1%, 21.6% and 14.6%, respectively), and this is probably due to timing, and measures used. We examined parent *perceptions* of infant problems, as these are likely to drive health service use and help seeking behaviour. Wolke and colleagues used more objective

measures such as frequency of night waking and cry duration. We would also expect infant behaviour to be more settled by 5 months of age(9) and this could explain the difference in results from these two studies. At 4 weeks of age infants will wake to feed and sleep often is not well consolidated into longer uninterrupted blocks. Infants are approaching the slight peak in crying duration around 6 weeks of age. Our sample likely captured those who will experience persistent infant sleeping, crying and feeding problems, as well as those exhibiting normal infant behaviour that is perceived by parents as problematic. By 5 months of age, we would expect the latter group to no longer report infant problems as all three behaviours tend to settle somewhat by this age. Providing earlier support and anticipatory guidance about normal infant behaviour to these parents may be key to reducing maternal distress and unnecessary health care system use.(19,23)

Limitations

These findings are limited by the slightly higher socioeconomic **standing** and higher than average education of the sample. Caution should be applied when generalizing these findings to the broader population. When asked if their infant's sleep is a problem, parents likely answer based on the degree of interruption to their personal sleep, rather than the quantity or quality of the infant's sleep. **Additionally, parents may interpret any interruption to their personal sleep as problematic, even if they understand that infant night waking is normal.** Our measures of infant regulation were necessarily brief and do not explore the nature of what are likely complex and varying problems.

However, this study has several strengths, including the use of a large prospective community based sample that allows for precise estimates of the prevalence of these problems

and associated factors. Our findings provide the first indication of the prevalence, comorbidity and factors that predict parent report of infant regulatory problems in the first few weeks of life.

Conclusion

In a community sample of very young infants, sleeping, crying and feeding problems were commonly reported, with 27.8% of the sample reporting more than one problem. Mothers who describe themselves as tense, with doubt and low parenting self-efficacy, and/or first-time mothers, were more likely to report infant problems and comorbidity. **These mothers may benefit from anticipatory guidance around normal infant behaviour, strategies for coping with difficult infant behaviour, and increased parenting support and guidance.** Research could explore the most beneficial timing **and mode of delivery for this** support – in the antenatal period prior to the demands of early parenting, or during the postnatal period when concerns arise.

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Authors' contributions

Dr Cook contributed to the conceptualization and design of the study, drafted the manuscript, acted as program manager during data collection and carried out data analysis in conjunction with Dr Mensah. Dr Mensah oversaw data analysis and contributed to drafting the manuscript. Dr Bayer contributed to the conceptualization and design of the study and contributed to drafting the manuscript. Professor Hiscock conceptualized and designed the study and contributed to drafting the manuscript.

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Competing interests

The authors have no competing interests to report.