

**Postnatal Infant Crying
and Maternal Tiredness:
Examining their Evolution and
Interaction in the first 12 Weeks
Postpartum**

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Table of content

Table of content.....	3
Acknowledgements.....	5
Summary.....	8
References.....	12
1 Introduction.....	13
1.1 State of research in the field of postnatal infant crying and maternal tiredness.....	14
1.1.1 Maternal tiredness postpartum.....	14
1.1.2 Infant crying postpartum.....	16
1.2 Maternal tiredness and infant crying in the context of changing postnatal care practices.....	19
1.3 References.....	21
2 Aims of the study.....	27
2.1 Specific research questions.....	27
3 Crying Babies, Tired Mothers: What do we know? A Systematic Review.....	29
3.1 Abstract.....	30
3.2 Introduction.....	31
3.3 Methods.....	32
3.3.1 Search strategy.....	32
3.3.2 Characteristics of included studies.....	34
3.3.3 Methodological quality of included quantitative studies.....	35
3.3.4 Methodological quality of included qualitative studies.....	36
3.4 Results.....	37
3.4.1 Associations between amount of infant crying and degree of maternal tiredness.....	39
3.5 Discussion.....	42
3.5.1 Synthesis and Gaps in Knowledge.....	42
3.5.2 Implications for future research and clinical practice.....	43
3.6 Acknowledgments.....	44
3.7 References.....	45
4 Predictors of crying problems in the early postpartum period.....	48
4.1 Abstract.....	49
4.2 Background.....	50
4.3 Methods.....	51
4.3.1 Swiss context and data source.....	51
4.3.2 Study Design.....	52
4.3.3 Sample.....	52

4.3.4 Factors selected for analysis	53
4.3.5 Statistical Analysis.....	53
4.4 Results.....	54
4.5 Discussion	61
4.5.1 Strengths and limitations	64
4.5.2 Implications for research and practice	65
4.6 Acknowledgements	65
4.7 References	66
5 Crying babies, tired mothers – challenges of the postnatal hospital stay: an interpretive phenomenological study.....	69
5.1 Abstract	70
5.2 Background	72
5.3 Methods.....	73
5.4 Results	76
5.5 Discussion	83
5.6 Competing interests.....	87
5.7 Authors’ contributions.....	87
5.8 Acknowledgements	87
5.9 References	88
6. Synthesis of findings, Discussion and Perspectives.....	92
6.1 Discussion of key findings	93
6.1.1 The interplay of postnatal infant crying and maternal tiredness	93
6.1.2 Separating the chicken from the egg – the question of causality	94
6.1.3 The impact of mothers’ postpartum conditions.....	96
6.1.4 The impact of maternal experience with childcare	97
6.1.5 The impact of childcare beliefs	99
6.1.6 The impact of health professionals’ support	101
6.2 Conceptualizing the interplay of infant crying and maternal tiredness.....	103
6.3 Limitation and strengths: Discussion of methods	105
6.4 Implications for research.....	108
6.5 Implications for practice.....	110
6.6 Perspectives on the research project and translation of the evidence into practice.....	113
6.7 Conclusion.....	114
6.8 References	115

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Summary

“A new mother lazing in childbed is a blessing for her family” is an old Swiss proverb. Maternal rest and recuperation after birth was a common concern in the past and was frequently supported by the extended family. However, mothers today barely enjoy restful days after birth; instead they enter directly into the challenge of combining baby- and self-care. They often struggle to soothe a crying baby, while coping with their own exhaustion, which can adversely affect family health. Surveys on maternal health consistently report tiredness and fatigue as the most frequent complaint postpartum, affecting 46%-87% of new mothers [1, 2]. Inconsolable infant crying is the most cited reason why parents consult health professionals [3]. To date little is known on how mothers confront and handle these challenges after birth. Routine postnatal care lacks effective strategies to alleviate the burden of infant crying and maternal tiredness which can adversely affect family health in the earliest stage.

Following the traditional division between neonatal and maternal healthcare, research has usually focussed on conditions affecting *either* the mother *or* the neonate, but little attention has been given to the interplay of infant crying and maternal tiredness. While maternal tiredness after birth can be seen as normal reaction to the efforts of gestation and birth [4], maternal fatigue is more severe than tiredness, and can be defined as imbalance of activity and rest [5]. Whereas tiredness is naturally relieved in the circadian rhythm by periods of sleep, fatigue persists through the circadian rhythm, cannot be relieved through a single period of sleep, and is accompanied with a negative feeling [6]. Fatigue hampers the well-being of the affected person and is known as risk factor for the development of postpartum depression [7] and for a slightly less optimal development of the infants’ fine motor and coordinative skills [8].

Postnatal infant crying is currently regarded as a normal part of a child’s neuro-behavioural development following a typical curve which peaks during the sixth week postpartum at nearly 3 hours crying per day, and declines to below 1 hour per day by 12 weeks of age, with large inter-individual variation [9, 10]. Excessive crying is usually defined by ‘Wessel’s rule of three’. It lasts more than 3 hours on more than 3 days per week, and recurs for more than 3 weeks [3, 11]. Such crying behaviour is a known risk factor for the development of maternal postpartum depression, dysfunctional parent-child relation and, in extreme cases, for shaken baby syndrome or other forms of child abuse [12-14].

Our interest in the present research project was not limited to the pathologic forms of maternal fatigue and excessive crying, but embraced the entire continuum from physiologic maternal tiredness to fatigue, and from normal to excessive infant crying. If healthcare is to address the prominent concerns of parents caring for a neonate, we need a deeper understanding of how infant crying and maternal tiredness develop and interact, and what support new parents need to overcome these early challenges to family health. The aim of this study was therefore to explore the evolution and interaction of postnatal infant crying and maternal tiredness. Understanding these interactions could hold potential to develop evidence based interventions to enhance the adaptive circularity of infant soothing and maternal recovery, and to prevent a vicious circle of infant crying and maternal fatigue and its' adverse effects on family health.

A mixed methods approach was used, which combined qualitative and quantitative methods for data collection and analysis. We first conducted a systematic review to synthesize the evidence on the interconnectedness of infant crying and maternal tiredness in the first three months postpartum. Both quantitative and qualitative studies were included. Evidence from this review showed that infant crying was related to the experience of tiredness and/or fatigue in new mothers. Whereas the included quantitative studies mainly implied that infant crying was a predictor of maternal tiredness, the qualitative studies also depicted how maternal tiredness can negatively impact a mother's capacity to respond to her child's needs. We concluded that the interconnectedness of infant crying and maternal tiredness is a cyclical process. Second, we conducted a case control study to analyse socio-demographic, reproductive-maternal, and neonatal predictors of crying problems as reported by midwives conducting postnatal home care. We found that the interconnectedness of maternal conditions and infant crying was already evident in the immediate postpartum period, as maternal distress during the first ten days after birth was strongly associated with reports of crying problems. Finally, we added the perspective of new mothers' lived experiences by conducting a longitudinal qualitative study that used an interpretive phenomenological approach. Mothers' accounts indicated that their personal beliefs about beneficial childcare practices shaped the way they combined newborn and self-care and how they handled conflicting needs in the context of changing postnatal care practices.

Synthesizing the findings of the three studies yields the following key aspects which contribute to the current state of knowledge:

- The interconnectedness of postnatal infant crying and maternal tiredness cannot be fully explained by a unidirectional cause-effect relationship. The complexity of this interplay is better understood as a cyclical process embracing reciprocal influences of maternal and infant factors, which are embedded and shaped by the specific family, healthcare, socio-cultural and political context.
- Conditions which add to new mothers' stress appear to have a deteriorating effect on early infant crying problems. Potential sources of stress included maternal mood states, physical health problems, and social conditions (i.e. immigrant status or plans to resume paid work directly after the paid maternity leave of 14 weeks).
- The strongest protective factor for reported crying problems was having more than one child. According to the mothers' accounts, they acquired experience in response to crying in a multi-dimensional learning process. During this process mothers' attitudes and skills changed in a way which promoted a calmer and de-escalating response to infant crying.
- A novel and surprising finding was how the women's personal beliefs about beneficial childcare practices shaped the way they cared for the newborn and their own needs after birth. These beliefs reflected the ongoing discourse on beneficial child rearing practices over the last decades, and ranged from an infant-centred approach focused on the infant's development of a basic sense of trust, to an approach aimed at balancing infants' demands with own needs. According to their beliefs, mothers differed in their willingness to minimize their own needs for the child's sake, what influenced their opportunities to rest, and could mitigate or contribute to maternal tiredness and exhaustion.
- Health professionals' support played an important role in how mothers managed to combine baby- and self-care. Some mothers experienced care attuned to their and their child's needs, which reduced stress and enhanced their well-being. Others experienced care following a professional agenda even though it conflicted with their specific needs, producing frustration and increasing maternal stress. Balancing of infant's and maternal needs was especially delicate when unsettled babies impeded maternal sleep at night during the postpartum hospital stay. Whereas some professionals showed empathy and offered the mother respite from child care, others

appeared to expect mothers to take care of her baby alone. This approach could contribute to maternal sleep deprivation and exhaustion.

Based on the findings of this research project, we propose a conceptual model which situates the interplay of postnatal infant crying and maternal tiredness as embedded in and influenced by the socio-cultural and political contexts (see p. 100/101). Changing discourses on beneficial childcare and policies that regulate maternity and family leave appear to have a clear impact on the strategies and resources of the involved persons. The support of the family and professional caregivers can strengthen adaptive dynamics of infant soothing and maternal repose when all the actors (i.e. the newborn, the mother, family members and health professionals) are attuned to each other's needs and abilities. Mothers' prior experience with infant care is an additional resource to sustain adaptive dynamics. However, lack of family and professional support and diminished attunement constitute a risk for the adaptive circularity of infant soothing and maternal repose, and can fuel a vicious circle of increased crying and maternal fatigue.

This comprehensive conceptual model can be used as a guiding framework to plan both research and interventions at the micro-, meso-, and macro-levels of maternal and child healthcare. Areas of interest embrace direct clinical practice and postnatal care policies, cultural perceptions of child care, and politics and laws affecting motherhood and early family life. Future research should surmount the traditional division between women's and child health, scrutinize maternal, neonatal and paternal needs after birth, and consider the family as unit of interest. Furthermore, research should evaluate individualized and family-friendly forms of care provision, and investigate the impact of socio-cultural and political conditions on family health after birth. Analogously, interventions have to target different levels. Campaigns and publicity aimed at enhancing public awareness of health needs in the postpartum period are needed to re-establish social conditions which enable adequate rest and repose for new mothers. Initiatives to extend paid maternity and family leaves would further strengthen conditions which are conducive for early family health. On the level of care provision the challenge is to develop new models of care which are responsive to families' postnatal needs of individualized care. Working in such care setting should prepare and enable nurses and midwives to provide care, which is attuned to the mother's, the newborn's and the family's current situation. Such care has the potential to reduce the stress of families who care for their newborn child after birth, to mitigate early crying problems and maternal tiredness, and thereby, to protect and promote family health from the earliest stage.

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1 Introduction

Soothing a crying baby while coping with personal tiredness is a significant struggle for many new parents. Today mothers barely enjoy restful days after birth; instead they enter directly into the challenge of combining baby and self-care. Surveys on maternal health consistently report tiredness and fatigue as the most frequent complaint postpartum, affecting 46%-87% of new mothers [1, 2]. On the child's side, disquieting infant crying is the most cited reason why parents consult health professionals [3]. To date little is known on how mothers confront and handle these double challenges after birth.

Following the traditional division between neonatal and maternal healthcare, research has usually focussed on conditions affecting *either* the mother *or* the neonate, with little attention being given to the interplay of infant crying and maternal tiredness. Routine postnatal care lacks effective strategies to alleviate these problems which can adversely affect family health in the earliest stage. If health care is to address the prominent concerns of parents caring for a neonate, we need a deeper understanding how infant crying and maternal tiredness develop and interact, and what support new parents need in order to overcome these early hurdles to family health.

This thesis contributes to this goal by synthesising the current literature, and by presenting the results of a mixed methods study combining quantitative and qualitative approaches. The three main elements of the study were a systematic review which synthesises quantitative and qualitative evidence on the interconnectedness of postnatal infant crying and maternal tiredness; a case-control study that analyses a comprehensive range of predictors for early crying problems as reported in midwives' postnatal home care; and an interpretive phenomenological study examining new mothers' lived experiences and practices in view of infant crying and personal tiredness in the first three months postpartum.

The thesis is divided into six chapters. **Chapter 1** provides an introduction into the field of postnatal infant crying and maternal tiredness in the context of changing postnatal care practices in Western countries. It further delineates a gap in the literature and suggests a conceptual model which interlinks infant crying and maternal tiredness. **Chapter 2** describes the aims of the study. The next three chapters incorporate own publications. **Chapter 3** presents the publication "Crying Babies, Tired Mothers: What do we know? A Systematic Review" [4]. This systematic review synthesizes the still scarce evidence that focuses on the

interplay of postnatal infant crying and maternal tiredness, taking into account both quantitative and qualitative studies. **Chapter 4** presents the results of a case-control study that identifies the predictors of midwife-reported crying problems in the early postpartum period, based on the Statistical Database of Independent Midwives' Services in Switzerland (2007) [5]. **Chapter 5** reports a first set of findings from a longitudinal qualitative study that explores mothers' views and practices regarding infant crying and own tiredness during the first three months, focusing on the very first period that mothers spent on the hospital postpartum ward [6]. In **Chapter 6** the results of all study parts are synthesized and discussed, followed by suggestions for further research and clinical practice. We then outline further planned publications and describe initiatives to transfer the evidence into the areas of public health and the training for health professionals.

1.1 State of research in the field of postnatal infant crying and maternal tiredness

In this section we will first summarize separately the literature on maternal tiredness and on infant crying after birth. This includes existent concepts and evidence on influencing factors, measures for prevention and treatment, and described family health consequences. Finally, the state of evidence on potential interactions between infant crying and maternal tiredness will be discussed in view of changing practices in postnatal care, and a conceptual model interlinking postnatal infant crying and maternal tiredness will be proposed.

1.1.1 Maternal tiredness postpartum

Concepts of tiredness and fatigue: Milligan et al. propose differentiating between tiredness and fatigue, using the following criteria. Tiredness occurs after exertion and long hours awake and is relieved in the circadian rhythm by periods of sleep. Fatigue is more severe than tiredness: it persists through the circadian rhythm, can not be relieved through a single period of sleep, consists in a negative feeling, and hampers the well-being of the affected person. [7]. Other authors focus on fatigue only. Lee defines fatigue as the imbalance of activity and rest and views its perception on a continuum from slightly to extremely exhausted [8]. In contrast to this uni-dimensional model, multidimensional concepts have also been suggested. They differentiate between physical and mental fatigue [9, 10], or between the symptoms occurrence and the distress caused by fatigue [11].

In view of terms, the German language does not differentiate between tiredness and fatigue, but uses the word 'Müdigkeit' (tiredness) for the both states. In the present thesis we tend to use the term 'tiredness' in this general way, embracing the entire continuum of feeling slightly to extremely tired. Yet, when only the upper end of this continuum is meant, we use the term 'fatigue'.

Influencing factors: Older literature on maternity care views tiredness after childbirth as a normal reaction to the efforts of gestation and delivery. The emphasis for new mothers is on the need for rest and recuperation [12, 13]. More recently, studies have focused on fatigue and investigated specific physical, psychological and contextual risk factors of maternal fatigue after birth. Among physical predictors, they identified operative delivery, blood loss and low haemoglobin, neuroendocrine states and inflammatory processes [7, 8, 14-16]. Conflicting results are reported on the influence of breastfeeding [17, 18]. Regarding the psychological wellbeing, qualitative studies have described the exhaustive nature of the personal transition to motherhood, which includes taking over unrelenting responsibility for the child [19, 20]. Fatigue is furthermore an associated symptom of psychological disorders, such as maternal depression [21, 22]. On the contextual level, the prominent risks are interruptions of maternal sleep due to infantile sleeping and feeding patterns, especially if infants show erratic regulatory behaviours [7, 14, 21, 23]. However, the influence of infant crying per se is rarely addressed as explicit factor. Several studies investigated factors such as family structures, cultural traditions regarding motherhood, socioeconomic resources, and, to some extent, the impact of employment. The results were mixed. Most consistent has been the alleviating influence of social support [7, 9, 14].

Prevention and Interventions: Only a few studies exist on the prevention and treatment of postpartum tiredness and fatigue – possibly because the lay public and health professionals alike consider its occurrence an inescapable part of early motherhood [21, 24]. The use of a *Tiredness Management Guide* as preventive self-care intervention in the puerperal period did not have a significant effect on the experience of maternal tiredness [25]. In breastfeeding mothers, lying on the side instead of sitting for feeding reduced perceived fatigue 30 minutes later ($p < .05$), but only after non-operative deliveries [26]. For the treatment of mothers suffering from depressive symptoms and parental stress 4-6 months postpartum, an intervention by phone call tailored to reduce fatigue and symptom distress had a significant effect on the level of fatigue ($p < .001$) [11]. In a pilot study, Stremler and colleagues [27]

tested an educational sleep intervention to reduce maternal sleep deprivation and fatigue. Whereas the intervention had a positive effect on neonatal and maternal length of night-time sleep ($p < .05$), the effect on maternal fatigue was not significant ($p = .10$).

Apart from these tested interventions, experts and guidelines recommend experience-based measures such as limiting visitors, assistance with baby care, facilitating rest, relief from housework, and enhancing social support [28-30]. Nonetheless, mothers surveyed in Western countries repeatedly reported that contemporary postnatal care did not correspond to their need for support and rest [31-38]. So far, health professionals as well as researchers have not sufficiently explained or resolved this discrepancy between perceived needs and provided care [39-41].

Consequences: A few studies addressed some of the consequences of postpartum fatigue. Affected mothers feel cranky and less patient with partners; they also report reduced ability to concentrate [42]. Fatigue was also reported to decrease the capacity for daily activities and to hamper the well-being of affected mothers [43]. Longitudinal studies identified maternal fatigue as a risk factor for postpartum depression [44, 45] and for a slightly less optimal development of the infants' fine motor and coordinative skills [10].

1.1.2 Infant crying postpartum

Concepts of normal and excessive crying: During the last decades, crying in neonates and infants has evoked diverse interpretations in health and child rearing literature. Crying has been described as; an undesirable behaviour needing measures to extinguish it, a mode to discharge tension, a plea for help, an important attachment behaviour, and the child's first language [46, 47]. Most contemporary researchers regard crying specific to the normal neuro-behavioural development of neonates [48, 49]. Research on normal infant crying supports an n-shaped pattern over the first three months of life. The amount of daily crying begins to increase about two weeks postpartum, peaks during the sixth week at nearly three hours/day, and declines to below one hour/day by 12 weeks of age. During this period, crying episodes cluster typically in late afternoon and evenings hours [48, 50, 51]. How to distinguish normal from excessive crying is an ongoing discussion. Most researchers and practitioners refer to 'Wessel's rule of three', defining 'excessive crying' – or the synonymously used 'infantile colic' – as lasting more than 3 hours on more than 3 days per week, and recurring for more than 3 weeks [3, 52]. Alternative definitions include a high-pitched quality in the crying, parental distress and inconsolability of the infant [53, 54].

Influencing factors: In recent decades, clinicians and researchers have developed numerous theories to explain the origins of excessive infant crying, suggesting medical or behavioural causes for infant colic [55-57]. Although ‘infantile colic’ suggests gastrointestinal causes, pathologies of the digestive tract (i.e. hernia or reflux) or nutritional intolerances have been diagnosed only in a few cases [58, 59]. Some researchers suggest more subtle digestive causes, such as alterations in the gut microflora [57], disturbed gut motility and visceral hypersensitivity [60]. Surprisingly, pain as cause for excessive crying is mentioned by worried parents, but is hardly assessed in research [54]. Other researchers investigated prenatal and perinatal complications (i.e. preterm birth, low birth weight, assisted vaginal delivery) as cause for excessive crying, with inconsistent results [61-64]. The results on type of feeding are also conflicting. Whereas breastfeeding appears as a risk factor for excessive crying in some studies, it seems to be protective in others [65-67]. Consistent evidence exists on the negative effect of maternal smoking, both during and after pregnancy [67-69].

The second line of aetiological research pertains to psychosocial and behavioural predictors for excessive crying. Some evidence supports theoretical models linking excessive crying to maternal anxiety [70, 71]. Other risk factors are single motherhood [70] and dissatisfaction or conflict in the parental partnership [72, 73]. Controversial issues include the influence of the infant’s temperament [71, 74] and the mode of childcare [75-77].

Sociodemographic factors such as maternal education and socioeconomic status showed conflicting results [61, 66, 70], whereas higher parity appeared to be protective in most studies [61, 66, 70]. Considering such complex patterns of predictors, the origins of excessive crying remain a mystery. Some researchers suggest that excessively crying infants are a heterogeneous group, reflecting an array of different aetiologies [48, 54].

Prevention and Interventions: The rare studies on prevention of prolonged crying rely on the assumption that excessive crying is associated with modifiable parental behaviours. A groundbreaking study found that prompt response to infant crying would reduce later crying and stimulate secure mother-child attachment [78], but these results were not confirmed in a study with a larger sample [76]. Another study identified a preventive effect of increased carrying, but this effect was not replicable either [79, 80]. Nonetheless, prolonged physical contact and high parental responsiveness were associated with less crying per 24 hours in a cross country comparison [81]. In a broader perspective, these parenting behaviours which are particularly responsive to infant crying are in line with one of the prominent discourses on

beneficial child care practices of the last decades. There is an ongoing controversy on the potential benefit of a parenting style that responds to babies' perceived needs, called infant-led care, versus forms of parenting that seek to impose routines and rhythms on babies' behaviour, referred to as structured care [77]. It seems that the two approaches have different benefits and costs. Structured care leads infants to rather develop the ability to remain settled at night by 12 weeks of age. In contrast, infant-led care leads to less overall fussing and crying, but to recurrent waking at night [77].

Interestingly, the common interventions for the treatment of excessive crying refer primarily to physical causes. In two meta-analyses of randomized controlled trials, effective interventions were dietary changes that included eliminating cow's milk protein or using herbal tea [82, 83]. Another treatment often recommended for excessively crying babies is cranio-sacral therapy or chiropractic, to realign functional disturbances of the vertebral column which may have occurred during a difficult delivery. However, evidence regarding the effects of these treatments is mixed [84-86].

Regarding behavioural interventions, the mentioned meta-analyses report a beneficial effect for reduced stimulation of the child, whereas supplemental carrying had no effect [82, 83].

Several studies investigated the outcomes of in- or outpatient programs which provided specific counselling and support for parents of excessively crying infants, all with positive outcomes [49, 87-89]. All in all, both biological and socio-behavioural interventions appear to mitigate excessive crying.

Consequences: Research results on the consequences of excessive infant crying are inconsistent. On the mothers' side, parenting stress, fatigue, early cessation of breast feeding, bodily dysfunction, anxiety and depression were found to be associated with excessive crying [49, 53, 71, 90-94]. However, Clifford et al. [95] did not identify lasting effects on maternal mental health. For infants, excessive crying is generally described as a self-limiting condition – without lasting effects in most cases [95, 96]. Yet the risk for regulatory disorders and hyperactivity seems to be increased [97, 98]. On the relational level, the risks include mother-infant distress [73, 96, 99], strained family relations [90, 91, 99], aggressive thoughts towards the infant, shaken baby syndrome and/or other forms of child abuse [100-103].

1.2 Maternal tiredness and infant crying in the context of changing postnatal care practices

During the last decades of the twentieth century the paradigm of postnatal care provision in Western countries changed significantly. The length of postnatal hospital stay decreased and the main responsibility for newborn care was shifted from the professionals to the mother herself [104-106]. Large-scale programs such as the Baby Friendly Hospital Initiative [107] informed care policies advocating unrestricted mother-child contact to promote bonding and breastfeeding [30, 108]. Despite positive results in view of mother-child bonding and breastfeeding rates [109, 110], not all mothers seemed to be satisfied with all aspects of the new models of care [40, 111]. It is a conundrum still awaiting resolution that across diverse countries new mothers express persistently less satisfaction with postnatal care than with care during pregnancy and delivery [39, 112].

We hypothesized that an important reason for mothers' dissatisfaction may be that current postnatal care practices lack effective strategies to address the newborn's crying and alleviate maternal tiredness, which are two of new mothers' frequently reported concerns [1-3, 113, 114]. In the context of the continuous rooming-in promoted by current care practices, mothers become the main caregivers for the newborn and are challenged to combine baby and self-care from the earliest stage. To date, little is known on how mothers confront the onset of these challenges after birth, i.e. how they take care of their own need for recovery while simultaneously providing care to a newborn baby who may cry more than expected.

Common sense suggests that maternal tiredness is related to the amount of time a baby is crying. However, the literature on postnatal care has barely addressed this interconnection, probably following the traditional division between neonatal and maternal health care. The disciplines of infant psychology and infant psychiatry were the first ones who paid broader attention to the interplay of infant crying and maternal tiredness. Based on experience in a specialised treatment program for excessively crying babies, Papousek et al. described the negative reciprocity of prolonged crying and parental exhaustion in a systemic model of parent-infant communication [49, 115]. A persistently crying child leads to parental exhaustion or depression, and exhausted or depressed parents are less able to offer their child support to calm down. This concept addresses the interactive process between parent and child from a psychological perspective. To healthcare providers it lends interesting insights on parent-infant interaction. Yet, to guide clinical postpartum care, we propose an adapted model

which puts maternal and infant care needs centre stage. This adapted concept provides primary postnatal caregivers with an understanding of the dynamics leading to an adaptive circularity of infant soothing and maternal recovery (Fig.1), or to a negative reciprocity of increased crying and maternal fatigue, with the risks of adverse effects on family health (Fig. 2).

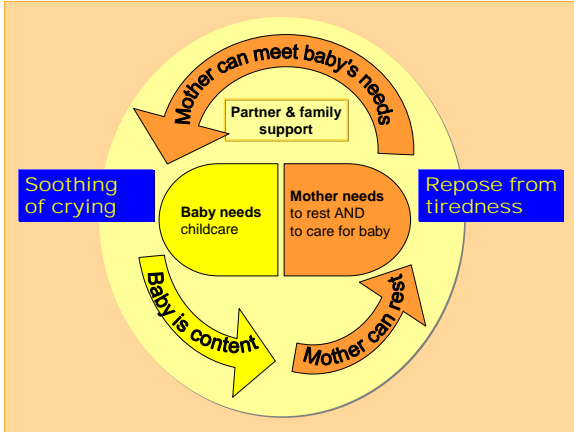


Fig. 1 Adaptive circularity of infant soothing and maternal repose

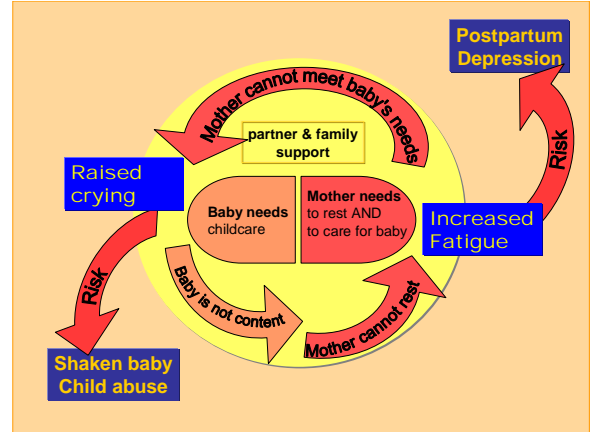


Fig. 2 Vicious circle of infant crying and maternal fatigue, and adverse effects

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2 Aims of the study

To promote family health right from the beginning, healthcare urgently needs strategies to manage new parents' prominent concerns. The aim of this study was therefore to explore the evolution and interaction of infant crying and maternal tiredness. It thereby seeks to promote the development of evidence-based interventions that enhance the adaptive circularity of infant soothing and maternal recovery and that conversely prevent a vicious circle of infant crying and maternal fatigue and its' adverse effects on family health.

2.1 Specific research questions

A mixed methods approach was used, which combined qualitative and quantitative methods for data collection and data analysis. We first conducted a systematic review to synthesize the evidence on the interconnectedness of infant crying and maternal tiredness in the first three months postpartum. Both quantitative and qualitative studies were included. The next step applied quantitative methods and consisted of a case control study based on the data collected in the Statistical Database of Independent Midwives' Services in Switzerland in 2007. The last step consisted of a qualitative study using interpretive phenomenological methods to investigate new mothers' views and practices as they evolve over time in everyday life.

In the case-control study the specific question was:

- 1) Which sociodemographic, reproductive-maternal and neonatal factors are associated with midwife-reported crying problems and maternal distress as registered in the Statistical Database of Independent Midwives' Services in Switzerland home care (2007)?

We hypothesized that higher risk for reported crying problems would be seen in mother-child pairs with the following exposures:

Sociodemographic factors: lower age; higher education; higher work strain; single parent

Reproductive-maternal: lower parity; prenatal, intrapartum or postpartum pathologies, including psychic decompensation and / or depression

Neonatal factors: preterm birth; small-for-date baby; neonatal pathologies.

In the interpretive phenomenological study the specific questions were:

- 2) **a)** How do new mothers experience maternal tiredness and infant crying on the postpartum ward and after discharge at home during the first 12 weeks postpartum?

- b)** What are the practices and perceptions concerning maternal tiredness and infant crying which sustain or impair maternal and infant health during the first 12 weeks postpartum?

3 Crying Babies, Tired Mothers: What do we know? A Systematic Review

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3.1 Abstract

Objective: to synthesise the evidence on the interconnectedness of infant crying and maternal tiredness in the postpartum period, both from quantitative as well as from qualitative studies.

Methods: a systematic review was conducted including studies in English, French and German published from 1980-2007. Studies were included in the systematic review if they had extractable data on infant crying as well as maternal tiredness in the period of 0-3 months postpartum. Of 100 retrieved publications, 10 met these criteria.

Findings: evidence from this review indicated that the amount of infant crying during the first three months postpartum is associated with the experience of tiredness and fatigue in new mothers. Significant associations were found in five of six quantitative studies. The four identified qualitative studies describe how infant crying disrupts new mothers' circadian rhythms, reducing opportunities to rest, and exacerbating tiredness. Incremental exhaustion diminished parents' ability to concentrate, raising the fear of harming their children, triggering depressive symptoms and burdening parent-child interaction.

Key conclusions and implications for practice: if healthcare professionals are to address the prominent concerns of parents caring for a neonate, it is essential to review current care practices and tailor them to maternal and infant needs. A care strategy alleviating the burden of infant crying and maternal fatigue has the potential to strengthen family health from the earliest stage.

KEY WORDS: postpartum period, infant crying, colic, postpartum fatigue

3.2 Introduction

Soothing the crying baby while coping with own tiredness and exhaustion is a significant struggle for many new parents. Up to 46%-87% of new mothers report problems with tiredness or fatigue [1-3]. Disquieting infant crying is the most cited reason why parents consult health professionals [4]. Following the traditional division between neonatal and maternal healthcare research has usually focussed on complaints affecting *either* the mother *or* the neonate, but little attention has been given to the interplay of infant crying and maternal tiredness.

Neonates' crying is now regarded as a normal part of neuro-behavioural development. It follows a typical curve that peaks during the sixth week postpartum at nearly 3 hours' crying per day, and declines to below 1 hour per day by 12 weeks of age. However, there are large individual differences [5-7]. Existing literature concentrates on the upper end of the crying continuum – infantile colic (excessive crying), which affects 5-19% of infants [8-10]. Excessive crying or infant colic is usually defined as fussing or crying lasting more than 3 hours per day, more than 3 days per week, for at least 3 weeks during the first months of life [11]. Such situations are known to heighten the risk for shaken baby syndrome or other forms of child abuse [12]. A large body of literature addresses the meaning of maternal response to infant crying in relation to the emerging mother-child relation [13, 14]. However, this research focuses on psychological aspects, and barely addresses issues of mothers' health.

Postpartum maternal tiredness or fatigue is defined as an imbalance between activity and rest [15]. Milligan and colleagues [16] differentiated between tiredness and fatigue, defining tiredness as a physiological state occurring after extended wakefulness and/or exertion, which is relieved by a period of sleep. Fatigue, however, is seen as a pathological state, which persists through the circadian rhythm and cannot be relieved through a single period of sleep. It decreases the capacity for daily activities and hampers the well-being of the affected person [17]. Postpartum fatigue has further been identified as a predictor of postpartum depression [18].

To date, the specific interplay of infant crying and maternal tiredness has only been addressed in treatment programmes for excessive crying babies [6, 19, 20]. On the basis of Papousek and von Hofacker's systemic concept tracing the reciprocity of infant crying and maternal exhaustion [21], we propose a conceptualisation that places both maternal and infant's needs centre stage, and incorporates the influential support within the family system (Fig. 1 & 2). A

contented baby allows the mother to recover. When rested, the mother can make better use of her parental competencies to sustain a baby's self-regulation, resulting in more successful soothing and rewarding mother-child interactions (Fig. 1). Conversely, an excessively crying baby prevents the mother from getting the necessary rest. A mother suffering from exhaustion may show less adequate parenting behaviours, enforcing the infant's arousal and perpetuating its' crying (Fig. 2). If the adaptive circularity between infant and maternal needs gets out of balance, mother and child are at a higher risk for adverse outcomes as postpartum depression or infant abuse.

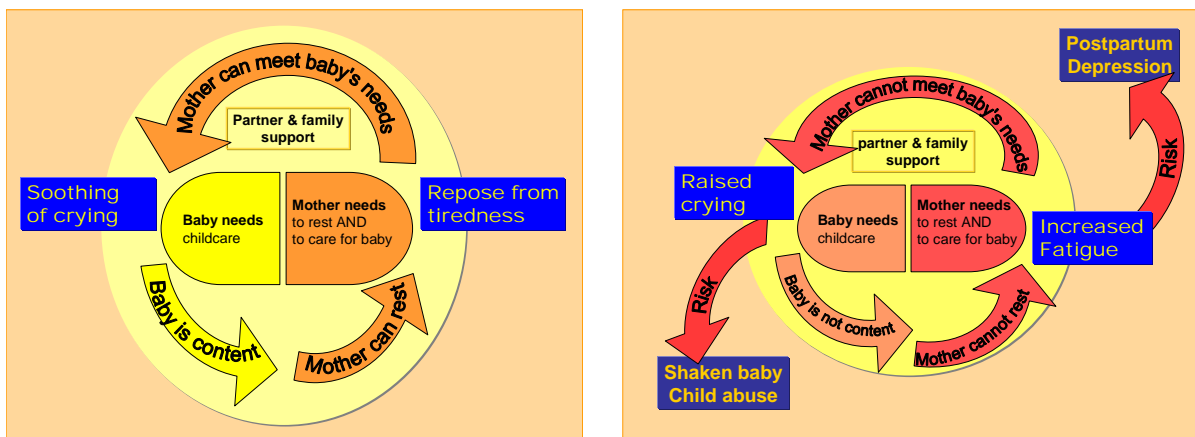


Fig. 1 Adaptive circularity of infant soothing and maternal repose

Fig. 2 Vicious circle of infant crying and maternal fatigue, and adverse effects

Until now, routine postnatal care has lacked targeted strategies to prevent and treat distressing crying and maternal tiredness from the earliest stage [22, 23]. Midwives are in an ideal position to respond to both maternal and neonatal needs. However, midwifery research has more often centred on maternal experiences [17, 24] while neglecting issues on infant crying. To promote family health from the beginning, postnatal caregivers urgently need an evidence base for interventions relating maternal and newborn concerns. The aim of this systematic review is, therefore, to evaluate the current state of knowledge on the interconnectedness of postnatal infant crying and maternal tiredness.

3.3 Methods

3.3.1 Search strategy

Our literature search included the full spectrum of infant crying in the first three months postpartum and the entire range of maternal experiences from slight tiredness to extreme

exhaustion. We targeted studies containing at least one search term for infant crying (infant crying, excessive crying, infantile colic and unsettled or irritable infant) and one for maternal tiredness (maternal or postpartum fatigue, tiredness, exhaustion). Searches were conducted in Pubmed, Cinahl, Cochrane and PsycINFO and included studies published in English, French and German from 1980-2007. Further studies were retrieved by detailed searches of the reference lists of identified articles. To be included, the publication had to describe an original quantitative or qualitative study addressing infant crying in relation to maternal tiredness in the period of 0-3 months postpartum. Qualitative studies were included as they play a valuable role in understanding participants' views, exploring complex processes, and thereby complementing and explaining quantitative evidence [25, 26]. Of 100 retrieved publications, the title and abstract were analysed for relevance to the topic of interest based on our inclusion criteria. About 66 publications addressed other topics and were excluded. Only two studies had no abstract available. As their titles did not suggest a correspondence to our research question, we decided to exclude them as well (see Fig. 3). The reasons for further exclusions were missing assessment of maternal tiredness or infant crying, absent correlation between both phenomena, or all participant infants older than three months. For one study, we contacted the authors because the associations between infant crying, infant soothability and maternal tiredness were not fully reported [27, 28]. According to the authors it was not possible to analyse the association of interest with confidence for infants aged up to 3 months, as this age group was too small in their sample including infants up to 15 months (Fisher, personal communication, April 27, 2009). We therefore excluded this study.

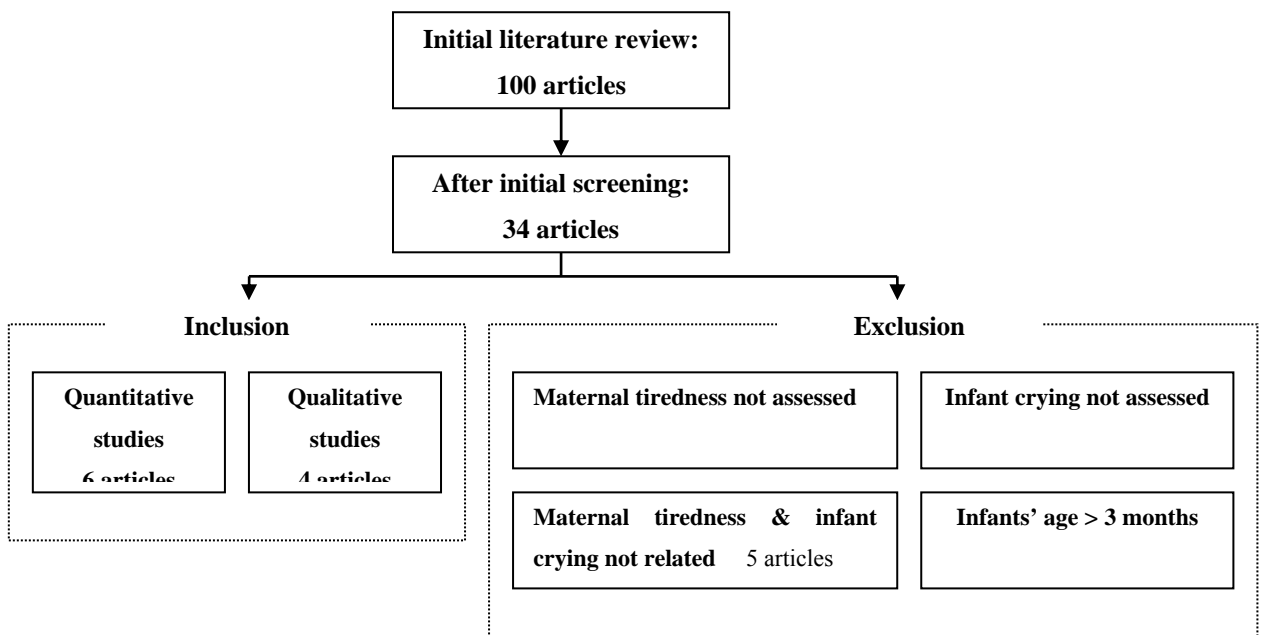


Figure 3 Flowchart of study selection

3.3.2 Characteristics of included studies

Of the 10 studies included in the review five were conducted in the United States, two in Canada, one in the UK and two in Germany. Nine studies were published in English and one was in German. All were published between 1986 and 2007.

Recruitment strategies targeted either community-based samples of healthy mother-child pairs (five studies) or mother-child pairs with a reported complaint of prolonged infant crying (two studies). The remaining three studies first recruited mother-child pairs reporting problems with the baby's crying behaviour, and secondly a comparison group of mother-child pairs without such complaints. Recruitments took place in pre- and postnatal care settings, in postnatal gymnastic courses, with help of birth records in local newspapers or in specialised programs for excessively crying babies. The size of study samples ranged from 24 to 505 in quantitative studies, and from 13 to 50 in qualitative studies.

The quantitative studies applied a cross-sectional design (three studies) including infants from 1-6 months postpartum or a cohort design (three studies) with observation periods of two to six months postpartum. Statistical procedures varied accordingly and included two-group comparisons, ANOVA, linear or logistic regression analysis and correlation.

Two qualitative studies were based on a grounded theory approach, one on ethnographic participant observation and interviews followed by an adapted grounded theory approach for data analysis, and one study conducted a case analysis drawn from a larger sample.

Data collection for maternal and infant variables was based on mother-charted diaries or questionnaires for quantitative studies, and on interviews and participant observation for qualitative studies.

Assessment of infant crying was either reported as mean daily crying duration based on 24 hours-diaries charting the baby's behaviour over 5-10 days or as score derived from the Infant Difficulty Subscale in the Infant Characteristics Questionnaire (ICQ). This subscale consists of nine items, addressing infants' amount and intensity of crying, irritability, soothability, mood changes and overall degree of difficulty and has a reported validity [29]. Because most of these items are indicators for the crying behaviour of an infant, we included the variable 'infant difficulty' as a measure for infant crying into our review. One study applied a five point Likert scale to assess the frequency of infant crying from 'never' to 'very often' [30].

Maternal tiredness/fatigue was measured using four English instruments [31-34] and two German instruments [35, 36] (see Table 1 and 2). These instruments represented conceptualisations of fatigue as unifactorial or multifactorial phenomenon. All the scales have some reports of validity but only three were designated for or tested in childbearing women [32, 34, 36]. Dennis and Ross [30] applied a five point Likert scale to assess the frequency of feeling tired from 'never' to 'very often' without reported validity.

Only one study assessed the effect of maternal tiredness/fatigue on infant care by using a Likert scale question about the 'impact of fatigue on infant care activities'[37].

3.3.3 Methodological quality of included quantitative studies

Quality criteria for quantitative studies were used to assess included studies' methodological soundness [38]. To recruit representative population-based samples was only an aim in the cohort studies of Dennis and Ross [30] and Milligan et al. [16, 39]. However, as they did not fully report response rates and loss to follow up the representativeness of their samples remains unclear. Furthermore Dennis and Ross [30] excluded mothers with raised depression scores in the first week postpartum, and Wambach [37] excluded not-breastfeeding mothers which limits the generalisability of these results. The studies recruiting mother-child pairs affected by problematic infant crying might have attracted mothers experiencing a high

burden due to their child's crying behaviour. Mothers with higher tolerance towards infant crying might be underrepresented. Some of the quantitative studies might have been underpowered to detect significant associations due to small sample sizes [37, 40, 41].

In data analysis, some studies controlled for confounders by matching as e.g. infant age, maternal education or parity [6, 40-42]. Only Milligan and colleagues [39, 43] controlled for confounding in a regression model.

Most quantitative studies categorized the original continuous variable of crying duration which may have decreased statistical accuracy. This is especially true for Becker et al.'s study [40] which compared infants excessively crying according to Wessel's criteria [11] or only according to maternal perception with infants without any report of crying problem. A linear regression of duration of crying and degree of maternal exhaustion across all three groups might have provided a more sensitive result, especially as one control child was in fact excessively crying > three hours per day, but remained in the control group.

3.3.4 Methodological quality of included qualitative studies

Specific quality criteria were used to assess qualitative studies' rigour [44]. Two of the qualitative studies report a theoretical sampling strategy to include participants with socio-demographic or obstetric variation [45, 46]. Drummond and colleagues [47] approached only mothers with a healthy baby and good social support, whereas Thompson and colleagues [48] were the only which included parents and health professionals, but lacks description of the participants' socio-demographic background. None of the studies reports on refusals during recruitment. Procedures for data collection and analysis are comprehensively described in the studies of Long and Johnson [46] and Runquist [45], but only partly in the study of Drummond et al.[47]. Not traceable are the procedures in the study of Thompson et al. [48]. Despite the lack of methodological description, we decided to retain the study in the review, because of the unique sample which included health professionals. Furthermore, it was the only study which developed a theoretical model about the dynamics in families affected by excessive crying.

Two studies mention strategies to enhance trustworthiness of findings including discussing the analysis with other experts or checking emerging findings with participants (respondent validation) [45, 47].

3.4 Results

Major findings of the systematic review are summarised in tables 1-3. Table 1 compiles methods and results of four studies examining statistical associations between the amount of infant crying and the degree of maternal tiredness. Table 2 shows the results of studies reporting scores for infant difficulty, but not explicitly the amount of daily crying. Table 3 summarizes methods and results of the four qualitative studies.

Table 1 Amount of infant crying and degree of maternal tiredness

Authors	Design/ Setting	Sample	Infant crying	Maternal tiredness/fatigue	Results
Dennis and Ross (2005)	Cohort Population-based sampling in pre- and postnatal care, Canada.	n= 505 mother-child pairs at 4 and 8 weeks postpartum. Exclusion of mothers with EPDS* > 12 at first week postpartum.	Mother- reported amount of baby crying, on 5- point Likert scale (never – very often)	Self-reported frequency of feeling tired, on 5- point Likert scale (never – very often) Length of maternal sleep per 24h on 4- point Likert scale (0-4h to >8h)	Mothers who reported frequent infant crying were significantly more likely to feel often fatigued (p=.004). Reported fatigue (p=.008), frequent infant crying (p=.02) and having less than 6 hours sleep per 24h (p=.02) were significantly associated with elevated postnatal depression scores (main outcome) at 4 and 8 weeks postpartum.
Papousek and von Hofacker (1998)	Cross-sectional Interdisciplinary intervention program for fussy babies and community based sampling through birth records, Germany.	cases n= 63 babies referred for excessive crying, data collection at time of referral (1 - 6 months postpartum, mean 3.6 months) comparison group n= 49 babies crying <1 h per day, matched to cases by age & gender	Mother charted duration of crying/fussing / 24h over 5 days Mother reported Infant Difficulty Subscale in Infant Characteristics Questionnaire (ICQ)	Exhaustion subscale in Maternal Childcare attitudes & Feelings (EMKK)	Mothers of referred extremely crying (4.9 hrs/d) and moderately crying (2 hrs/d) babies scored significantly higher on exhaustion than mothers of controls (p< .001). No difference in level of exhaustion between mothers of extremely or moderately crying babies. Mothers of referred babies reported fatigue hampered their interchange with child.
Becker et al (1998)	cross-sectional Community-based paediatric practices and postnatal gymnastic courses, Germany.	cases n= 25 babies whose mothers complained about excessive crying during paediatric consultation comparison group n= 25 babies without reported crying problem, similar to cases regarding age, gender, feeding mode, maternal education. Data collection at mean age of 7 (standard deviation=3.3) weeks postpartum	Mother charted duration of crying/fussing / 24h over 10 days Subscale 'Failure of settling attempts' assessed in structured interview	Exhaustion subscale in Giessen Subjective Complaints List (GBB)	No significant differences in degree of exhaustion between cases and controls.
Pinyerd (1992)	Cross-sectional (Pilot Study) Community based paediatric care, Children's Hospital, and recruited by newspaper advertisement, USA.	cases n= 12 babies crying > 2 h / day comparison group n= 12 babies crying < 2h per day, matched to cases by maternal parity, education, marital status, infant gender. Data collection at 7 weeks postpartum.	Mother reported diaries on duration/ quality of crying, and occurrence of inconsolability over 7 days (based on parental activity records developed by Barr (1988) & the Nursing Child Assessment Sleep activity Record.	Subscale of fatigue-inertia in Profile of Mood States (POMS)	Fatigue in mothers of study cases was significantly higher than in mothers of control group (p<.05).

* Edinburgh postnatal depression scale

3.4.1 Associations between amount of infant crying and degree of maternal tiredness

Of the four studies displayed in **Table 1**, three found a positive association between the reported amount of infant crying and the degree of maternal tiredness/fatigue. As might be expected, mothers who reported more infant crying also had increased tiredness/fatigue. These findings were consistent across cohort and cross-sectional studies. Only the cross-sectional study by Becker and colleagues [40] failed to find a difference in fatigue-levels between mothers complaining of excessive crying and mothers without such complaints, which may be due to the shortcomings discussed above. One study further incorporated measures of depression, which correlated with fatigue ($r=0.49$, $p<.01$) and crying ($r=0.24$, $p<.01$) [30]. Papousek and von Hofacker [42] briefly mention mothers' report of fatigue hampering their ability to engage in stress-free playful interchange with their infants. However, the authors do not precise how this information was elicited.

Table 2 Associations between scale of infant difficulty and degree of maternal tiredness

Authors	Design/ Setting	Sample	Infant Difficulty	Maternal tiredness/ fatigue	Results
Wambach (1998)	cohort Obstetric care units at University-affiliated hospitals, USA.	n= 41 healthy mother-child pairs Exclusion of non-breastfeeding and mothers which weaned before 9 weeks postpartum Data collection at 3-4 days, and at 3, 6, and 9 weeks postpartum.	Mother reported Infant Difficulty Subscale in Infant Characteristics Questionnaire (ICQ)	Multidimensional Assessment of Fatigue (MAF) Lee Fatigue Scale Verran Snyder-Halpern Sleep Scale	Infant difficulty was positively correlated with fatigue at 6 and 9 weeks postpartum ($p<.05$). Mothers perceived that their fatigue had a mild, but increasing effect on their child care activities.
Milligan et al. (1990) Milligan et al. (1996)	cohort Community Hospital, USA.	n= 259 new mothers with healthy neonate of lower and middle socioeconomic status Data collection at 1 st day, 6 weeks and 3 months postpartum.	Mother reported Infant Difficulty Subscale in Infant Characteristics Questionnaire (ICQ)	Modified Fatigue Symptoms Checklist (MFSC) Visual analog scale for tiredness	Infant difficulty was a predictor of fatigue at 6 weeks and 3 months postpartum ($p<001$).

The two studies in Table 2 identified a positive association between reported Infant Difficulty Scores (broader assessment of infant crying, irritability, soothability, etc.) and the degree of maternal tiredness. Only Wambach [37] assessed the effect of maternal tiredness/fatigue on the ability of the mother to care for her infant and found a mild negative effect which increased over the study period from one to nine weeks postpartum.

Table 3 Qualitative studies on infant crying and maternal tiredness

Authors	Design/Setting	Study population	Data Collection	Main Results
Runquist (2007)	Grounded Theory Study Recruitment at postpartum unit in regional hospital, USA.	n=13 new mothers of healthy infants, 5 primiparae, 8 multiparae, 2 to 5 weeks postpartum. Theoretical Sampling	Semi-structured interview in the family home	Participants minimized their own needs for sleep and self-care in order to keep up with the care-giving demands of their children. Infants who were unsettled and crying long hours enhanced mothers' fatigue. Fatigue hampered mothers' physical and mental wellbeing, increased feelings of helplessness, self-doubt, frustration, stress and worry. Mothers' patience was reduced and care giving for children became challenging. In spite of an overwhelming desire to rest and sleep mothers persevered in care-giving using self-identified coping techniques as drinking coffee, going to bed early, in combination with the belief that their children brought purpose and meaning to their lives.
Long & Johnson (2001)	Pragmatic Ethnography, analysis following an adapted Grounded Theory approach Rural and urban areas, UK.	n= 14 mothers & 6 fathers of currently or previously excessively crying babies in first year postpartum Theoretical Sampling	focused interview conducted in the family home, augmented by periods of participant observation	While caring for an excessively crying baby, the lives of parents were characterized by pervasive disruption: repeatedly disturbed nights caused exhaustion, conversations were distorted, marital relations strained, daily activities stopped; gradual introversion, with crying becoming the focus of life. Sleep shortage reduced ability to concentrate, which could lead to varying risks, e.g., driving while exhausted. Inability to soothe the baby undermined parents' sense of competence and led to feelings of guilt. Fatigue further obliterated optimistic perspectives Most significant fear of parents was to lose control and non-accidentally injure the baby. Parents sought to cope with various strategies, such as seeking a cure for excessive crying, establishing a routine with the baby, taking time-outs, resignation.
Drummond et al. (1994)	Longitudinal qualitative study Recruitment in prenatal classes and through family physicians, Canada.	n= 18 partnered mothers with good health status, half primiparous, half multiparous Convenience sampling	Semi-structured narrative interviews in mothers' homes at 6, 10 and 16 weeks postpartum	Over the course of the postpartum period, mothers came to understand their babies' crying as a form of communication, and their soothing became differentiated and more effective. One mother-child pair had a different trajectory, where excessive crying impeded the mother's rest and the resulting exhaustion diminished the mother's empathetic capacities in response to her child, what resulted in moments of despair.

Thompson et al. (1986)	Grounded Theory Study Health care and public settings, USA.	n= 50 parents, nurses, and physicians having experience with and/or knowledge of infant colic/excessive crying. Convenience Sampling through referrals and information booth at shopping mall	Interviews which allowed participants to share their experiences. Part of data collection conducted at shopping mall.	Participants described the infants' crying as unrelenting and inconsolable. The effect of persistent crying was the gradual development of 'parent colic', which is characterized by parents' crying, fatigue, guilt, and resentment of the infant. Depending on the duration of infant & parent colic, outcomes for parent-child relations were aggravated: a) Parents can maintain positive emotional reciprocity with child b) Parents invest more than they receive from the child, which places an emotional debt upon the child. c) Parents invest their time and energy to such an extent that they become unable to cope, which results in active crisis, including impaired self-image and increased risk of child abuse.
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The studies compiled in Table 3 illuminate diverse perspectives on infant crying and maternal tiredness. Whereas Long and Johnson [46] and Thompson and colleagues [48] focussed on the lived experiences with excessively crying infants, Drummond [47, 49] started investigating maternal understanding of infant crying in general and ended up describing a specific trajectory of a mother and her persistently crying child. Runquist [45] puts the experience of early postpartum fatigue centre stage. All four studies identify a link between excessive crying, impeded opportunities to rest and resulting fatigue in mothers, especially if nocturnal crying causes sleep deprivation. Mothers describe mainly mental and emotional effects of fatigue: difficulties to concentrate, reduced patience, frustration, feelings of incompetence or guilt, resentment and fear of becoming aggressive towards the child. Drummond and colleagues [47] further describe the underlying process how fatigue hampers the mothers' empathetic response to her infants' crying. Thompson and colleagues [48] illuminate diverse trajectories for the parent-infant relationship affected by excessive crying, which in the worst case ends up in negative emotional reciprocity. Persistent crying diminishes positive and rewarding parent-child interactions and failed attempts to understand and comfort the crying baby evoke feelings of frustration.

3.5 Discussion

Evidence from this review suggests that the amount of infant crying during the first three months postpartum is associated with the experience of tiredness and/or fatigue in new mothers. This association was found both in community samples of healthy mother-child pairs and in mother-child pairs affected by difficulties with infant crying.

None of the study designs permitted conclusions that separated cause and effect regarding infant crying and maternal tiredness. As the two phenomena occur mostly simultaneously, it is not possible to clearly identify predictors and outcomes. However, most quantitative study designs assumed crying to be a predictor of maternal fatigue. The qualitative studies exposed also the opposite direction, how fatigue can diminish a mother's ability to empathise with her child and respond to his/her needs adequately. Only Wambach [37] investigated the impact of maternal fatigue on child care activities using a quantitative approach and found a minor effect, which is in some contrast to the qualitative findings. A similar question as the one used by Wambach was recently added to the 'Multidimensional Assessment of Fatigue Scale' to validate the scale for the childbearing population [32]. As the added item yielded only a minor score, the authors assume that social desirability may have prevented mothers from admitting that their fatigue is interfering with their parenting efforts when answering the questionnaire [32]. On the basis of this systematic review it appears that mothers may be more likely to share their difficulties with child care caused by fatigue during face-to-face interviews.

3.5.1 Synthesis and Gaps in Knowledge

The long search period applied for our systematic review (1980-2007) with only 10 included studies points to a topic with scarce evidence. Furthermore, the included studies are heterogeneous and pose limitations due to methodological issues. First, there is a striking absence of conceptual and measurement clarity to assess infant crying and maternal fatigue. The diverse types of outcomes and effect measures put an unbridgeable hurdle to our attempts to conduct a formal meta-analysis for the quantitative studies. In fact, it would have been possible to calculate pooled effect sizes for four studies only. This calculation would have required to dichotomise all exposures in an excessive and low crying group and to assume equal differences between the resulting groups across the studies. As these assumptions were inaccurate, we refrained from reporting a pooled effect size. A second limitation is the potential reporting bias, since data on maternal and infant factors were mostly mother-reported. A fatigued mother may feel that her baby is crying a lot, when a neutral observer

might not. However, no study made use of a third person's rating of infant difficulty or of technical auditory measurement for infant crying. Although mother-reported data on infant behaviour does not provide strong evidence to conclude causality, it is appropriate if the point of interest is the burden mothers experience while caring for a crying child. The third limitation was with the study samples, which were mostly Caucasian, middle-class families. Although most studies controlled for some confounders such as parity, marital status, social support, education or maternal psychopathology, uncontrolled residual confounding may still have affected the associations.

The limited number and comparability of the reported studies point to the fact that interactions between maternal and neonatal health are an under-researched area. Research is still structured along the traditional division of paediatrics and obstetrics, which may explain the few numbers of studies connecting the two main concerns of new mothers. Most studies and systematic reviews, in particular, have focused either on infant crying or on postpartum fatigue [4, 7, 50-53]. In this context, the present review describes the current state of knowledge how infant crying and maternal fatigue are related. Its strength is the combination of evidence from quantitative and qualitative studies, which embraces statistical associations as well as the perspectives of lived experience by affected mothers. In this way, the qualitative accounts serve to interpret associations identified in quantitative studies and to enlighten underlying processes.

On the basis of these findings, we suggest to understand the interconnectedness of infant crying and maternal tiredness as a cyclical process, which may best represent the reciprocal dynamic of maternal and neonatal health (see figure 1). Prolonged infant crying reduces parents' access to rest, and therefore increases tiredness/fatigue. Fatigue can then impair the parents' ability to provide empathetic care to a crying infant, leading to still more crying.

3.5.2 Implications for future research and clinical practice

To understand dynamics in early family health future research requires integrated approaches which observe maternal and infant factors together. Broader knowledge is necessary of the processes leading to an adaptive cycle of infant soothing and maternal recreation or to a negative spiral of infant crying and maternal fatigue with the potential of adverse effects on family health. To capture the full range of such developments, longitudinal and prospective study designs are needed which will enrol families prenatally, before any patterns of interaction are established. As most studies focus on the mother-child pair, the perceptions and experiences of fathers need specific attention. Family practices and experiences are

always multifactorial. Therefore researchers should apply a systematic view, which may be best achieved through multi-method approaches. Assessment strategies should be based on clear, explicit definitions of the domains to be measured, in order to enhance comparability of results.

In clinical practice, several intervention programs for excessively crying infants have combined training to read babies' cues and teaching of soothing skills with measures to facilitate maternal rest, with encouraging results [6, 20]. However, in routine care, surveyed mothers reported repeatedly that contemporary postnatal care does not correspond to their need for rest and childcare support [24, 54, 55]. So far, this discrepancy between perceived needs and provided care has not been sufficiently explained or resolved [56-58].

In light of the existing evidence, we suggest three key areas to target in postnatal care. First, the determination and assessment of new parents' needs regarding infant crying and maternal fatigue requires increased attention in routine postnatal care. Second, adequate information about mothers' postnatal recovery and patterns of infant crying has to be combined with new parents' introductions to efficient infant settling. Third, by correcting our society's idealised conceptions of motherhood, health professionals can help new parents adopt a realistic view of parenting, and encourage them to organise relief and recuperation from the 24 hours efforts awaiting them.

In conclusion, infant crying, coupled with maternal tiredness and/or fatigue are the most frequent complaints of new mothers, and emerging evidence shows that they are interconnected. If healthcare professionals are to address the prominent concerns of parents caring for a neonate, it is essential to review current care practices and tailor them to maternal and infant needs. A care strategy alleviating the burden of infant crying and maternal fatigue has the potential to strengthen family health from the earliest stage.

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4 Predictors of crying problems in the early postpartum period

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4.1 Abstract

Objective: To investigate maternal and infant factors associated with midwife-reported crying problems in the early postpartum period.

Design: Case control study.

Setting: Postnatal home care in Switzerland

Participants: 7,765 mother-child dyads who received postnatal homecare by midwives (n= 1,636 cases of midwife-reported crying problems, n= 6,129 controls)

Methods: We investigated factors associated with midwife-reported crying problems in postnatal home care utilizing the Statistical Database of Independent Midwives' Services in Switzerland (2007) collected by the Swiss Federation of Midwives. Using case control methodology, we matched all identified cases of crying problems with controls who had been cared for by the same midwife. A conditional logistic regression model was used to analyze the associations of reported crying problems with maternal and infant factors.

Results: The relationship between maternal health problems and infant crying was recognizable in the immediate postpartum period. Substantially associated with early crying problems were maternal depression, psychological decompensation, and maternal complications during the first 10 days after birth. Further risk factors were planned resumption of paid work directly after paid maternity leave (at 15-16 weeks postpartum) and immigrant status. A protective effect was observed for higher parity.

Conclusions: Crying problems in the early postpartum period interact with maternal conditions. To prevent early crying problems, postpartum care should reduce maternal distress by strategies which enhance mothers' rest and recuperation after birth. Specific support is important for mothers with early signs of depression or decompensation, intention to return early to paid work, immigrant background and for first-time mothers.

KEYWORDS: excessive crying, newborn, colic, parity, maternal depression, postpartum period, maternal health

Crying constitutes the first form of neonatal communication and elicits the caretaking behaviours necessary for a baby's survival [1, 2]. Yet, infant crying is known as one of the major challenges for new parents and contributes considerably to parental stress [3, 4]. Prolonged crying is one of the most frequent reasons why parents seek medical care [5, 6]. Most distressing for parents is when their infant cannot be consoled. This may lead to concerns that the baby suffers from a health problem, and may damage parents' confidence in

Infant crying is known as one of the major challenges for new parents and contributes considerably to parental stress.

their ability to care for their child [3, 7]. Such a situation can endanger the normal

development of the parent-child relation; dysfunctional patterns of interaction may form and disturb reciprocal attachment [8, 9]. In extreme cases, babies who cry excessively are at risk for shaken baby syndrome or other forms of abuse [10, 11]. Understanding the complexity of infant crying is crucial to effective care during the postnatal period.

4.2 Background

Current pediatric theories regard infant crying as a normal part of a child's neuro-behavioural development with large inter-individual variation. Infant crying follows a typical curve which peaks during the sixth week postpartum at nearly 3 hours crying per day, and declines to below 1 hour per day by 12 weeks of age [12-14]. Existing literature concentrates on the upper end of the crying continuum – infantile colic, also called excessive crying – which affects 5-19% of infants during the first six months after birth [15-17]. The wide range of reported prevalence is likely due to inconsistent definitions of excessive crying [18]. The most common definition dates back to the 1950s and is known as “the rule of three”[19]. Crying is excessive if an infant cries more than 3 hours per day, on more than 3 days per week, for at least 3 weeks. However, according to this time-based definition early crying problems, that can put families under stress shortly after birth, would not be considered excessive crying. That may be the reason that little is known about crying problems occurring in the first month postpartum.

In addition to “the rule of three” various authors have suggested diverse qualitative characteristics to differentiate normal from excessive crying such as paroxysmal crying, unresponsiveness to soothing, and pain-like facial expressions [20, 21]. Others have identified parents' perception of crying as a problem or their need for professional help as indicator for excessive crying [15, 22].

In recent decades, clinicians and researchers have developed numerous theories to explain the origins of excessive infant crying and to serve as basis for specific therapeutic approaches [23, 24]. Explanatory models of a gastrointestinal or allergenic etiology are common, but these disorders have only been identified in a minority of cases [5, 25-27]. Some evidence supports theoretical models linking excessive crying to environmental tension or maternal anxiety, but study findings are inconsistent [28]. Maternal depression and stressful experiences during pregnancy have, however, been consistently associated with a higher risk for excessive crying [26, 29], [17, 30]. In sociodemographic studies, factors such as maternal education and socioeconomic status showed conflicting results [17, 30, 31], while higher parity appeared to be protective in most studies [17, 28, 32].

As most of these studies assessed crying at 2-3 months postpartum, little is known about earlier crying problems. Furthermore, many studies focused on either sociodemographic or health related predictors while others reported only bivariate relationships between predictors and excessive crying resulting in a lack of knowledge about potential confounding factors. A comprehensive assessment of different predictors and their interactions is lacking. Our objective was to gain more insight into the predictors of early crying problems by examining the associations between sociodemographic, reproductive-maternal and neonatal health factors and infant crying problems utilizing data supplied by the Statistical Database of Independent Midwives' services in Switzerland .

4.3 Methods

Based on previous literature we hypothesised that the risk of early crying problems would be associated with sociodemographic factors (maternal age; maternal education and work load; single parenthood), reproductive-maternal factors (parity, mode of delivery, prenatal, intrapartum or postpartum disorders, including psychological decompensation and/or depression of the mother), and neonatal health factors (gestational age, birth weight, neonatal disorders). We also investigated women's plans for paid work after birth since length of maternity leave has been shown to have an impact on maternal and neonatal health, but its impact on infant crying has not been investigated [33].

4.3.1 Swiss context and data source

Midwifery postnatal home care in Switzerland is provided by self-employed midwives, whose fees are reimbursed by mandatory health insurance. Approximately 50% of the childbearing population enlists these services postnatally, most commonly after hospital discharge (at 4-5

days postpartum) to the tenth day postpartum. If more home care is deemed appropriate after 10 days, it must be prescribed by a physician [34]. The Swiss Federation of Midwives maintains an administrative-clinical database for all midwifery services provided by self-employed midwives [35]. The midwife completes a standardized form to document sociodemographic and health data for each mother-child dyad cared for. The numbers of postnatal visits (mean 4.45, range 1-42) and maternal or child hospitalization are also recorded [35]. In addition, midwives document common prenatal, intrapartum and postpartum conditions in mothers and neonates using standardized lists including infant crying problems.

4.3.2 Study Design

A case control approach was used to analyze a range of factors associated with reported crying problems. The midwifery data set offered the opportunity to use undesirable outcomes as a starting point and to identify cases and controls from the same source population [36]. Cases were defined as all mother-child pairs with an entry of “excessively crying infant” on the data form, whereas controls were defined as mother-child pairs without documented crying problems. The Statistical Database of Independent Midwives’ services in Switzerland does not have standardized criteria for documenting conditions. As a result, documentation was based on the midwife’s assessment and professional judgement. Consequently, a report of excessive crying could have been based on the midwife’s direct observation of the infant or on maternal report. To control for differences in reporting of crying problems between midwives, we matched cases of mother-child dyads to controls who were cared for by the same midwife. Since we were examining sociodemographic and reproductive factors as predictors of crying problems, we did not use additional matching criteria.

The study was approved by the Swiss Federation of Midwives and the cantonal ethical committee.

4.3.3 Sample

The Statistical Database of Independent Midwives’ services in Switzerland provided a dataset consisting of a nationwide sample of 36,821 mother-child dyads who received postnatal midwife care in 2007. This corresponded to 49% of the live-births (74,494) reported in Switzerland in 2007 [37]. We identified 1,636 cases of reported excessively crying infants and matched them with 6,129 controls without reported crying problems. To increase statistical power, our goal was to select 4 controls for each case. This was possible for 1,416 cases. We were only able to match 1-3 controls for the remaining 218 cases. Only two cases could not be matched and were, therefore, excluded.

4.3.4 Factors selected for analysis

The selection of factors to examine as potential predictors of infant crying problems was based on searching the literature for socio-demographic, maternal-reproductive and neonatal factors related to postnatal crying problems. All selected factors, which were available in the midwifery database, were included in the analysis (see Table 2).

Maternal vocational education, i.e. education obtained after mandatory or secondary education, was reported in three categories (< 2 years, 2-4 years, > 4 years). Plans for resumption of work after birth were categorized according to the Swiss regulation of paid maternity leave (14 weeks) and mothers' intent to return to work (no, undecided, yes time point unknown, yes <14 weeks, yes 14-16 weeks, yes >16 weeks postpartum).

We used 3 categories for parity (1, 2, or ≥ 3 children) since no additional effect was shown for multiparity over the third child. The prenatal disorders examined were bleeding, preeclampsia, intrauterine growth retardation, infections, breech-presentation and postdate pregnancy. The postnatal disorders were complications related to wound healing (perineal or caesarean) and insufficient uterus involution. The neonatal disorders available in the database were infections, malformations, congenital heart defects, acute respiratory distress syndrome, and meconium aspiration.

4.3.5 Statistical Analysis

In the first step of the regression analysis we compared the factors between cases and controls in a bivariate analysis. To account for the 1:4 matching, we used simple conditional logistic regression to compute associations. In the second step multiple conditional logistic regression models were utilized to assess the importance of individual predictors when adjusted for factors from the same category (sociodemographic, reproductive-maternal or neonatal health problems, data not shown). In the third step, we included all factors in one model.

For continuous variables (maternal age, gestational age and birth weight), we tested the linearity of their associations with the outcome variable by inserting quadratic and cubic terms [36]. None of these terms were significant ($p > .05$).

To assess potential trends between the risk for crying problems and categorical or ordinal variables (mothers' post-mandatory education, amount of paid work before birth, parity), we used trend tests which were all significant ($p < .05$). We also evaluated collinearity of gestational age and birth weight. The correlation of the two variables was rather low

($R^2=0.29$). Therefore, we decided to include both variables in the final regression model. In addition we examined potential interaction between gestational age and birth weight. The interaction term was not significant ($p=0.50$).

Because postnatal home care is focused on the first few weeks after delivery, independent midwives may have already terminated their care when preterm infants are discharged following a prolonged hospitalization. Consequently, we felt that these infants would be less likely to be seen by independent midwives. Therefore, we carried out a sensitivity analysis, excluding all mother-child pairs with preterm birth < 37 weeks of gestational age ($n= 383$ mother-child dyads).

We also carried out another sensitivity analysis to determine if factors associated with crying problems reported during the first ten days differed from those associated with crying problems reported after ten days, when home visits need a prescription from a physician.

4.4 Results

The source population for the study was women that received postnatal home care by independent midwives in Switzerland in 2007. Characteristics of the source population were compared with the overall childbearing population in Switzerland for the same year (2007) (Table 1). The women in the source population were slightly older and there was a higher percentage of non-Swiss mothers compared to the overall childbearing population in Switzerland in 2007. Family structure and the number of children were less comparable, as the Swiss Birth Register does not report these data in the same way as the Statistical Database of Independent Midwives' services in Switzerland. The study population appears to include more first-time mothers than reported in the Swiss Birth Register. However, this difference may be due to the fact that the Swiss Birth Register only includes the number of children for married mothers, but not for unmarried mothers.

Table 1 Description of the source population in comparison with all Swiss life births in 2007

	Source population ^a (n= 36,821)	Nation-wide live births in 2007 (n=74,494)
Maternal age, in years (mean)	31.5	30.8
Swiss nationality	61.8 %	64.0 %
Living with a partner/married ^b	96.0 %	83.8 %
Multiple births	1.67 %	1.66 %
Parity/ Live birth in current marriage ^c		
1 child	53.2 %	46.9 %
2 children	32.7 %	38.4 %
3 and more children	12.6 %	14.7 %

^a Live births with midwifery care after delivery

^b Dataset of study population reports living with a partner, the register of nation-wide life births reports mother's marital status

^c Dataset of study population reports maternal parity, the register of nation-wide life births reports number of live births in current partnership of married mothers

More than half of the cases with infant crying problems were identified within the first 10 days postpartum (59 %). Fewer cases were documented after 10 days (40.8 %). Three infants were hospitalized for treatment of crying problems (0.2%).

Table 2 shows the results of the bivariate analyses comparing differences in the factors between cases (infant crying problem reported) and controls (no crying problem reported). Mothers of infants with reported crying problems differed significantly from controls in relation to several maternal socio-demographic factors (e.g. nationality and education), as well as in reproductive-maternal factors (e.g. parity, mode of delivery and maternal depression). Cases also differed significantly from controls in relation to the infants' gestational age and the presence of neonatal disorders.

Table 2 Characteristics of mother-child pair cases and controls

Sociodemographic factors			
	Reported crying problem	No reported crying problem	p-value ^a
	n=1,634	n= 6,129	
	n (%)	n (%)	
Maternal age (mean (SD))	31.4 (4.9)	31.5 (5.0)	0.45
missing data	4 (0.2)	8 (0.1)	
Nationality			0.00
Swiss	891 (54.5)	3,686 (60.1)	
European	513 (31.4)	1,721 (28.1)	
Other countries	228 (14.0)	721 (11.8)	
missing data	2 (0.1)	1 (0.0)	
Family structure			0.54
Partnered	1,596 (97.7)	5,973 (97.5)	
Single mother	38 (2.3)	155 (2.5)	
missing data	0 (0.0)	1 (0.0)	
Vocational education, y			0.01 ^b
0-2	276 (16.9)	1,197 (19.5)	
2-4	848 (51.9)	3,189 (52.0)	
>4	504 (30.8)	1,722 (28.1)	
missing data	6 (0.4)	21 (0.3)	
Paid work before birth			0.00 ^b
None	419 (25.6)	1,924 (31.4)	
Part time	576 (35.3)	2,413 (39.4)	
Full time	627 (38.4)	1,753 (28.6)	
missing data	12 (0.7)	39 (0.6)	
Plans for paid work after birth			0.00 ^b
No return to paid work	417 (25.6)	1,992 (32.5)	
Unknown yet	256 (15.7)	897 (14.6)	
Planned, timepoint unknown	447 (27.4)	1,579 (25.8)	
Planned, > 16 wks postpartum	200 (12.3)	679 (11.1)	
Planned, 15-16 wks postpartum	200 (12.3)	600 (9.8)	
Planned, < 14 wks postpartum	110 (6.7)	366 (6.0)	
missing data	4 (0.2)	16 (0.3)	

Reproductive-maternal factors			
Parity			0.00 ^b
1 child	1,177 (72.0)	3,247 (53.0)	
2 children	365 (22.3)	2,035 (33.2)	
3 or more children	92 (5.6)	846 (13.8)	
missing data	0 (0.00)	1 (0.0)	
Childbirth Classes			0.00
no	634 (38.8)	3,044 (49.7)	
yes	826 (50.6)	2,417 (39.4)	
unclear	172 (10.5)	665 (10.89)	
missing data	2 (0.1)	3 (0.1)	
Prenatal disorders	64 (3.9)	194 (3.2)	0.17
Prenatal hospitalization	15 (0.9)	54 (0.9)	0.99
Course of delivery			0.00
Physiologic	759 (46.5)	3,181 (51.9)	
Pathologic	866 (53.0)	2,902 (47.4)	
missing data	9 (0.6)	46 (0.8)	
Modus of delivery			0.00
Spontaneous	861 (52.7)	3,627 (59.2)	
Vaginally operative	259 (15.6)	691 (11.3)	
Section	501 (30.7)	1,760 (28.7)	
missing data	13 (0.8)	51 (0.8)	
Multiple birth	19 (1.2)	114 (1.9)	0.03
Maternal complications^c	350 (21.4)	916 (15.0)	0.00
Maternal psychic decompensation^c	45 (2.6)	57 (0.9)	0.00
Maternal depression^c	91 (5.6)	103 (1.7)	0.00
Neonatal Factors			
Gestational age in weeks			
mean (SD)	39.6 (1.4)	39.3 (1.5)	0.00
missing data	10 (0.6)	63 (1.0)	
Birth weight in kg			
mean (SD)	3.331 (0.442)	3.323 (0.485)	0.59
missing data	14 (0.9)	97 (1.6)	
Neonatal disorders	173 (10.6)	1,258 (20.5)	0.00

^a In order to account for the matching, the p- values were computed from simple conditional logistic regression model

^b Trend test significant

^c 0-10 days postpartum

In the multivariate model, the strongest associations with infant crying problems were maternal depression (OR 4.02, CI 2.91-5.56) or psychic decompensation (OR 2.59, CI 1.69-3.97) during the first 10 days postpartum, followed by non-Swiss nationality (Europe: OR

The relationship between problematic infant crying and maternal mood problems was already evident during the first ten days postpartum .

1.34, CI 1.16-1.55, non-Europe: OR 1.47, CI 1.20-1.80), planned resumption of paid work at 15-16 weeks

postpartum (OR 1.38, CI 1.07-1.79) and the presence of maternal complications after birth (OR 1.37, CI 1.16-1.61).

Multiparity was highly protective (2nd child: OR 0.53, CI 0.45-0.63, ≥ 3 children: OR 0.31, CI 0.24-0.41) against infant crying problems. No significant associations with crying problems were found for higher levels of maternal post-mandatory education (>4 years) (OR: 1.16, CI 0.94-1.43) and fulltime work before birth (OR: 0.97, CI 0.78-1.22).

Table 3 Unadjusted and adjusted odds ratios for reported crying problems
(mother-child pairs in model adjusted for all factors: N= 7383)

Reported crying problem	Raw OR	p-value	OR adjusted for all factors ^a	p-value
Sociodemographic factors				
Maternal age	1.00 (0.98-1.01)	0.45	1.01 (1.00-1.03)	0.06
Nationality				
Swiss	1		1	
European	1.22 (1.08-1.38)	0.00	1.34 (1.16-1.55)	0.00
Other countries	1.23 (1.04-1.46)	0.02	1.47 (1.20-1.80)	0.00
Family structure				
Partnered	1		1	
Single mother	0.89 (0.62- 1.28)	0.54	0.73 (0.49-1.10)	0.13
Vocational education, y				
0 ≥2	1		1	
2 -4	1.18 (1.01-1.38)	0.04	1.13 (0.94-1.37)	0.19
> 4	1.31 (1.11-1.55)	0.00	1.16 (0.94-1.43)	0.17
Paid work before birth				
None	1		1	
Part time	1.07 (0.93- 1.23)	0.37	0.82 (0.66-1.00)	0.06
Full time	1.71 (1.48-1.97)	0.00	0.97 (0.78-1.22)	0.82
Plans for paid work after birth				
No return to paid work	1		1	
Unknown yet	1.17 (0.97-1.41)	0.11	1.08 (0.86-1.34)	0.51
Planned, timepoint unknown	1.30 (1.12-1.52)	0.00	1.15 (0.93-1.43)	0.20
Planned, > 16 wks postpartum	1.43 (1.18- 1.74)	0.00	1.24 (0.96-1.61)	0.10
Planned, 15-16 wks postpartum	1.64 (1.35-1.99)	0.00	1.38 (1.07-1.79)	0.01
Planned, < 14 wks postpartum	1.45 (1.14-1.86)	0.00	1.22 (0.90-1.64)	0.20
Reproductive-maternal factors				
Parity				
1 child	1		1	
2 children	0.48 (0.42-0.55)	0.00	0.53 (0.45-0.63)	0.00
3 or more children	0.30 (0.24-0.37)	0.00	0.32 (0.24-0.41)	0.00
Childbirth Classes				
no	1		1	
yes	1.63 (1.45- 1.84)	0.00	1.07 (0.92-1.24)	0.83

Prenatal disorders				
None reported	1		1	
yes	1.23 (0.92-1.65)	0.16	1.25 (0.87-1.80)	0.22
Prenatal hospitalization				
None reported	1		1	
yes	1.00 (0.56-1.77)	0.99	0.71 (0.34-1.45)	0.34
Course of delivery				
Physiologic	1		1	
Pathologic	1.26 (1.23- 1.41)	0.00	1.12 (0.92-1.37)	0.26
Modus of delivery				
Spontaneous	1		1	
Vaginally operative	1.56 (1.32-1.83)	0.00	1.05 (0.83-1.32)	0.69
Section	1.20 (1.05-1.36)	0.01	0.99 (0.80-1.22)	0.91
Multiple birth				
None reported	1		1	
yes	0.60 (0.37-0.98)	0.04	0.77 (0.45-1.34)	0.36
Maternal complications^b				
None reported	1		1	
yes	1.40 (1.21-1.63)	0.00	1.37 (1.16-1.61)	0.00
Maternal hospitalization pp				
None reported	1		1	
yes	0.57 (0.20-1.63)	0.30	0.30 (0.10-0.92)	0.04
Maternal psychic decompensation^b				
None reported	1		1	
yes	3.22 (2.16-4.82)	0.00	2.59 (1.69-3.97)	0.00
Maternal depression^b				
None reported	1		1	
yes	3.70 (2.74-5.00)	0.00	4.02 (2.91-5.56)	0.00
Neonatal factors				
Gestational age	1.11 (1.07-1.16)	0.00	1.06 (1.01-1.12)	0.03
Birth weight (kg)	1.03 (0.92-1.16)	0.59	0.90 (0.77-1.05)	0.17
Neonatal disorders^b				
None reported	1		1	
yes	0.45 (0.371-0.52)	0.00	0.43 (0.36-0.52)	0.00

a Adjusted for all factors listed in Table 3

b 0-10 days postpartum

Unadjusted and adjusted odds ratios differed considerably, pointing to confounding variables in the bivariate analysis. In the multivariable model several factors that were significantly related to crying problems in the bivariate analyses were no longer significant (e.g. maternal education, amount of paid work before birth, mode of delivery). Such shifts indicate underlying confounding variables. The overestimation of the effect of maternal education in the unadjusted analysis was corrected when the variable “parity” was taken into account. The variable “parity” was also responsible for correcting the formerly overestimated effects of “full time work before birth” and “childbirth classes”. More primiparous mothers had a post-mandatory education > 4 years (31.3 % of primiparous vs. 25.4 % of multiparous mothers), were working fulltime before birth (46.8 % of primiparous vs. 9.8 % of multiparous mothers) and attended childbirth classes (59.8 % of primiparous vs. 17.9 % of multiparous mothers).

The sensitivity analysis, which excluded preterm neonates < 37 weeks of gestational age showed no substantial change in significant associations. The second sensitivity analysis, which excluded cases of reported crying after ten days, showed an even stronger associations with early postpartum depression (OR 6.48, CI 4.14-10.13) and maternal decompensation (OR 5.01, CI 2.76-9.11).

4.5 Discussion

Our analysis identified significant associations between midwife-reported crying problems in the early postpartum period and sociodemographic, reproductive-maternal and neonatal factors. A novel finding is that the relationship between maternal health problems and infant crying was recognizable in the immediate postpartum period. Maternal depression and psychic decompensation during the first 10 days were the major risk factors associated with reported crying problems, followed by non-Swiss nationality, planned resumption of paid work between 15 and 16 weeks postpartum and maternal complications after birth. Having more than one child was the strongest protective factor.

The association between maternal depression and the occurrence of crying problems is consistent with previous evidence in studies of infants up to six months of age [26, 29, 38]. Our study adds evidence on the association between maternal depression and infant crying problems during the immediate postpartum period. Infant crying problems were four times more likely to be reported when there was maternal depression than when it was absent. However, the direction of the underlying causality is not clearly known. On the one hand, an unsettled baby with prolonged periods of crying often leads to sleep deprivation in caregivers

which increases the risk for developing postpartum depression [39-41]. On the other hand, exhausted or depressed mothers may be more sensitive in their perception of crying as a problem [42]. Furthermore, severely depressed mothers are known to interact less responsively with their infants, which may lead to and/or perpetuate unsettled infant behavior [9, 43].

Our study also identified maternal complications during of the postpartum recovery period as a risk factor for crying problems in the neonate. There is little previous research examining this association. In fact, maternal health problems are typically underreported in the postpartum period [44] and need further attention in research and in practice.

To our knowledge no evidence is available examining the association between new mothers' plans to resume paid work and infant crying problems. It is known, however, that multiple roles can constitute a stress factor in mothers [45]. This effect may be reduced by longer maternity leave. Longer maternity leaves are known to be beneficial for maternal and child health, and they are associated with a longer duration of breast feeding [33]. Supposedly, a longer period of reduced stress after birth may also have a positive impact on the occurrence of crying problems. In Switzerland, mothers are entitled to 14 weeks of paid maternity leave. In this study, the risk of infant crying problems was not highest for mothers who planned their return to paid work before 14 weeks, but for the group of mothers who planned their return right after their paid maternity leave. One explanation for these findings is that mothers who planned to return to work earlier may have voluntarily chosen to do so, whereas mothers who planned to return after their paid leave may have felt obligated to return which could have increased their stress level. Mothers who can afford to add unpaid maternity leave or to quit paid work, may experience less stress during the postpartum period. Although no previous studies examined the relationship between the length of planned maternity leave and infant crying problems, Canivet and colleagues [30] found no association between economic stress and crying problems.

The protective effect of higher parity is consistent with most previous findings as well [17, 28]. Alvarez et al. found the same amount of crying in infants of primiparous or multiparous mothers, but that primiparous mothers were more likely to respond by seeking professional help [46]. Other studies have reported that primiparous mothers are less confident in interpreting their baby's signals [4, 47], whereas multiparous mothers profited from a higher sense of maternal self-efficacy [48]. Experienced mothers also showed a different response to fussing and crying, which may stimulate infants' emergent abilities to cope with mild distress

[49]. In a society where many new mothers feel isolated after giving birth, an insufficient transfer of childcare skills and support to primiparous mothers may put additional stress on inexperienced mother-child pairs. This risk may be even higher in immigrant mothers, who frequently lack family support and social networks [50]. However, the association of immigrant status with the occurrence of crying problems has rarely been addressed. According to a study from the Netherlands, fewer crying problems occurred in families from Surinam than in the Dutch population [51]. Immigrants in our study however had different origins (eg. Africa, and South- and Eastern Europe) which may not allow comparison to the Surinam migrant group in the Netherlands.

Our study did not confirm prior findings that maternal education was a risk factor for crying problems [17, 30]. Our findings are, however, consistent with those of Rauatava and colleagues [31] who also did not find a significant association between maternal education and infant crying problems. These inconsistencies may be partly due to differences in the confounders controlled for when examining the relationship or may reflect differences in how social contexts influence the parenting experience.

For other factors evaluated in this study the existing evidence shows mixed results. In our study, the risk of crying increased as gestational age increased. In contrast, Sondergaard, Skajaa, & Henriksen [52] identified younger gestational age as a risk factor for excessive crying, while Talachian and colleagues [32] found no differences in the rates of excessive crying between preterm and full term infants. Our result may have been, in part, due to the early observation period of our study. As the crying peak is apparently related to the time since conception rather than time since birth [53], midwives' home visits may not have covered the emergence of crying problems in children of younger gestational age.

A surprising finding was that neonatal health problems and maternal hospitalization appeared to be protective for the reporting of crying problems. One possible explanation is that infants who suffer from diseases such as infections or acute respiratory distress syndrome, may be too exhausted to cry much. On the other hand, this association could reflect a reporting bias, as crying might lose its importance in the presence of severe maternal or neonatal health problems. Furthermore, midwives may be less involved when mothers or neonates need hospital care.

4.5.1 Strengths and limitations

Our results stem from a secondary analysis, an approach entailing a set of advantages and disadvantages. While the predetermined variables precluded a standardized definition of the reported conditions, we compensated for this by matching cases to controls cared for by the same midwife. However, underreporting of crying problems may have occurred, as midwives may not have recognized all existing crying problems during home visits. We are less concerned that crying problems were over-reported because this problem is unlikely to be identified unless it is a clinical concern which needs attention. It has been demonstrated that parents' reports of problematic crying were clinically relevant and could be confirmed by more objective measures as 24-crying diaries [54, 55].

Some variables known to influence the occurrence of excessive crying, such as feeding methods, social support, marital conflict or infant temperament, were not available in the data set and could not be studied. Still, using the Swiss National Database of Independent Midwives allowed inclusion of cases and controls from the same source population, based on the nationwide dataset on childbearing families with very low rates of missing data. Furthermore, the data set permitted the study of risk factors associated with infant crying problems during the early postpartum period in a large sample of maternal-infant dyads. A comprehensive range of sociodemographic, reproductive-maternal and neonatal factors were available for study. The finding that the association between maternal mood problems and infant crying is already evident in the early postpartum period is an important contribution to the literature.

Still, only 49% of childbearing mothers engage independent midwives postnatally so the data are not representative of the entire Swiss population. In particular, underprivileged mothers may not be informed about independent midwives' services. In addition, these services are also more likely to be used by mother-child pairs with complications and by first-time mothers.

Another limitation is the possible underestimation of the risk for crying problems in very preterm infants, as they less frequently receive home-care from independent midwives. Yet, in the sensitivity analysis excluding preterm neonates < 37 weeks of gestational age, effect estimates did not change substantially.

4.5.2 Implications for research and practice

The interconnectedness of maternal conditions and reported crying problems was recognizable in the immediate postpartum period. Specifically, maternal mental and physical health problems during the first days postpartum appeared to be highly related to reported crying problems. Further research is needed to investigate interactions between maternal

To prevent early infant crying problems, clinical and policy level measures designed to reduce maternal stress after birth should be should be developed and evaluated.

health, length of planned maternity leave and occurrence of crying problems during the first weeks postpartum. Based

on the findings in this study, infant crying problems in the early postpartum period are best understood as a multifactorial phenomenon. Both maternal and neonatal conditions need to be considered as interventions are developed and tested to prevent and treat this problem.

Since multiparity appeared to be strongly protective, tailored strategies are needed on how to provide support and transfer of child care skills to first-time mothers, who are a growing part of the childbearing population in Western countries.

To prevent early crying problems, postpartum care and policies should focus on ways to reduce maternal stress following birth. Specific support is crucial for mothers with early signs of depression or decompensation, intent of early return to paid work, immigrant background and for first-time mothers.

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5 Crying babies, tired mothers – challenges of the postnatal hospital stay: an interpretive phenomenological study

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5.1 Abstract

Background

According to an old Swiss proverb, “a new mother lazing in childbed is a blessing to her family”. Today mothers rarely enjoy restful days after birth, but enter directly into the challenge of combining baby- and self-care. They often face a combination of infant crying and personal tiredness. Yet, routine postnatal care often lacks effective strategies to alleviate these challenges which can adversely affect family health. We explored how new mothers experience and handle postnatal infant crying and their own tiredness in the context of changing hospital care practices in Switzerland.

Methods

Purposeful sampling was used to enroll 15 mothers of diverse parity and educational backgrounds, all of who had given birth to a full term healthy neonate. Using interpretive phenomenology, we analyzed interview and participant observation data collected during the postnatal hospital stay and at 6 and 12 weeks post birth. This paper reports on the postnatal hospital experience.

Results

Women’s personal beliefs about beneficial childcare practices shaped how they cared for their newborn’s and their own needs during the early postnatal period in the hospital. These beliefs ranged from an infant-centered approach focused on the infant's development of a basic sense of trust to an approach that balanced the infants’ demands with the mother's personal needs. Getting adequate rest was particularly difficult for mothers striving to provide infant-centered care for an unsettled neonate. These mothers suffered from sleep deprivation and severe tiredness unless they were able to leave the baby with health professionals for several hours during the night.

Conclusion

New mothers often need permission to attend to their own needs, as well as practical support with childcare to recover from birth especially when neonates are fussy. To strengthen family health from the earliest stage, postnatal care should establish conditions which enable new mothers to balance the care of their infant with their own needs.

5.2 Background

Comforting a crying baby while coping with personal tiredness can challenge mothers after birth. As many as 46%-87% of new mothers report problems with tiredness or fatigue [1, 2], and disquieting infant crying is the most commonly reported reason parents consult health professionals [3]. Not surprising, the occurrence of postnatal tiredness is associated with the amount of infant crying [4, 5]. In the worst case, infant crying and increasing exhaustion can cumulate into a vicious circle and negatively affect family health. Maternal exhaustion has been identified as a predictor of postpartum depression [6, 7], and persistently crying infants are at a higher risk for shaken baby syndrome or other forms of child abuse [8, 9]. To date, little is known about how mothers confront these challenges during their postnatal hospital stay.

Both postpartum maternal tiredness and fatigue are defined as an imbalance between activity and rest [10]. Milligan and colleagues [11] differentiate between tiredness and fatigue, defining tiredness as a physiological state occurring after extended wakefulness and/or exertion which is relieved by a period of sleep. Fatigue, however, is seen as a pathological state which persists through the circadian rhythm and cannot be relieved through a single period of sleep. Fatigue decreases the capacity for daily activities and hampers the well-being of the affected person [12]. Facilitating new mothers' recuperation has been the primary focus of postnatal care in the past [13], as noted in an old Swiss saying, "a new mother lazing in childbed is a blessing to her family". According to this saying, if a new mother is allowed to rest during the first weeks after birth she will recover faster and, therefore, be able to fulfill her tasks of mothering and caring for her family in a better way than if she has to return to work immediately after giving birth. During the early twentieth century, when women entered hospitals to give birth, babies were separated from their mothers and placed in nurseries. Mothers were freed from childcare tasks apart from breastfeeding, in part to ensure maternal recuperation [14]. During the last decades of the twentieth century the paradigm for postnatal care provision in Western countries changed and the main responsibility for early newborn care shifted to the mothers [15]. Large-scale programs, such as the Baby Friendly Hospital Initiative [16], informed care policies by advocating unrestricted mother-child contact to promote bonding and breastfeeding [17, 18]. Despite positive results in relation to mother-child bonding and breast-feeding rates [19, 20], not all mothers seemed to be satisfied with all aspects of the new models of care [21, 22]. It is a conundrum still awaiting resolution that

across diverse countries new mothers express persistently less satisfaction with postnatal care than with care during pregnancy and delivery [23, 24].

As a midwife practicing in a regional Swiss hospital from 1991-2004, the first author and principal investigator in this study witnessed and participated in this paradigmatic shift on the postnatal ward. Some mothers obviously enjoyed the unrestricted contact with their baby, whereas others struggled to combine their own recovery with baby care. The purpose of this study was, therefore, to explore first, how new mothers experience the crying of their baby and their own tiredness and second, which perceptions and practices concerning these issues sustain or impair early family health and wellbeing. Data in this study were collected over the first three months postpartum. This article concentrates on mothers' experiences during the postnatal hospital stay.

5.3 Methods

5.3.1 Study Design

The theoretical background and method for this study derived from interpretive phenomenology as described by Heidegger [25] and Merleau-Ponty [26], and applied to nursing research by Benner and her colleagues [27-29]. According to this phenomenological approach, human beings are situated in their life world. They both create and are created by their situation [30]. Therefore, interpretive phenomenology takes into account the situatedness of human beings in time and space, the taken-for-granted cultural meanings and the personal concerns that matters to a person [27, 28, 31]. Methods of interpretive phenomenology are especially suited to explore human learning processes, transitions, and everyday comportment [27-29], all of which are important features when a woman is becoming a mother and the day-to-day caregiver for a baby. .

5.3.2 Swiss context and setting

In Switzerland, maternity services are reimbursed by the mandatory health insurance, which covers a hospital stay up to four days after birth [32]. Our study took place on the postnatal ward of a tertiary care women's hospital which serves the urban and suburban population of the region, and had been certified by UNICEF as a baby-friendly hospital, which includes the promotion of 24-hour rooming-in [16]. The two units of the postnatal ward can host 35 mother-child pairs in two-bed and single rooms. Single rooms are available for women with

private health insurance, and for women willing to pay an extra fee. The postpartum staff includes pediatric nurses (n= 39), midwives (n=4) and breastfeeding counselors (n=2).

5.3.3 Sample

We enrolled 15 mother-child pairs recruited from the prenatal outpatient clinic. Future mothers were invited to participate in the study by the attending midwife during a prenatal care appointment between the 30th week of pregnancy and birth. To fully depict an image of contemporary mothers we used maximum variation, sampling mothers of diverse parity and educational background [33]. Eligibility criteria included singleton pregnancy, vaginal or caesarean birth, and a full term healthy newborn. Mothers were excluded if they had conditions known to be associated with high risks for fatigue, such as postnatal anemia or depression. The study procedures were approved by the hospital directorate and the cantonal ethical committee. All participants provided written informed consent. There was no attrition.

5.3.4 Data collection

Participant observation in the postnatal ward and two narrative interviews at participants' homes at 6-8 and 12-14 weeks postpartum were conducted to examine the trajectory through the postnatal period. Each visit lasted approximately 60-90 minutes. All data were collected by the first author. For five mothers, a visit at the postnatal ward was not feasible, and was replaced by a visit at home within ten days following discharge. A few fathers were present during the hospital or home visit and sometimes joined in for part of the conversation. All mothers participated for the full length of the study.

Participant observation was selected to gather data on the postnatal ward because it is less obtrusive and thus, well suited for investigating childcare behaviors and social interactions [34-37]. The focus of the observation was mother-child interactions (including crying and soothing behaviors, facial and vocal expressions, eye-contact, and body positions) and interactions with family members and health professionals if they were present. The first author visited mothers and babies around the fourth day after birth on the postpartum ward. With the participants' permission she stayed in their room and took field notes of her observations. When the baby was quiet and no visitors were present, she had conversations with the mothers who gladly engaged in accounts about their birth and postpartum experience. If not spontaneously mentioned, prompts were used to elicit information about mothers'

experiences of tiredness and sleep. With the participants' permission, the investigator occasionally tape recorded longer narratives.

During the second and third visit at the participant's home each mother was encouraged to share stories about her baby's crying and her experiences of tiredness and rest, using a semi-structured interview guide with open ended questions. The goal of the interviews was to allow mothers to recount their experiences and reflect on them in the presence of an empathic, non-directive facilitator [28]. Prompts used to elicit memories of care experienced in the hospital included, "When thinking back on your stay at the postpartum ward, what do you remember about those days? How did the professionals react when your baby was crying? Was there something, which the professionals could have done to make your stay better?" The interviews were tape recorded and transcribed verbatim. To maintain participant confidentiality, all names were replaced by a pseudonym.

For the present paper, data related to the postnatal hospital stay was used from the visits on the postpartum ward and from the interviews at the mothers' homes. The translation of the quotes from German to English was validated by a bilingual speaker.

5.3.5 Data analysis

According to the phenomenological approach based on Heidegger, there is no neutral position outside the lived world for the researcher [38]. Rather, her or his own previous knowledge and beliefs function as starting point to enter the 'hermeneutic circle', which describes the researcher's circular movements between previous and new understandings, as well as the change between perspectives at parts of a narrative and at the narrative as a whole during data analysis. This process was supported by three interwoven interpretive techniques described by Benner [30]: case and thematic analyses and the identification of exemplars. Analysis began as soon as text was available, paralleling and informing further data collection. In the analysis of cases we closely examined the observational field notes and interview transcriptions of one mother-child pair, and wrote a tentative interpretation seeking to understand this participant's reasoning and actions from her point of view. After one case was fully interpreted, we explored other cases, comparing and contrasting them and identifying paradigm cases which conveyed a strong pattern of meanings. During the thematic analysis we compared issues noted across the field notes and in the accounts of different participants, identified commonalities and differences and discerned reoccurring patterns. Finally, we searched narrative accounts for exemplars to illustrate and convey aspects of the case and the thematic

analysis in their situational context. [27, 29, 39]. ATLAS.ti software supported data management and organization [40].

To balance views and strengthen the trustworthiness of interpretations, we discussed the analysis on a regular basis with a group of researchers representing diverse experiences in childcare practice and research. The input of these colleagues was valuable in revealing gaps and blind spots, to offer alternative interpretations [28, 39], and to provide feedback on how the text would speak to the reader [41].

5.4 Results

5.4.1 Participants

Maternal age ranged from 23 to 44 years (mean 33.5). Nine participants were of Swiss origin, six had a migrant background (e.g. from Croatia, Italy, or Germany). Six mothers gave birth to their first child, six to their second child, and one mother each to her third, fourth or fifth child respectively. Only one mother was single and living alone, all others were partnered. There was a range of educational backgrounds and vocations (e.g. nursing assistant, lawyer, secretary) with a noticeable number of nursing professions (n=6). Thirteen mothers had a spontaneous vaginal birth and two mothers had a planned caesarean section for medical reasons. All neonates adapted normally after birth and were transferred to the postnatal ward together with their mothers. All mothers initiated breast feeding, and 80% (n=12) were continuously breast feeding at 12 weeks postpartum.

5.4.2 Themes and patterns

The findings illustrate how mothers entered into the challenge of combining baby- and self-care. This included 1) mothers' experiences of tiredness and rest, 2) their responses to their baby's needs and crying, 3) the interplay of infant crying and maternal tiredness, and 4) mothers' experience of professional support. To illustrate the wide continuum of maternal experiences and practices we used several exemplars conveying aspects of the case and the thematic analysis. We chose those exemplars that exemplify a certain pattern most clearly.

5.4.3 Mothers' experience of tiredness and rest

After giving birth some mothers were so excited that they slept little during the first night without feeling tired; others felt tired from the first day. Those who did feel tired often distinguished emotional from physical tiredness. Physical tiredness was attributed to sleep deprivation or symptoms such as pain or nausea, especially after a caesarean birth. Emotional tiredness resulted from facing a new situation filled with new impressions, concerns and challenges, as described by the following mother.

It's not just physical tiredness. It's also emotional tiredness. It's the sleep that I am missing but it's also this new situation, all these impressive events... one has to adapt to this new situation and overcome the experience of the delivery. And one has to get to know the child. (Simone, second-time mother, field note)

The birth of a child filled many mothers with energy and joy, but it also required additional strength to grow into a new role and to recover physically. The restoration of strength was hampered by a lack of sleep, which was mostly due to the infant's needs, but sometimes also because mothers' wellbeing required night-time assessment by care providers. In addition, the actual environment created challenges to obtaining rest, especially when women shared rooms. A few mothers qualified for a single room because they had a private health insurance, or were paying an extra-fee. Yet, the majority shared a two-bed room with another mother-child pair.

Interestingly, most mothers started to count the hours of sleep they got per night, suggesting this was becoming an increasing concern for them. They tried to catch up on rest during the day-time, but that was often impossible or difficult. Daily standard procedures such as medical care and housekeeping combined with the presence of visitors clashed with this need.

Somebody is constantly entering the room, the door is always opening and closing, be it that somebody comes to see my room-mate or me. In general the noise level is simply very high. I think, at home it will be more relaxed and quiet. (Angelika, first-time mother, field note)

Although some mothers seemed to enjoy the company of a room-mate, most said that they would have preferred a single room to get more rest. Some multiparous mothers arranged for a more restful environment by paying extra for a single room and/or limiting visitors. Overall, few mothers felt rested during the hospital stay, whereas most experienced some level of tiredness, which they attributed to emotional, physical and environmental conditions. Their

explanations included disturbances caused by everyday life on a busy hospital ward. There were, however, also highly related to sleep disruptions due to the newborn's or the mother's care needs.

5.4.4 Mothers' experience of infant crying and soothing

Most mothers noted that their newborns only cried loudly when changed or bathed. Milder signs of discontent, such as fussing, occurred more frequently. Mothers attributed such signs of discontent to trouble with digestion, feeling too hot, and most of all, to hunger. Breastfeeding was a main measure to soothe crying, followed by holding and rocking the baby, talking gently, offering a pacifier, and walking around. Such measures were usually successful in calming crying babies.

Some participants, especially first-time mothers, found hearing their baby cry hard to tolerate: "It tears the heart". However, the mothers held different views on ideal responses to a baby's crying. Susanne, a first time mother, commented that she did not react nervously or excitedly when her four day old baby had a crying bout, but handled it calmly. During one of the interviews at home, she described the rationale for her mothering style:

I have always said, I don't want to be a mother who runs for every squeak and picks the baby up immediately...then the child notices, I only have to make a "peep" and someone comes. This may sound silly, but this goes in the direction of tyrannizing. That the child really realizes, I just have to pretend a bit and then mommy is there immediately, then you really run for every crap [for every little thing]. (Susanne, first-time mother)

Susanne believed that babies could easily get used to instant parental responses and start to tyrannize their caregivers. The view that babies may have a natural need to cry sometimes and that they benefit from slightly delayed parental response in order to adapt to the realities of life was also shared by other mothers.

Carol, another first-time mother, held a contrasting view. She felt a deep empathy with her newborn baby and imagined that her daughter would feel alone and neglected when left on her own for a few minutes. Because she did not want her daughter to cry in her cradle, she would wait to go to the bathroom until her husband came for his daily visits on the postnatal ward.

Otherwise, I would have had to lay Sara crying into the cradle, and this would have burdened me incredibly. I think, she has just come out of the belly and must process so much new, and then she shouldn't have to cry so alone. I find this sad, it also hurts me.

During an interview at home, Carol also gave a rationale for her approach to crying:

It was said, you shouldn't let babies cry ...so they will build up a basic sense of trust at the beginning. ... If Sara cries, I can not really endure it. I want to comfort her fast. (Carol, first-time mother)

Carol's concern for the baby's development of basic trust informed her mothering style. Both Carol and Susanne acted in accordance with their personal beliefs about what constitutes best childcare. To foster healthy psychological development Carol aimed to meet all her baby's needs immediately, while Susanne saw it as beneficial for the social development of a child to experience certain limits from the earliest stage. Most mothers' attitudes lay somewhere in-between these positions, as explained by Regina, who described her efforts to strike a balance between infant centered and a more structured childcare approach.

We do not spoil her, there is a limit somewhere then. Not that we just let her cry ...I make sure that we go and see within the first five minutes...She doesn't have to cry forever until somebody comes. She can count on it that somebody is there. (Regina, first-time mother)

Regina repeatedly stated that she and her husband did not want their baby to become 'the centre' of their lives, receiving all their attention; yet, she wanted the baby to feel cared for. Such different attitudes about beneficial childcare practices shaped the way mothers handled baby- and self-care from the first day.

5.4.5 The interplay of infant crying and maternal tiredness

As mentioned, most babies did not cry for long periods during the first days of life. Their mothers had the chance to rest and sleep, when not hindered for other reasons. However, some babies were often unsettled, slept for only short periods, and required frequent attention. Their mothers' opportunities to rest and sleep were seriously affected. This pattern was more pronounced in first-time mothers and becomes especially clear from Carol's description of the first 24 hours after a planned caesarean birth.

The next morning I was completely tired out ... I had only slept about 3 hours, at most, and Sara the same ... She had to be undressed over and over again to measure her temperature and blood glucose, and then she cried again, and then she came to breastfeed, and this went on the whole night, more or less, certainly four times. The next morning ... I felt extremely exhausted... And then, on the first day one gets thousands of pieces of information - how one must look after the child now and this and that, and the midwife really told me a lot, she did a lot and explained a lot to me, but I was so exhausted, absolutely empty. I could not take it at all in properly and I couldn't perceive the child properly either. (Carol, first-time mother)

Carol had mild gestational diabetes during pregnancy, so her daughter needed regular blood sugar evaluation during the first night, which precipitated crying periods and sleep interruptions. Carol felt her sleep deprivation and exhaustion eventually affected her cognitive abilities, which compromised her ability to absorb the childcare guidance given by health professionals and interfered with her perceptions of her baby. Sleep deprivation persisted, exacerbated by the fact that Carol's attempts to catch up sleep with naps during day-time were hampered by the busy life on the ward. Despite her family's encouragement to benefit from the hospital stay for her own recovery, she did not see this as a possibility and hoped to get respite and more rest at home after discharge.

Newborns' needs for nocturnal feeding, comforting and medical monitoring interfered markedly with mothers' night-time sleep. As a consequence, affected mothers suffered from increasing sleep deprivation, a state they described as compromising their own well-being and their abilities to learn the necessary parenting skills. In addition, their exhaustion could throw a shadow over their early perceptions of their newborn child. Depending on their beliefs pertaining to childcare, mothers tended to prioritize their newborn's needs and minimize own needs to various degrees. As a result, one mother in fact ignored her own need for rest and personal time in order to offer her child the best possible care.

5.4.6 Mothers' experience of professional caregivers' support

Women reported diverse experiences with professionals' support on the postnatal ward. Carol was aware that she could hand over some of her daughter's care to get rest during her hospital stay; yet her conviction that neonates need to develop a basic trust precluded her willingness to leave her child in the care of the postpartum staff. In addition, she expressed fear that her

baby would not get adequate attention and care in the nursery, nor would she become self-reliant in childcare before discharge if she did not assume all of the care herself.

They simply take the child out and put her in the baby's room, and I cannot have this, this breaks my heart ...At home I would have my husband, who would have taken her once and changed her diaper. But I can't call [the nurses] to change the diaper every time, I must see that I become self-reliant, so that when one goes home it will work. There, I can't ring the bell that they [the nurses] change her diaper either. (Carol, first-time mother)

Jacqueline is the mother of an infant that also was very wakeful, but she described a different approach. Since Jacqueline had barely slept the first night after birth the nurses offered to take care of her child for several hours.

I tried to keep her in the room, but around 2 o'clock I accepted the nurses' offer and let them take over. The first time, when the nurses moved the cradle with crying Sophie out of the room, it was a strange feeling. It felt like a kick in my heart. But I bundled all my forces to let Sophie go and convinced my self that it is better for Sophie and for me if I could get some sleep. (Jacqueline, first-time mother, field note)

Jacqueline had started with the conviction not to become an overprotective mother. But in this moment she experienced something she had not expected, an intense urge to mother her baby, despite her own fatigue. She went through an inner conflict between her emotional desire and her rational conviction that the baby was better cared for by nurses than by a mother who reached her limits. The nurses supported her view. Jacqueline looked back at her hospital stay:

Yes I think the most important thing there was that I could sleep through the night. To know that I can hand her over, if it doesn't work anymore. That was the most important - to have a little bit of the feeling that you can still fill up your strength. (Jacqueline, first-time mother).

Jacqueline left her child in the nurses' care to recover and gain strength for her maternal responsibilities after discharge. Carol maintained the responsibility for childcare round the clock to become self-reliant before discharge, in spite of overwhelming exhaustion. Both mothers strove to become the best possible caregivers for their newborn babies, but chose opposite paths. Carol seemed to concentrate on fulfilling all her child's needs while

postponing her own need for recovery and rest. Jacqueline took care of her own needs in order to provide good care to her child afterwards. Their different attitudes, beliefs and concerns entailed a higher hurdle to accept professionals' support for Carol, in contrast to a lower hurdle for Jacqueline.

Mothers reported that their opportunities to profit from support on the postnatal ward were also shaped by the time available to professionals and their willingness to provide help. Carol experienced the ward as busy and envisioned that the professional caregivers would not have enough time to take care of her baby. Jacqueline had the impression that the professionals had plenty of time for Sophie, as the ward had only few mothers during her stay. There were also accounts of mothers who would have wished to hand over an unsettled baby to get some sleep during the night-time, but had the impression that they did not have a real choice. Here the account of Patrizia, a mother whose first baby had been crying all the nights on the postnatal ward.

Once the night nurse said, she'd take him along for one hour, but brought him back when she could not calm him. But in general, they do not take the babies. My room-mate had also asked whether they couldn't take her child. The night nurse then said, she had so much to do. She could take him, but wouldn't be able to look after the child because she has to go when other women rang. Therefore, I didn't even ask ... I thought it doesn't help to ring; they won't take him anyway. (Patrizia, second-time mother, talking about first child)

Patrizia perceived night-shift nurses as reluctant to provide mothers of unsettled babies respite from childcare and offered several thoughts to explain their attitude. First, she had the impression that the postnatal ward had a philosophy of not separating the babies from their mothers. Second, even if nurses wanted to enable mothers to get some nocturnal rest, they might not be able to provide the baby with adequate care because of their heavy workload. Third, if a nurse was not successful in comforting the crying child she would pass care back to the mother.

This description of professional care provision was in sharp contrast to the accounts of Jacqueline, who was offered respite from childcare several times. Nevertheless, Jacqueline also noticed that the night-shift nurse was more reluctant to take the baby when the ward became busier. On the other hand, on the last night before discharge Patrizia met a night-shift nurse, who noticed her exhaustion, showed empathy and offered to take over the crying baby.

Evidently, the mothers experienced a variety of professional approaches when babies were fussy during the night-time, ranging from an inclination to reluctance to provide respite from childcare. They attributed these differences to the varying workload on the ward, and to the differing attitudes of the individual professionals.

5.5 Discussion

This study described how mothers combined baby- and self-care from the first days postpartum. Taking care of the newborn and mothers' own needs was easier when the baby was mostly content, but highly challenging if the baby was unsettled over long periods, preventing the mother from getting sleep and rest. The possibility and readiness to benefit from professionals support became a critical factor in how these mothers managed their own recuperation.

The mothers' account of their tiredness is in line with previous research [42-44]. Previous investigations identified environmental disturbances, care needs of the mother, and care needs of the baby as hurdles to rest during the postnatal hospital stay. Postnatal wards' busyness, noise, and shared rooms have been cited as disruptive to maternal sleep and recovery in Sweden [45], Australia [46] and in Switzerland [47].

More discordance exists about the newborns' impact on maternal rest, especially when babies stay with their mothers over night, as is now widely practiced and advocated [16]. This practice is based on the evidence that continuous rooming-in has a positive effect on breastfeeding initiation and duration [19, 20], and on the bonding process between mother and child [20]. In our study, maternal accounts reflected wide variations in how mothers experienced nocturnal rooming-in. Although some enjoyed their baby's closeness, others developed severe sleep deprivation and exhaustion, especially when caring for an unsettled child during the night. This supports the interconnections between the amount that infants cry and maternal tiredness reported in several studies [4, 5]. However, current guidelines on rooming-in [16, 20] cite evidence reporting that mothers slept the same number of hours when keeping the baby in their room as when placing it in the nursery over night. This evidence seems to be based on two studies [48, 49]. The samples and settings of these studies may explain the contradictory experiences of mothers in our study. Keefe [48] only compared multiparous mothers, 11 in the continuous and 10 in the daytime-rooming-in group and warned against generalizing the results. In our study, severe sleep deprivation during the hospital stay was

mainly reported with the first child. First-time mothers may be at a higher risk of being overwhelmed because they are novices in childcare [50] and tend to report more crying problems in their babies [51].

Waldenstrom and Swenson [49] conducted a quasi-experimental study in which 104 mothers were offered only day-time rooming-in in the first phase of the study, while 111 mothers were offered 24-hours rooming-in in the second phase of the study, six months later. For the second phase, the ward made adjustments and increased access to single and double rooms, acknowledged as possible confounders. Moreover, the second group also had a choice to delegate nocturnal childcare and their babies still spent, on average, four hours in the nursery per night which was in effect only one hour less than in the group without continuous rooming-in. A large-scale survey in Norway investigated mothers' experiences with nocturnal rooming-in and found no differences in tiredness between mothers who tried to keep their babies with them (n= 983) and those who did not (n=277) [21]. However, it was not reported how many mothers indeed achieved 24-hours rooming-in or received respite from childcare, which was offered to most mothers. In summary, these studies only provide evidence on partial rooming-in at night, but not on rooming-in the entire night, as was usually practiced by the mothers in our study. Our findings suggest that night rooming-in of unsettled babies has a clear impact on maternal sleep. It remains to be clarified whether the benefits of uninterrupted rooming-in in relation to breastfeeding and bonding outweighs the risk for exhaustion in mothers of unsettled neonates. Studies have shown that maternal exhaustion is a risk factor for early cessation of breast-feeding [52, 53]. Based on these findings, denying an exhausted mother respite from child care at night may in some cases result in a shorter breast-feeding duration. Furthermore, enforcing uninterrupted rooming-in could also have a negative effect on the mother-child relationship, as bonding has been shown to be best achieved when mothers can determine the pace and intensity of increasing contact to their newborn children, and are not forced to take over total child care responsibility before they feel ready [54].

An unexpected finding was the important role that maternal beliefs about childcare played in mothers' responses to their newborns' and their own needs. The views expressed by the women in this study reflect the ongoing discourses on the most beneficial child rearing practices over the last decades. Not putting infants' demands centre-stage was a common approach in prior generations [55, 56], whereas infant-centered care spread with the popularization of the bonding theory which emphasizes neonates' need to develop a basic sense of trust [57, 58].

The second view was more prevalent than the first in this study, but mothers also combined elements from both. How much attention they paid to meeting the neonate's needs or taking care of own needs was informed by their personal convictions about best approach to childcare. Typically, meeting the baby's needs was in the foreground, which supports a similar finding in Frei's [47] study.

Scientific discourses about potential benefit and harm of structured versus infant-led care are controversial [59]. A groundbreaking study [34] found that prompt response to infant crying reduced later crying and stimulated secure mother-child attachment, but these results were not confirmed in a study with a larger sample [60]. Bonding theory has also been criticized for its' monotropic view of the mother as an infant's principal caregiver [61] and its potential to reinforce devotional mothering as the social norm [62]. Apparent neglect of maternal needs in the mothers' accounts in this study gives some evidence for this concern.

Hurdles to getting professionals' support for child- and self-care have been addressed in most studies on postnatal care [23, 24, 63]. Rudman and Waldenstrom [45] reported that some new mothers felt neglected and abandoned, left to a 'help-your-self-model'. Weiss and Armstrong [64] investigated mothers' preferences for night-time care for their neonates and found that most mothers preferred rooming-in with the option of leaving the baby in the nurses' care if they needed uninterrupted rest. Our study depicts the complex decision process about nocturnal respite from childcare in a baby friendly hospital, from the mothers' point of view. When newborns hampered maternal sleep, mothers considered whether their child would get adequate care from the professionals. Their appraisal depended on their personal convictions about childcare, on perceived norms on the ward, and on the perceived workload and willingness of the involved professionals to care for the baby.

5.5.1 Limitations and strengths

Despite maximum variation sampling, the findings of our study depict a specific part of the complex processes around neonatal crying and maternal tiredness. Other mothers may have divergent experiences. The description of the study context and participants should allow readers to judge if and how far findings can be transferred to other settings. Data analysis according to interpretive phenomenology does not claim to identify a single right interpretation, but acknowledges that more plausible or comprehensive interpretations are always possible [27]. The strengths of our study lie in the longitudinal design which allowed mothers to talk about their immediate experience at the postnatal ward and to reflect on it

during the subsequent interviews at home while becoming better acquainted and familiar with the interviewer. Women's trust in the interviewer was demonstrated by mothers' openness to also share experiences and feelings not viewed as socially desirable.

5.5.2 Implications for further research and practice

Further research on coping with postnatal infant crying and tiredness should include fathers' views, which are absent in most research to date, including ours. To assess the effects of different care models on maternal tiredness and fatigue, replicating the study by assigning mothers to daytime rooming-in versus continuous rooming-in would not be judged ethical today. However, 24-hours rooming-in, as it has become standard in many hospitals, could be compared to a flexible rooming-in with guaranteed childcare assistance on maternal demand. Of course, such a study should not only assess the effects on maternal sleep and tiredness, but also on parent-child relations, duration of breastfeeding, breastfeeding complications, and parent satisfaction.

The present findings suggest that it is time to rethink current practices in hospital-based postnatal care. We question whether staff attitudes should influence mothers to agree with continuous rooming-in, as recommended by Svenson and colleagues [65]. We advocate professional care givers being aware of their own beliefs, especially in cases of inconsistent evidence, and offering mothers choices and shared decision making and providing care tailored to individual needs before and after discharge [45, 46]. Assessing varying maternal and neonatal needs and supporting mothers in finding solutions suited to their personal situation requires high levels of professional and social competences. Moreover, adequate staffing is essential to allow professionals the time to become attuned to babies and mothers and to provide empathetic care. In such an environment, new mothers may get some of the support that female networks used to and still do provide during a postnatal lying-in time, thereby allowing the mother to regain her strength and adapt to the new situation [66].

5.5.3 Conclusion

Postnatal care in hospitals should enable new mothers to take care of their babies' and their own needs in a balanced manner. If given support with childcare and the permission to pay attention to their own needs, mothers of unsettled babies may get more sleep and have a higher chance to avoid exhaustion during the postnatal hospital stay.

5.6 Competing interests

The authors declare that they have no competing interests.

5.7 Authors' contributions

Study conception and design: EK, HPK, ES, EZ. Coordination and implementation of the study: EK, JB, IH. Data collection: EK. Data management and analysis: EK, HPK, ES. Drafted manuscript: EK. All authors read and approved the final manuscript.

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6. Synthesis of findings, Discussion and Perspectives

This final chapter synthesises the results of the three foregoing studies, discusses their interpretation, and proposes a refined model for the conceptualisation of the interplay of postnatal infant crying and maternal tiredness. Further, limitations and strengths of the mixed methods approach are described. The last section suggests implications for research and practice while also outlining further perspectives, including socio-political and public health dimensions.

This mixed methods study examined the development and interaction of infant crying and maternal tiredness, which represent the most reported maternal or neonatal health problems in the early months after birth. As far as we are aware, this is the first time that postnatal infant crying and maternal tiredness were investigated by combining qualitative and quantitative methods in a mixed methods approach. The second innovation of our approach was to explore the link between a maternal health issue and health concerns of early infancy by focussing on the interplay of the two phenomena, phenomena which have usually been studied only from either the maternal or the infant perspective. Using multiple methods and focusing on the interplay of infant and maternal aspects made it possible to depict processes in early family health in a new concreteness and to clarify the impact of factors which have been barely addressed to date.

These contributions to narrowing the gap in existing knowledge were achieved as follows. First, we conducted a systematic review to synthesize the evidence on the interconnectedness of infant crying and maternal tiredness in the first three months postpartum. Both quantitative and qualitative studies were considered. Evidence from this review showed that infant crying was related to the experience of tiredness and/or fatigue in new mothers. Whereas the included quantitative studies mainly implied that infant crying was a predictor of maternal tiredness, the qualitative studies also depicted how maternal tiredness can negatively impact a mother's capacity to respond to her child's needs. We therefore suggest understanding the interconnectedness of infant crying and maternal tiredness as a cyclical process. Second, we conducted a case control study to analyse socio-demographic, reproductive-maternal and neonatal predictors of crying problems as reported in midwives' postnatal home care. We found that the interconnectedness of maternal conditions and infant crying was already recognizable in the immediate postpartum period, as maternal distress during the first ten days

after birth was strongly associated with reports of crying problems. Third, we added the perspective of new mothers' lived experiences by conducting a longitudinal qualitative study that used an interpretive phenomenological approach. Mothers' accounts depicted that their experiences with childcare as well as their personal beliefs about beneficial childcare shaped how they combined newborn and self care and handled conflicting needs in the context of changing postnatal care practices.

6.1 Discussion of key findings

The discussion of the key findings and their interpretation are arranged as follows. First, the interplay of postnatal infant crying and maternal tiredness is described (6.1.1), followed by a discussion of the question of causality (6.1.2). Second, we discuss aspects identified as significant for mothers' experience of and dealing with infant crying and personal tiredness. These are: maternal conditions after birth (6.1.3.), maternal experience with prior childcare (6.1.4), childcare beliefs (6.1.5) and health professionals' support (6.1.6).

6.1.1 The interplay of postnatal infant crying and maternal tiredness

Evidence for the interplay between infant crying and maternal tiredness was found on three levels: in the systematic review; in the case-control study and in the phenomenological study. A first step in filling the gap regarding the interlinkages of infant crying and maternal tiredness consisted in consolidating current scientific knowledge by means of a systematic review. Despite the extended period covered by this study (1980-2007) only 10 studies could be identified which had extractable data on infant crying as well as maternal tiredness in the period of 0-3 months postpartum. The scarcity of these studies stands in sharp contrast to the popular perception that infant crying and maternal tiredness are interlinked, a perception which arises from new parents' everyday experience. This discrepancy between everyday experience and research may be due to the fact that research in the positivist tradition favours analytic approaches which divide complex phenomena into single units and investigates each unit in isolation [1]. In the area of postnatal care, such an approach may have contributed to studies which either focussed on neonatal or maternal health, or more precisely on issues of infant crying or on maternal tiredness and fatigue. Hence the interface of the two phenomena hardly received scientific attention. Accordingly, care practices continued to be based mainly on the common sense of new parents and care providers.

Yet, the initial evidence from the systematic review suggests that quantitative and qualitative research confirms the popular perception which links infant crying and maternal tiredness.

These studies were, however, heterogeneous and had diverse methodological limitations, such as uncontrolled confounding factors.

The results of the case-control study provided further evidence for the interplay of infant crying and maternal distress after birth. However, as maternal tiredness was not reported in the dataset, we used data on maternal distress (depression/ psychic decompensation) as proxy-indicators for maternal tiredness and fatigue. Although these indicators are not identical with maternal tiredness/fatigue, they are known to be highly related [2, 3].

Finally, the interconnectedness of infant crying and maternal tiredness was also confirmed in the phenomenological study, where mothers described in detail how caring for a crying neonate interacted with their experience of tiredness from the first day after birth.

6.1.2 Separating the chicken from the egg – the question of causality

This section explores the difficult question: what comes first, infant crying or maternal tiredness? It is the question of causality. Traditional positivist research strives to explain how something functions by identifying mechanisms of cause and effect, or in epidemiological terms, exposure and outcome [4]. In view of a crying baby and an exhausted mother, the first impulse may be to identify the infant's crying as cause, and the mother's tiredness as effect of the baby's relentless care needs. Such a linear and unidirectional association was hypothesized in most quantitative studies included in the systematic review. At a second glance, the ongoing interaction between mother and child may be more complex. Like other qualitative studies included in the systematic review, the phenomenological study revealed that mothers who were tired and overstrained felt less capable of responding appropriately to their child; hence they may also have been less successful in soothing a crying child. In this way, the mother's tiredness or fatigue may be seen as cause, and the infant's persisting discomfort and crying would turn into an effect of the mother's reduced calm. Bringing together evidence from quantitative and qualitative research challenged the assumption of a unidirectional association between postnatal infant crying and maternal tiredness. It endorsed a conception which views the maternal and the infant sides in circular interaction, as proposed in the introduction (see p. 17/18).

Such a circular view of reciprocal interaction was reinforced by the results of the case-control study, focusing on the neonatal outcome of crying problems. Midwife-reported maternal depression in the first ten days postpartum was the strongest predictor of reported crying problems (OR 4.02, CI 2.91-5.56). Maternal psychic decompensation also had a significant

negative effect (OR 2.59, CI 1.69-3.97). To date excessive crying of the child has been known as risk factor for postpartum depression measured at 4 or 8 weeks after birth [5, 6]. In our study, the data on maternal depression and decompensation was reported during the first ten days postpartum. These results give initial evidence, that crying problems may also occur as a consequence of maternal depression, and not only as a contributing factor to postpartum depression. Hence, the novel finding of the present study was that infant crying and maternal depression were already significantly related during the immediate postpartum period.

However, a possible confounder could have been prenatal depression, which was not reported in the data set. As early depression after birth may have followed prenatal depression, the unborn infant would already have been exposed to the mother's depressive state during pregnancy, which has been identified as a risk for excessive crying in neonates [7].

The results of the case-control study could furthermore have been influenced by a reporting bias. Since barely any studies measure infant crying objectively by audio-recording, a potential reporting bias is inherent in all studies relying on mother-reported crying problems. It has been hypothesised that crying problems are at least partially "in the eye of the beholder" [8], which means that we do not know exactly if a mother's distress after birth in fact caused crying problems. To some extent distressed mothers may perceive crying as more problematic, and therefore they may be more likely to discuss the issue with the attending midwife. These reservations notwithstanding, it has also been shown though that mother-perceived crying problems were of clinical relevance, i.e. they could not only be attributed to a maternal oversensitivity [8, 9].

The phenomenological study, which explored mothers' experiences from the first day postpartum confirms that mothers of unsettled babies had already entered into severe sleep deprivation and exhaustion during the first 4-5 days postpartum and suffered from emotional distress. It could therefore be possible that even symptoms of depression shortly after birth were triggered by sleep deprivation [2] due to persistent infant crying during the first days and nights after birth.

Based on this evidence, it is plausible that a primary state of infant crying or a primary state of maternal tiredness could be the starting point for a vicious circle of intensified crying and increased maternal tiredness.

6.1.3 The impact of mothers' postpartum conditions

Evidence of the case control study suggests that both mothers' mood problems and physical health problems after birth were significantly related to early crying problems. Further significant risk factors pertained to social conditions, such as immigrant status or intended return to paid work directly after the paid maternity leave of 14 weeks. These findings encouraged a more comprehensive understanding of maternal distress that embraces mental, physical and social conditions which may add to new mothers' experience of stress. In the case of immigrant status, the stress could be caused by a reduced availability of social networks and respective support. This interpretation is in line with a survey on immigrant mothers' needs in Switzerland, which identified the lack of social support as their biggest problem [10]. As social support is known to buffer the negative relationship of maternal fatigue to parenting [11], mothers who lack social support may experience less practical help and reassurance with baby care [12]. This may contribute to the higher occurrence of crying problems.

As far as could be ascertained, this study was the first to examine the association of crying problems with mothers' intended return to paid work. Here, the broader socio-political context of a relatively short period of paid maternity leave (14 weeks) in Switzerland [13] emerged as a factor, which appears to influence early family health. Health professionals know from experience that many mothers experience stress when they have to return to work before they feel ready and are confident that the baby will prosper in somebody else's care. Furthermore, the shortage of childcare facilities in Switzerland means that some new parents struggle to find adequate daycare [14]. The situation can become especially stressful for mothers who intend to breastfeed fully for the first six months, as the Swiss Society of Neonatology and the WHO recommend [15, 16]. Evidence shows that earlier resumption of paid work contributes to shorter length of breast feeding duration [17, 18] In addition an extended length of paid maternity leave was shown to be associated with better maternal and infant health outcomes [19] and with favourable child development [20].

The present study adds a novel finding, namely the association of the duration of maternity leave with early crying problems. In our case-control study maternity leave > 16 weeks had a beneficial effect on reported crying problems. That may be due to maternal stress reduction, as potential job stress and stress related to combining infant care with work requirements are postponed [21].

In summary, it appears that maternal conditions which include somatic or psycho-social stressors, such as postpartum health problems, immigrant status or early resumption of paid work, have an unfavourable impact on crying problems in the early postpartum period.

6.1.4 The impact of maternal experience with childcare

Evidence from both the case-control and the phenomenological study pointed to the important role of women's previous experience as a mother. Having more than one child was the strongest protective factor for reported crying problems in the case-control study, an effect which grew even stronger for having three or more children. The analysis of the phenomenological study depicted the learning process in response to crying from the first to subsequent children. These findings will be subject of an additional article, which is in preparation. Participating mothers' narratives gave a rich description how responses to the crying baby changed in different regards. With a second or subsequent child, mothers expected that crying would be part of normal infant behaviour; they assessed crying episodes as less urgent; their emotional reaction to crying became calmer; and they knew a broader range of successful soothing techniques. Furthermore, they became more accustomed to integrating the unpredictable crying into the tasks and activities of everyday life; they had figured out their own parenting style and felt more confident that it would work; and they knew from experience that difficult phases of prolonged crying would pass. In contrast, first-time mothers felt that such difficult phases would never end, which contributed to feelings of desperation.

Multiparity seemed also to have some effect on maternal tiredness and exhaustion. Already during the hospital stay experienced mothers tended to organize possibilities to get more rest themselves, for instance by limiting visitors, or paying an upgrade to get a single room.

The protective effect of higher parity in view of crying problems is consistent with most existing evidence [22-24]. Some explanations for this difference between first-time and experienced mothers already existed. Primiparous mothers were found less responsive and less confident in interpreting a baby's signals [25-27], whereas multiparous mothers profited from a higher sense of maternal self-efficacy [28]. Experienced mothers also showed a differentiated response to fussing and crying, which may stimulate infants' emergent abilities to cope with mild distress [29]. However, one study showed that 2-3 days after birth, primiparous mothers were as effective as multiparous mothers at quickly soothing their newborn as shown during a filmed episode of 75 seconds [30]. This points to the fact that mothers do not need parenting experience to soothe their crying child, but have such skills

from the onset. Yet, dealing with an unsettled neonate in every day life over several weeks or months appears to require additional skills which seem to grow with experience. In regard to the acquisition of mothering skills, there is an interesting divide between Anglophone and German theorists. Whereas English literature explains mothering skills as resulting from learning processes [31, 32], authors from Germany rather see mothering skills as the result of maternal instinct and intuition [33, 34].

Whereas existing evidence mainly focused on single aspects of mothering skills, the present study depicted mothers' overall learning process in response to crying in the context of everyday life. Although first-time mothers had skills to soothe their child from the first day, with growing experience these skills became more differentiated and attuned to the varying situations of everyday parenting.

Evidence of the effect of multiparity on maternal tiredness and fatigue is scarce and less conclusive [35]. First-time mothers suffered from more fatigue one month after birth than multiparous mothers, but at three months postpartum fatigue was higher in multiparous mothers. The data of our phenomenological study may help to interpret these findings to some extent. Some multiparous mothers mentioned that they felt higher energy after birth than when they had given birth to the first child and attributed that to a less exhausting delivery. In addition, some of them had arranged stress-reducing measures for the early phase after birth. Yet, in the long run, their household and infant care responsibilities were higher than in first-time mothers, which may well have contributed to higher fatigue later on.

To sum up, knowledge and experience of childbirth and new born care are surely less common in a society with a mean number of 1-2 children per woman, than in societies with higher numbers of children per family. In traditional extended families there were multiple occasions to get in touch with newborn care, and learning by observing experienced mothers was possible. In contemporary Western societies, the culturally stored knowledge about care for neonates has diminished [36]. For many adults their first hands-on experience with a newborn is with their own, and available role models are scarce [30]. In addition, traditional forms of lying-in time after birth and an infrastructure of extended family support for new mothers are no longer in place, which further hampers the transfer of childcare skills and practical support for new parents [37]. On the contrary, many new mothers feel isolated after giving birth. This may make them especially vulnerable to suffer from lack of support and overstrain, which in turn contributes to fatigue and crying problems.

6.1.5 The impact of childcare beliefs

A surprising and novel finding from the phenomenological study concerns the impact of women's personal beliefs about beneficial childcare practices on how they manage infant crying and personal need for rest. Such childcare beliefs were present from the first week after birth – probably even before – and shaped how mothers cared for the newborns' and their own needs from the very start on the postpartum ward. As far as can be established, the variety of childcare beliefs in this early stage of parenthood has barely received attention in health research.

Interestingly, mothers uttered these beliefs in the form of concerns. These concerns ranged from being worried that their child should develop a basic sense of trust to the fear that the child could start tyrannising the parents. Expressed views reflected the ongoing discourses on beneficial childcare of the last decades. There is an extensive debate in the research and popular literature about the relative merits of forms of parenting that respond to babies' perceived needs (often called 'infant-centred' or 'infant-led' care) and forms of parenting that seek to impose routines, rhythms and constraints on babies' behaviour ('scheduled' or 'structured' care) [38]. Whereas the structured care was a common approach in prior generations [39, 40], infant-centred care spread with the popularisation of the bonding theory, which emphasises neonates' need to develop a basic sense of trust [41, 42].

This shift of popular views was reflected in some mothers' accounts about grandmothers' advice to let the baby cry a moment, while most interviewed mothers tended to the infant-centred approach and strove to respond immediately to their child's crying. However, there were mothers who were concerned not to put the infant's needs centre stage, and some mothers searched for a middle course between infant-centred and structured care. Overall, the study results illustrate how individual families searched for their own parenting style in a period when the prevailing child rearing theory and practice was shifting from a structured to an infant-centred approach.

This shift had a profound impact on postnatal care practices, where strict schedules for feeding of the newborns were replaced by recommendations to feed on demand so as to promote bonding and breastfeeding. Accordingly, mothers were expected to breast feed without limits, be it day or night [43], while the facilitation of maternal recovery and rest after birth seemed to take a back seat [36, 44, 45]. In addition, the view on ideal responses to a baby's crying also changed. The popular recommendation 'just let the baby cry' was replaced by child expert's advice to respond immediately to crying. A groundbreaking study [46] had

found that prompt response to infant crying would reduce later crying and stimulate secure mother-child attachment, which became a central aim of postnatal care provision [47-50].

Yet, scientific discourses about potential benefits and harm of structured versus infant-led childcare remain controversial [38]. Apparently, neither of these parenting approaches is better overall; they are rather associated with different benefits and costs. There is evidence that structured care (as exemplified by parents following behavioural programs) leads infants to develop the ability to remain settled at night by 12 weeks of age. On the other hand, infant-centred care was associated with lower amounts of overall fussing and crying; but these infants continued more often to wake at night by 12 weeks of age [38].

In view of bonding, the beneficial effect of prompt response to crying was not replicable in a later study with a larger sample. Actually, prompt response to neonatal crying was even associated with an ambivalent attachment between mother and child [29]. From a social-critical perspective, bonding theory has also been criticised for its' monotropic view of the mother as an infant's principal caregiver [51] and its potential to reinforce devotional mothering as social norm [52].

In fact, the findings of our study give some evidence that maternal needs took rather a back seat when mothers adhered to an infant centred childcare approach. How much attention mothers put to their own needs for rest and recovery was clearly related to their childcare beliefs. Striving to meet all newborns' needs immediately made it difficult to find time for self-care and rest, especially when the newborns were fussy. The neglect of maternal needs could reach the point of severe sleep deprivation and exhaustion, already during the hospital stay postpartum. On the other hand, mothers who rather believed in the benefits of structured childcare or tried to find a middle way, were more determined to utter own needs and to ask and accept support with childcare. Yet, meeting the baby's needs was in the foreground for all mothers, which supports a similar finding in Frei's [53] study.

Whether mothers' desire to protect and nurture their child is nature or nurture, is an ongoing controversy. Whereas some theories link maternal behaviour to neuro-endocrine changes and inherent psychological processes during pregnancy, birth and early motherhood [54-56], feminist theories explain how maternal behaviour is influenced by social norms which depend on the historic and cultural context, and therefore have changed over time [57-59].

In view of our findings, offering the child the best possible care was a goal shared by all participating mothers. Yet, present discourses on beneficial childcare approaches influenced what mothers believed to be the best mode of meeting their baby's needs. According to their beliefs, mothers differed in their willingness to set back their own needs for the child's sake. This influenced their opportunities to rest, and could mitigate or contribute to maternal tiredness and exhaustion.

6.1.6 The impact of health professionals' support

Evidence of the phenomenological study suggests that professionals' support played an important role how mothers managed to combine baby and self-care. As far as could be established, this study is the first to depict new mothers' complex decision on accepting respite from childcare in hospitals adhering to the protocols of the Baby-Friendly-Hospital-Initiative [60, 61].

Evidently, the mothers encountered a variety of professional approaches: these ranged from an inclination to offer practical support and respite from childcare during their postpartum hospital stay to reluctance to offer such support. They attributed these differences to the varying workload on the ward, and to the differing attitudes of the individual nurses and midwives. Mothers themselves also differed in their inclination to accept professional help. When mothers were in need of uninterrupted rest, they reflected whether their child would get adequate care from the professionals. Their decision if they would ask and accept respite from childcare was based on the perceived workload and empathy of the involved care provider, on perceived norms on the ward, and on their personal beliefs about beneficial childcare.

Paralleling the shifting approaches to child rearing and postnatal care described above, changes in professionals' expectations of new mothers' 'normal' behaviour has also been documented. To meet current expectations regarding appropriate maternal behaviour, new mothers are expected to be happy to take total care of their babies in hospital. If not, they may be considered difficult or lacking normal maternal instincts [62]. Some mothers participating in our study experienced such attitudes in care providers and felt that they had no real option to leave their child in the nurses' care, even when they felt that they were reaching their own limits. Other mothers, in contrast, were offered respite from childcare when they could not get sleep at night and were even encouraged to get rest and sleep. Of course, mothers' accounts only give an outside perspective on the care providers' attitudes. It appears though that there is a wide variety of individual convictions amongst care providers' regarding which support a new mother should receive. These convictions were transmitted to mothers by professionals'

behaviour, and thereby clearly impacted if mothers were encouraged to take care of their own needs, or to neglect them.

Difficulties to get professionals' support for child and self-care during the hospital stay were addressed in most studies on postnatal care [36, 63, 64]. The health professionals too appeared to be dissatisfied with the care they were able to provide on postpartum wards, attributing the unsatisfying care provision typically to heavy workload and time constraints [65, 66]. Women participating in our study likewise mentioned the negative effect of nurses' work strain on quality of care, but that was only part of the story. Other aspects became apparent in episodes when mothers were offered care which was not attuned to their current conditions and needs. For instance when they were given extensive instructions for childcare while they were in a state of reduced ability to concentrate and learn, caused by acute sleep deprivation. Or when a mother was told to continue breastfeeding in spite of intolerable nipple pain, in order to comply with the hospital's baby friendly policy. Such care was not attuned to maternal needs and produced mild to strong frustration in new mothers. The involved care providers at times seemed to run their professional agenda, even though it jarred with the current situation of a mother-child dyad. Discordant care such as this caused additional stress for mothers, whereas well attuned and empathetic care helped to reduce stress and enhanced mothers' well-being.

One possible root of discordant care provision may be found in the current guidelines and policies which shape postnatal care. On the one hand, there are recommendations and efforts to individualise maternity care and to offer women choice [67-71]. On the other hand, standardised protocols tend to promote uniform approaches which rather inhibit than support individualised care for women after childbirth [72, 73]. In the case of the baby-friendly hospital campaign, the respective certificate is only issued if a hospital complies with the 'ten steps to successful breastfeeding' [61, 74]. This worldwide campaign aimed at raising dropping breastfeeding rates, with repeatedly reported success [74-76]. One of the recommended steps to promote breastfeeding requires that a certain percentage of mothers practice 24 hours rooming in. To qualify for the certificate, postnatal staff is encouraged to persuade mothers to comply with the guideline. It is a question whether such recommendations contradict the goal of offering new mothers choices. In fact, postpartum teams may find themselves in a dilemma. If they want to be certified to be baby-friendly, they have to limit maternal choices such as flexible rooming-out on maternal demand. If, instead, they want to provide individualised care with a diverse offer of options, they risk not obtaining or losing baby-friendly-hospital certification [60].

Ultimately, it boils down to the question: does the evidence that rooming-in is beneficial for breastfeeding and bonding justify imposing it on mothers who prefer the option of leaving babies in the care of professionals if they need uninterrupted rest? The evidence of the phenomenological study is in line with prior research showing that new mothers clearly appreciate having this option [77]. This findings call for careful scrutiny of the scientific evidence. There is not only evidence that continuous rooming-in has a positive effect on breastfeeding [43, 75]; there is also evidence that maternal exhaustion is a risk factor for early cessation of breastfeeding [78, 79]. In the end, to deny an exhausted mother respite from childcare at night may in some cases result in shorter breastfeeding duration. In view of bonding, some evidence suggests that 24-hours mother-child contact is beneficial [43]. Yet, other evidence indicates that bonding is best achieved when mothers themselves can determine the pace and intensity of building the contact to their newborn child rather than being forced to take over total childcare responsibility before they feel ready [80].

In summary, health professionals have the challenging task to understand and weigh evidence that is not always conclusive. In addition, drawing on their professional experience they have to assess the benefits of respective protocols and guidelines for the individual mother-child pair. While taking into account the available resources within the care setting, they should provide care tailored to each mother-child pair's specific needs and to maternal choices.

This may be a difficult or even impossible task, especially if it is compounded by lack of access to scientific evidence and missing familiarity with the principles of evidence based practice [81]. In Switzerland academic training in nursing and midwifery is recent. Hence, the majority of nurses and midwives in this country still face educational and language barriers which prevent them from directly using the evidence, which is often only available in English, in their practice.

6.2 Conceptualizing the interplay of infant crying and maternal tiredness

Based on the findings of this mixed methods study, the conceptual model proposed in the introduction (see p. 17/18) can now be complemented and refined. The explanation of the added elements proceeds from the social context (placed on the outside) to the dynamics within the family and with professional caregivers (placed in the centre).

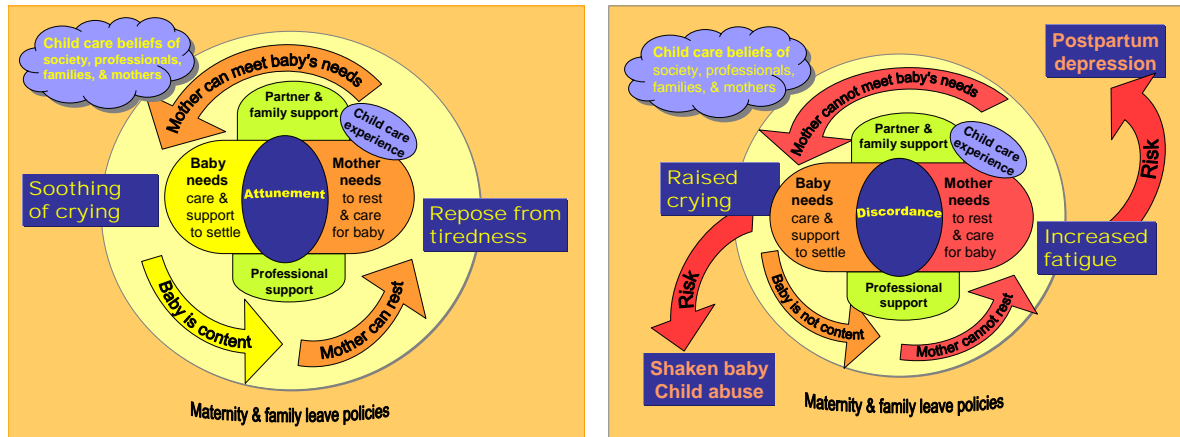


Fig. 1 Adaptive circularity of infant soothing and maternal repose

Fig. 2 Vicious circle of infant crying and maternal fatigue, and adverse effects

Results of the case-control and the phenomenological studies gave hints that dynamics regarding infant crying and maternal tiredness are embedded in and influenced by the social and political contexts. Changing discourses on beneficial childcare in Swiss society appeared to have a clear impact on the views and beliefs of professionals and laypersons. These beliefs ranged from the conviction that a child-centred approach would be the best for the child till the convictions favouring structured childcare. The second important element on the social level is the policies that regulate maternity and family leave. The intention to directly return-to-paid work after the legally granted minimum maternity leave of 14 weeks [13] appeared to be an additional stressor for early family dynamics, resulting in a higher risk for reported crying problems. Furthermore, available support by partners is also determined by Swiss policies on family and parental leave after childbirth, which allow new fathers only 1-2 guaranteed days off [82].

Turning to the inner circle, two new elements emerging from the study are the protective role of mothers' prior experience with childcare (which can also be further supported by the experience of other family members) and the importance of the support provided by professionals'. An adaptive circularity of infant soothing and maternal repose is endorsed when all the actors in the inner circle i.e. the newborn, the mother, family members and professionals – are attuned to each other's needs and abilities. The vulnerability of the different actors varies widely though. This ranges from a high vulnerability and dependency of the baby, to a certain vulnerability and dependency of the mother who has recently given birth, followed by the father and other family members who may find themselves in a new and unfamiliar situation. The least vulnerable are the professional care givers. Accordingly,

the professionals would be expected to show most attunement to the receivers of their care, whereas the newborn baby is just starting to develop his or her abilities of self-regulation and attunement to others.

If reciprocal attunement is not possible or distorted by any of the different actors, the support needed for the newborn and the mother may be hampered. Lacking attunement and support constitutes a risk for the adaptive circularity of infant soothing and maternal repose, thereby fuelling a vicious circle of raised crying and increased maternal fatigue. Additional risks can be added when mothers and their support persons are inexperienced in childcare; when the childcare beliefs of the different actors are constraining; or when these beliefs clash, leading to disagreements and further stress. An extra stressor may be the lack of sufficient time to recover from birth and become familiar with the new role, as may be the case when the mother is under strain to return to paid work prior to feeling ready and before she is confident that her child will receive appropriate care in her absence.

6.3 Limitation and strengths: Discussion of methods

In order to complement the overall picture of the interplay between maternal tiredness and infant crying, we used a mixed methods approach combining qualitative and quantitative methods for data collection and data analysis. As mixed methods is still an emerging field, there is still lacking consensus on its definition. Whereas some researchers would only use the term for a study using qualitative and quantitative data from the same sample, the present study adheres to the definition suggested by Creswell and Plano Clark [83]:

'As a method, it focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone. (p. 5)'

The combination of methods should serve several purposes that contribute to the strength of the present study. To begin with, the use of multiple methods (a) aims at a higher complementarity of results. This is the case when the different methods diminish or overcome the limitations of a single approach. Furthermore, it (b) seeks to enhance the validity of results. This happens when multiple types of data and analysis support the results, or when these multiple types of data and analysis point out discrepancies that may serve as springboard for further investigation of the origin of incongruities. Finally, the combination of

methods (c) strives to enhance the interpretability of study results. This applies when, for example, quantitative analysis demonstrates systematically related variables, but fails to explain what that means. Findings from the qualitative part may then inform an adequate interpretation [84-87]. The following section explores the extent to which the mixed methods presented in this study met these three aims.

(a) The complementarity of the results first became manifest in the main finding of the systematic review, namely that the link between infant crying and maternal tiredness could be best explained as a circular process. Quantitative studies had focused on the negative effects of infant crying on maternal tiredness. Qualitative studies, in contrast, shed light on the reduced tolerance and abilities of tired mother to soothe a crying child. Combining quantitative and qualitative evidence endorsed a conception which views the maternal and the infant side in circular interaction.

Complementarity of results was also achieved through the combination of the case-control and the phenomenological studies. This applies particularly to the different approaches to data collection in the quantitative and the qualitative parts. The quantitative approach to collecting standardized data by all self-employed midwives in Switzerland provided a data set covering half of the Swiss childbearing population, including migrant groups who are often excluded from studies due to limited knowledge of the local language. This data set allowed a broad overview of socio-demographic and health factors and their statistical associations in view of infant crying, such as the significance of intent to resume paid work. As far as could be ascertained, this is a unique data pool to investigate such a large population regarding the outcome of early crying problems in Switzerland.

The qualitative data in turn allowed an in-depth analysis of maternal perceptions, maternal experience and the ways in which mothers deal with situations. This includes the impact of different childcare beliefs on parenting styles and maternal self-care, or the complex decision-making process through which mothers accept respite from nocturnal childcare during their postpartum hospital stay. The method of interpretive phenomenology offered tools to explore these different kinds of human activities, using qualified modes of observation and of questioning participants about their experiences, the meaning of those experiences, and about the related beliefs of the interviewees. Secondly, the method of interpretive phenomenology included careful and self-critical interpretation of the obtained textual data in continual collaboration with supervisors and with colleagues [88-90].

Bringing quantitative and qualitative findings together facilitated improved understanding of the complexity of a health problem that is embedded in cultural, social and political contexts which shape the contours of possible thoughts and actions for the involved parents and health professionals.

(b) Validation of results could be achieved when a topic was addressed in both the quantitative and the qualitative parts. This for instance, applied to the role of maternal experience, which appeared to be important in both the quantitative and the qualitative data analysis. However, not all issues could be addressed in both the quantitative and the qualitative parts. For instance, none of the mothers participating in the qualitative part planned to return to paid work directly after the minimum legal maternity leave of 14 weeks. Therefore, the organisation of breastfeeding and baby care upon returning to work was not an immediate concern of the mothers interviewed. Furthermore, mothers with an immigrant background could only participate in the interviews if they were able to speak German or English. This probably excluded the most vulnerable group of new immigrant women. In the end, one mother of non-European origin participated in the phenomenological study. Even though she happened to suffer from lack of social support and had a baby with crying problems, this single case would not serve as validation of the quantitative result that non-European mother-child pairs were at a higher risk for reported crying problems. A further group not included in the qualitative part, but present in the quantitative study, was mothers with preterm or unhealthy newborns. That was due to the fact that the qualitative part focused primarily on the development of crying problems and maternal tiredness in healthy mother-child pairs.

A further topic that was difficult to compare was maternal tiredness and fatigue. Since the case-control study drew on an existing data set, all the variables had been pre-defined. Given that there was no specific question addressing maternal tiredness and fatigue, the proxy-variables *maternal depression* and *psychic decompensation* had to serve as indicators. As mentioned, these variables are known to be highly related to maternal tiredness and fatigue, but they are not identical [2, 3].

The comparability of results was further limited as the quantitative part included a national sample from all Swiss regions, where as the qualitative part drew on a local sample from women attending a tertiary hospital in an urban area in Switzerland. Concerning the time frame after birth, results were however comparable since both the qualitative and quantitative parts of the study included data from the early postpartum period.

In an ideal world, the samples of the qualitative and the quantitative studies would embrace the same range of participant characteristics to allow maximum reciprocal validation of results in the mixed methods design. In the real world, feasibility set certain limits and required flexible approaches.

(c) The enhanced interpretability of study results became most evident when interpreting the association of higher parity and fewer crying problems found in the case-control study. This finding was added to the list of relevant topics to be addressed in the interviews in the phenomenological study. The resulting in-depth analysis of mothers' learning process in response to infant crying offers a detailed interpretation of the statistical association. This rich description of new mothers' learning process in everyday life is novel. However, like with validation, the interpretability of results was also only enhanced if a certain theme was addressed in both the case-control and in the phenomenological studies. As mentioned above, the topics of immigrant status and early return to paid work had only limited relevance in the interviews of the phenomenological study.

By and large, common criticisms of mixed methods focus on epistemological incompatibilities in gaining knowledge through hypothetico-deductive approaches in quantitative research and through an inductive logic in qualitative research [1, 85, 91]. In recent years, innovative theorists recommended leaving behind the purist pursuit of deductive or inductive research. They describe the value of research designs which move back and forth between induction and deduction by combining different methods which are responsive to real-world conditions. Referring to the philosophy of pragmatism [1], a pragmatic approach is advocated as a new research paradigm which may offer improved ways to answer existing questions [92, 93].

In the present study there was a distinct impression that the application of multiple methods and the integration of various findings in a mixed methods design delivered more comprehensive and differentiated answers to the research questions.

6.4 Implications for research

The conceptual model we proposed to understand the interplay of infant crying and maternal tiredness can be used as a guiding framework to plan both research and interventions at the micro, meso, and macro levels. Future research should address direct clinical practice,

institutional care policies and socio-cultural and political aspects which affect motherhood and early family life.

First, future research should include broader and integrated understandings of who is involved in postpartum family health. To begin with, it should overcome the traditional division between women's and child health and adopt approaches which embrace their intensive interconnectedness in the early stage after birth. This is of special relevance for the fields of midwifery and maternal-child nursing. A next important step would be to include fathers' perspectives, which are neglected in most research about the postpartum period, also in ours. In the end, postpartum health is connected to the entire family system, which includes the neonate, older siblings, parents and often grandparents. We therefore need research approaches that consider the family as unit of interest and investigate the hurdles of postpartum health using family research approaches [94-96].

Second, the evidence base of existing postnatal care policies should be scrutinized and re-evaluated. The importance of such assessment is evident from the findings of the present study which suggests that current postpartum care practices appear not to be optimally attuned to new mothers' needs, for instance their need for rest. Yet, ethical reservations weigh against replicating studies which assign mothers to daytime rooming-in versus continuous rooming-in in order to assess the effects of different care models on maternal tiredness and fatigue. A possible solution to this ethical objection could be to compare 24-hours rooming-in (as it has become standard in many hospitals), to flexible rooming-in with guaranteed childcare facilities on maternal demand. Of course, such a study should not only assess the effects on maternal sleep and tiredness, but also on parent-child relations, duration of breastfeeding, breastfeeding complications, and client satisfaction.

Third, research should evaluate how individualized forms of care provision are impacted by standardized care protocols. The present study gives hints that standardizing care provision by implementing protocols and guidelines may not be conducive to the provision of individualized postnatal care, which varies in response to the care receivers' personal needs. Hence, further research into the hurdles of combining standardized with personalized care may gain in importance, as both trends appear to have a strong impact on current health care policies and health care provision.

Fourth, research should investigate the influence of socio-cultural and political conditions on family health after birth. This study suggests that infant crying and maternal tiredness are

connected to the broader socio-cultural and political contexts. Further investigation is needed to examine the associations of length of maternity leave with postnatal crying problems and maternal tiredness. Historical, social and anthropological research could further explore the change and impact of childcare beliefs and maternal stereotypes on everyday family life.

6.5 Implications for practice

Our suggestions to prevent or mitigate postnatal crying problems and maternal tiredness are also guided by the proposed conceptual model, and accordingly target the micro, meso, and macro levels. We will start with the macro level and first address the contextual factors of policy/politics and laws.

Maternity leave and family policies: Compared to other European countries, Switzerland lags behind regarding maternity and parent leave, and available childcare facilities [13, 97, 98]. It has already been recognized that an early return to paid work is a risk factor for early cessation of breastfeeding [99]. Our study hints to the fact that new mothers' early return to the workforce also has a negative impact on the occurrence of crying problems. It is incumbent upon stakeholders and advocates of maternal-child health to seek allies in policymaking to implement longer paid maternity leave combined with the possibility for leave for fathers, as already practised in countries such as Norway and Germany. Further efforts are needed on the political level to stop health assurance policies which steer a course of cutting health care and support for postpartum families [100, 101].

Cultural perceptions and beliefs: Popular beliefs about good mothering can impede or promote early family health. The knowledge which former generations had, namely that a precondition to being a good mother is her recovery from birth has increasingly been replaced by the expectation that new mothers of healthy babies should be able to manage on their own. Campaigns and publicity aimed at enhancing public awareness of health needs in the postpartum period are needed to re-establish social conditions which enable adequate rest and repose for new mothers. Furthermore, experts engaged in public discussions on best childcare practices should not promote fundamentalist views in favour of either infant-centred or structured approaches. Instead they should popularize a more balanced approach which takes into account both maternal and infant needs. Such a balanced view would have the potential to mitigate some of new parents' insecurities and concerns that they may be responding inappropriately to their newborn's needs.

Health institutions: Hospitals shape new parents' experience of the first days postpartum by means of their care policies, staffing levels and architectural structures. Shared rooms, a high nurse-patient ratio, and a policy which sets nocturnal rooming-in as the norm, will clearly impact new mothers' opportunities to rest and recover during their hospital stay. Maternal stress can further be heightened by visiting hours which prescribe that the child's father and other close support persons also have to leave early, with the result that they are not allowed to further assist mother and child during the evening hours. Currently, most new mothers in Switzerland spend 4-5 days on the postpartum ward, a setting which appears often to be less than conducive to the sensitive processes of early family health. The necessary changes for the provision of adequate care should follow two mutually supporting routes that are responsive to families' diverse needs:

The first route consists of efforts to make the settings and policies on postpartum wards more baby, mother and family friendly. Important measures specifically aimed at preventing and allaying maternal tiredness include the following: (i) Single and family rooms need to be more widely available. (ii) Flexible guidelines should be introduced for rooming-in to guarantee respite from child-care if mothers of fussy neonates need uninterrupted rest. This, in turn, requires (iii) making arrangements for adequate staffing. (iv) Visiting hours should encourage - rather than hinder - the new family to spend time together, and to give the mother the support she needs.

The second route consists of implementing new models of integrated postnatal care which combine a short hospital stay after birth with need-oriented follow-up care at home [71, 102]. An early discharge after birth in combination with high-quality professional support at home would provide most mothers with a more restful environment. In addition, it would allow other family members to support mother and child from the earliest stage and to share the first days with the baby together [103]. However, as not all new mothers benefit from a supportive social network, practical assistance with housekeeping and care of the baby and of siblings should be available [100]. Furthermore, maternal and child health should be carefully monitored and promoted by professional caregivers who offer home visits and round-the-clock accessibility. This could include possibilities of modern E-Health, such as video-conferencing, an option which may be particularly convenient for remote areas [104]. Instruction and reassurance with childcare would also be vital, especially for inexperienced first-time mothers.

Considering healthcare costs, the early discharge option is more promising than the current 4-5 day hospital stay, and should therefore be made available for the majority of healthy new mothers with term newborns [102]. However, we should critically evaluate intended and unintended effects of a universal change in practice [105] such as shortening the postnatal hospital stay, to ensure that the implementation of alternative practices offer choices and promote favourable maternal, neonatal and family health outcomes.

Nursing and midwifery care: In the direct encounter, it is the nurse or the midwife which cares for mother and child after birth. If this care is not attuned to the mother's and the newborn's current situation, it can heighten maternal stress. To attune their care, nurses and midwives should become aware of mothers' different childcare beliefs and skills. The aim should not be to persuade mothers that one belief is better than another, but to assist parents in finding a form of childcare which enhances their well-being and that of their families. Superior professional and social skills are a prerequisite to offering such individually attuned care. In order to enhance such skills, care providers need to acquire a self-reflective practice that increases their awareness of the influence of their own beliefs and values on their care giving. In addition, care providers may need instruction and support how to integrate general care guidelines with the paradigm of individualised care, based on careful assessment of each mother-child pair's specific needs. Such support is crucial, especially for nurses and midwives without sufficient training in evidence based practice, or without access to current evidence.

Maternity care in general is still hampered by a peculiar lack of appropriate theoretical concepts. Some recent attempts propose the concept of *matrescence care*, understood as a skill in facilitating someone in becoming a mother [106, 107].

'Other women nurture the woman into motherhood, so that the mother is freed of her usual responsibilities and can 'grow with' her baby. The activity and focus of carers is to protect, to nurture and to cherish the new mother and baby'. [106]

Through this kind of care, new mothers may get some of the support that female networks used to and still do provide during a postnatal lying-in time, support which is crucial to allowing the mother to regain her strength and adapt to the new situation [54]. Given the trend that in many contemporary families new fathers also take on care-giving roles for their newborn children, we further propose extending the concept of *matrescence care* to include assistance for 'becoming a father'. All in all, this means orienting care towards the family as the important unit to foster the health of newborns, mothers and fathers.

6.6 Perspectives on the research project and translation of the evidence into practice

The mixed methods research undertaken in the present study is ongoing. The following steps are either underway or planned. They will serve to publish more of the gathered evidence and induce the transfer of the findings into the fields of public health and clinical practice.

Publications

- Ensuing from the qualitative part of the study, an article will address maternal learning processes in response to infant crying. A further publication will address the influence of cultural stereotypes of motherhood on the way new mothers combine baby and self-care, including their readiness to accept help. This leads to the topic of partner and family support as sketched in the conceptual model. Drawing on maternal accounts of fathers' engagement and involvement with childcare, an article will delineate the variety of described styles of sharing childcare responsibilities among the two parents. Finally, the importance of grandmothers' opinion and support in the postpartum period shall be thematized.
- Drawing on the dataset of the case-control study, a second analysis was performed examining the socio-demographic, reproductive-maternal and neonatal risk factors for maternal emotional distress in the early postpartum period quantitative part. An article reporting the respective results is in preparation.

Public health and clinical practice

This research project did not stop with publications. Translation of the findings into practice has already been initiated in the areas of public health and training for health professionals.

- To heighten the public awareness and knowledge of families' health needs after birth, the DVD-film 'Parents between joy and exhaustion – starting life with a baby' [108] was produced. My responsibility was to collaborate on the conceptualisation of the film content with an interdisciplinary group of professionals (health visitor, midwife, fathers' counsellor, psycho-therapist, social worker). Based on real life situations and interviews with new parents, the film aims at preventing or reducing exhaustion in parents of neonates. It points out helpful strategies and shows where new parents can find professional advice and support. The film was produced by 'Familien- und Frauengesundheit FFG-Videoproduktion' [Family and Women's Health – Video

production] and financed largely by ‘Gesundheitsförderung Schweiz’ [Swiss Health Promotion] and several cantonal health departments from the German and French regions in Switzerland. Participating cantons distribute the film amongst health visitors and midwives, who hand it out to new parents for a small fee or for free.

- The film and its topic are further promoted through organising public film events, in addition to sale of the DVD online and at various Swiss health conferences.
- Advanced training is in preparation to enhance health professionals’ skills and knowledge pertaining to infant crying and maternal tiredness. This will be collaboratively organised by the Swiss Federation of Midwives, the Swiss Association of Health Visitors and the Swiss Professional Association of Nurses.

6.7 Conclusion

By interlinking an issue in women’s health with health concerns of early infancy and studying it through the use of qualitative and quantitative methods, our research contributes a new dimension to the current understanding of the complex processes which determine early family health.

Postnatal care and policies should establish conditions which enable new mothers to balance the care of their child with their own needs. After giving birth, new mothers often need permission to attend to their own needs, while also being given practical support with childcare. This is especially the case when the neonates are unsettled, or when experience with childcare is lacking. Enhancing mothers’ rest and recovery after birth and assisting the acquisition of parenting skills are strategies to support a healthy start into family life and to prevent adverse outcomes such as postpartum depression and shaken baby syndrome. The challenge is to develop models of care provision which are responsive to the individual mother’s, the newborn’s and the family’s needs. Such personalized care has the potential to reduce maternal stress and tiredness after birth, to mitigate early infant crying problems, and thereby, to protect and promote family health from the earliest stage.

6.8 References

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