ANNE SALONEN

Parenting Satisfaction and Parenting Self-Efficacy during the Postpartum Period

Evaluation of an internet-based intervention

■

ACADEMIC DISSERTATION
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the Faculty of Medicine of the University of Tampere,
for public discussion in the Jarmo Visakorpi Auditorium,
of the Arvo Building, Lääkärinkatu 1, Tampere,
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Helsinki, September 2010

Anne Salonen

Abstract

Anne Salonen: Parenting satisfaction and parenting self-efficacy during the postpartum period: evaluation of an internet-based intervention

The aims of this study were to evaluate Finnish mothers' and fathers' parenting satisfaction and parenting self-efficacy (PSE) after childbirth and to identify contributing factors. Furthermore, the aim was to investigate changes in parenting satisfaction and PSE during the postpartum period, and to evaluate the effectiveness of an internet-based intervention.

The data (N=2600) were collected from parents at two maternity hospitals in southern Finland. A correlational and cross-sectional design was used with the data from cohort I in order to evaluate parenting satisfaction and PSE after childbirth and to develop the intervention. The intervention was designed to offer online support for parenting, breastfeeding and infant care beginning from midway through pregnancy. It comprised an information database, a peer discussion forum and expert advice. The data from cohort II were collected using a quasi-experimental design. This dataset was used to evaluate parenting satisfaction and PSE and the effectiveness of the intervention six to eight weeks postpartum. Parenting satisfaction was measured by the Evaluation subscale of the revised What Being the Parent of a New Baby is Like instrument. The PSE instrument was specially developed for this research. Comparisons were made between the parents in the intervention and control hospitals.

A total of 1,633 mothers and 961 fathers participated in the study. Mothers had a more positive assessment of their parenting satisfaction and PSE than fathers. Parents had a weaker assessment of their affective skills related to PSE than of their cognitive and behavioural skills. Self-concept, depressive symptoms, state of mind on discharge and perception of infant contributed significantly to both mothers' and fathers' parenting satisfaction and PSE. Infant centrality contributed to parenting satisfaction, but not to PSE. Parenting attitude during pregnancy contributed significantly to mothers' parenting satisfaction. Parity contributed significantly to both parents' PSE, but not to fathers' parenting satisfaction. Family functioning, family health and advice from nursing professionals were major contributory factors to parenting satisfaction and PSE. Parenting satisfaction and PSE scores became more positive during the postpartum period. This change was statistically significant for mothers' parenting satisfaction and for both mothers' and fathers' PSE. Affective skills related PSE improved more than cognitive and behavioural skills. Different groups of mothers and different groups of fathers showed equally positive changes in parenting satisfaction and PSE.

Parents' perception of themselves, their infants and family were associated with parenting experience. The results indicate that parents, and fathers in particular, may benefit from more family-focused care and sound advice. Interventions in infant behaviour and sleep may also offer strong support for parenting. Mothers experiencing breastfeeding difficulties should have ready access to more intensive support. If professionals can identify parents, especially mothers, who are afraid or concerned or who feel insecure during pregnancy, extended support can be provided even before the child is born. Both mothers and fathers showed similar changes in their parenting experience, although the timing of those changes was different The positive changes seen in parenting experience were greater in measurements of PSE than in measurements of parenting satisfaction. No intervention effects were found on parenting satisfaction and parenting self-efficacy.

Medical Subject Headings (MeSH): Family nursing, fathers, internet, intervention studies, mothers, parenting, postpartum period

Tiivistelmä

Anne Salonen: Tyytyväisyys vanhemmuuteen ja vauvanhoitovalmiudet lapsivuodeaikana: internet-pohjaisen intervention arviointi

Tutkimuksen tarkoituksena oli arvioida äitien ja isien tyytyväisyyttä vanhemmuuteen ja vauvanhoitovalmiuksia sekä niihin yhteydessä olevia tekijöitä lapsen syntymän jälkeen. Tarkoituksena oli myös arvioida vanhempien tyytyväisyydessä ja vauvanhoitovalmiuksissa tapahtuvaa muutosta lapsivuodeaikana, sekä arvioida kehitetyn internet-pohjaisen intervention vaikuttavuutta.

Tutkimusaineisto (N=2600) kerättiin kyselytutkimuksen avulla kahdesta eteläsuomalaisessa synnytyssairaalasta. Vanhempien tyytyväisyyttä vanhemmuuteen ja vauvanhoitovalmiuksia lapsen syntymän jälkeen tarkasteltiin kohortilta I kerätyllä poikittaistutkimuksella. Aineistoa hyödynnettiin myös intervention kehittämisessä. Internet-pohjaisella interventiolla tarkoitetaan vauvaperheiden äideille ja isille tarkoitettua verkkopalvelua, joka tarjosi tietoa ja tukea vanhemmuuteen, vauvanhoitoon ja imetykseen. Verkkopalvelun osa-toiminnot olivat tiedonhakupalvelu, vertaiskeskustelu ja mahdollisuus kysyä asiantuntijalta sähköpostitse. Seurantatutkimuksen aineisto kerättiin kohortilta II kvasikokeellista asetelmaa hyödyntäen. Sillä arvioitiin vanhemmuuden kokemuksissa tapahtuvaa muutosta 6-8 viikkoa lapsen syntymän jälkeen, sekä arvioitiin kehitetyn intervention vaikuttavuutta. Tyytyväisyyttä vanhemmuuteen arvioitiin Yhdysvalloissa validoidulla mittarilla ja vauvanhoitovalmiuksia tätä tutkimusta varten kehitetyllä mittarilla. Vertailut tehtiin koe- ja kontrollisairaaloissa äideille ja isille erikseen.

Tutkimukseen osallistui yhteensä 1633 äitiä ja 961 isää. Äidit olivat isiä tyytyväisempiä vanhemmuuteen ja vauvanhoitovalmiuksiinsa. Vanhemmat arvioivat vauvanhoitoon liittyvät emotionaaliset valmiudet heikommiksi kuin tiedolliset ja käyttäytymiseen liittyvät valmiudet. Minäkuva, masennusoireet, kotiutusmieliala ja vanhemman näkemys vauvasta olivat yhteydessä vanhempien tyytyväisyyteen. Se kuinka keskeinen sija vauvalla oli vanhempien ajatuksissa oli yhteydessä vanhempien tyytyväisyyteen ja suhtautuminen vanhemmuuteen odotusaikana oli yhteydessä äitien tyytyväisyyteen lapsen syntymän jälkeen. Lasten määrä oli yhteydessä vauvanhoitovalmiuksiin ja äitien tyytyväisyyteen, mutta sillä ei ollut vaikutusta isien tyytyväisyyteen. Perheen toimivuus, perheen terveys ja hoitajien ohjeet olivat yhteydessä tyytyväisyyteen ja vauvanhoitovalmiuksiin. Molempien vanhempien tyytyväisyys vanhemmuuteen ja vauvanhoitovalmiudet paranivat lapsivuodeaikana. Emotionaaliset valmiudet paranivat eniten verrattuna tiedollisiin ja käyttäytymiseen liittyviin valmiuksiin. Muutos oli samanlainen kohdesairaaloissa.

Vanhemman näkemys omasta itsestä, vauvasta ja perheestä olivat yhteydessä vanhemmuuden kokemuksiin lapsen synnyttyä. Vanhemmat, erityisesti isät, saattavat hyötyä aikaisempaa perhekeskeisemmästä hoidosta ja vankemmista ohjeista. Vauvan käyttäytymiseen ja uneen keskittyvät interventiot ovat kannatettavia vanhemmuuden tukemiseksi. Lisäksi imetysongelmista kärsiville äideille tulisi tarjota tehostettua tukea. Tunnistamalla vanhemmat, erityisesti äidit, jotka suhtautuvat tulevaan vanhemmuuteen pelokkaasti, huolestuneesti tai epävarmana, mahdollistetaan tehostettu tuki jo ennen lapsen syntymää. Äitien ja isien vanhemmuus kehittyy lapsivuodeaikana samantyyppisesti, mutta eri tahtiin. Vauvanhoitovalmiuksissa tapahtunut myönteinen muutos oli suurempi tyytyväisyyteen verrattuna. Interventiolla ei ollut vaikutusta vanhemmuuden kokemuksiin.

Yleinen suomalainen asiasanasto (YSA): Internet, interventio, isät, lapsivuodeaika, perhehoitotyö, äidit, vanhemmuus

Contents

List of tables

List of figures

List of appendices

List of abbreviations

ANOVA	Analysis of variance
CONSORT	The Consolidated Standards of Reporting Trials
CINAHL	The Cumulative Index to Nursing and Allied Health
EPDS	The Edinburgh Postnatal Depression Scale
ETENE	The National Advisory Board of Health Care Ethics
FAFHES	Family Functioning, Health and Social Support
GEE	Generalized Estimating Equations models
IT	Information technology
MEDLINE	Medical Literature Analysis and Retrieval System Online
MeSH	Medical Subject Headings
PSE	Parenting self-efficacy
RCT	Randomized controlled trial
SD	Standard deviation
SPSS	Statistical Package for Social Sciences
WBPL-R	The What Being a Parent of a New Baby is Like-Revised
YSA	Yleinen suomalainen asiasanasto

List of original publications

This thesis is based on the following articles, which are referred to in the text by their Roman numerals from I to IV:

I Salonen AH, Kaunonen M, Åstedt-Kurki P, Järvenpää A-L & Tarkka M-T (2008) Development of an internet-based intervention for infants' parents. Journal of Advanced Nursing 64 (1), 60-72.

II Salonen AH, Kaunonen M, Åstedt-Kurki P, Järvenpää A-L, Isoaho H & Tarkka M-T (2009) Parenting self-efficacy after childbirth. Journal of Advanced Nursing 65 (11), 2324-2336.

III Salonen AH, Kaunonen M, Åstedt-Kurki P, Järvenpää A-L, Isoaho H & Tarkka M-T (2010) Parenting satisfaction during the immediate postpartum period: factors contributing to mothers' and fathers' perceptions. Journal of Clinical Nursing 19, 1716-1728.

IV Salonen AH, Kaunonen M, Åstedt-Kurki P, Järvenpää A-L, Isoaho H & Tarkka M-T: Effectiveness of an internet-based intervention enhancing Finnish parents' parenting satisfaction and parenting self-efficacy during the postpartum period. Midwifery (In press).

1. Introduction

For most parents the postpartum period is one of great joy and happiness, but it also involves a number of challenges. These challenges revolve around learning infant care tasks, getting to know the infant and confronting one's self-expectations as a parent (Pridham & Chang 1989; Mercer 2004). Parents today often feel overwhelmed as they struggle to cope in their new role (Nyström & Öhrling 2004; Paajanen 2005). Barnard (1994) says that parent-infant interaction is influenced by the parent, infant and the environment. In this study, parent-infant interaction is approached from the parents' point of view, in terms of parenting satisfaction and parenting self-efficacy (PSE), which are important parts of parents' sense of well-being (Coleman & Karraker 1997; Elek et al. 2003; Drake et al. 2007; Ngai et al. 2007). Most importantly, PSE impacts parental practices, which in turn provide a key foundation for infant growth and development (Bandura 1997; de Montigny & Lacharite 2004; Jones & Prinz 2005; Ramchandani et al. 2005).

Shorter hospital stays after childbirth are challenging professionals to offer more effective support to facilitate parents' self-care at home. In Finland academic research related to parenting has discussed the essence of parenting (Lejonkvist 2004), experiences of pregnancy (Paavilainen 2003), fatherhood experiences (Kaila-Behm 1997; Mesiäislehto-Soukka 2005; Halme 2009), motherhood experiences (Tarkka 1996; Bondas 2000; Hannula 2003; Tammentie 2009), the family viewpoint (Pelkonen 1994; Hakulinen 1998; Hopia 2005; Honkanen 2008) and nursing care (Korhonen 2003; Kalam-Salminen 2005; Kouri 2006). Finnish parents have expressed the need for extended support from nursing professionals and peers (Tarkka 1996; Kaila-Behm 1997; Hannula 2003; Mesiäislehto-Soukka 2005; Paajanen 2005, 2006; Halme 2009; Tammentie 2009). Current caring practices have been criticized to be mother-oriented and routine (Tarkka 1996; Kalam-Salminen 2005; Mesiäislehto-Soukka 2005; Tammentie 2009). The results also imply that more individual and more family focused practices should be implemented (Paavilainen 2003; Hopia 2005; Kalam-Salminen 2005; Tammentie 2009), and that it is necessary to take better advantage of modern technology (Kouri 2006, Tammentie 2009). Earlier research on parenting satisfaction and parenting self-efficacy in the Finnish context were not found. Internationally, nursing research on parenting has concentrated mainly on mothers and on families with special needs (Gage et al. 2006). Further research is needed to evaluate both mothers' and fathers' perceptions as well as factors contributing to their perceptions (de Montigny & Lacharite 2005; Garfield et al. 2006; Magill-Evans et al. 2006; Drake et al. 2007).

Parenting interventions are often grounded in the assumption that the provision of support to parents benefits parents, infants and the whole family (Guyer et al. 2000; Kane et al. 2007). Internet-based interventions are one way of supporting parents during early parenthood (Nyström & Öhrling 2004; Kouri 2006; Magill-Evans et al. 2006; Madge &

O'Connor 2006). Finnish parents are active users of the internet (Statistics Finland 2008), but they are unequally placed with respect to their abilities to find, understand and assess this information (Lamp & Howard 1999; Tuffrey & Finlay 2002; Dhillon et al. 2003; Sarkadi & Bremberg 2005; Drake 2009). Health care professionals should be able to provide reliable support online and also recommend reliable sources of further information. Internet-based interventions can offer versatile support to parents in the form of information, peer support and expert advice (White & Dorman 2001; Herman et al. 2005).

This study was conducted as part of a project called "Urban parenthood", which is aimed at enhancing the well-being of families with infants through an intervention study. The project is a collaborative effort involving University of Tampere (Department of Nursing Science), Helsinki University Central Hospital (Department of Obstetrics and Gynaecology), Metropolia Helsinki Polytechnic (Nursing and Health Care), Tampere University Hospital (Department of Obstetrics and Gynaecology), Mindcom Ltd, the Miessakit Association, and the Breastfeeding Support Association in Finland. The internet-based intervention was chosen as the project's main intervention tool. In addition, the Family Functioning, Health and Social Support (FAFHES) instrument was modified for infants' parents as part of a family nursing project at the University of Tampere, Department of Nursing Science.

The aims of this study were to evaluate Finnish mothers' and fathers' parenting satisfaction and parenting self-efficacy after childbirth and to identify contributing factors. Furthermore, the aim was to investigate changes in parenting satisfaction and parenting self-efficacy during the postpartum period, and to evaluate the effectiveness of an internet-based intervention.

2. Literature review

2.1 Parenting during the postpartum period

A review of parenting studies published in core nursing journals found that none of these studies proposed a coherent definition of parenting. Parenting was most often described based on the domains of the instrument used in the research, or in terms of parents' tasks or roles (Gage et al. 2006). The Oxford English Dictionary online (2010) defines parenting as "the activity of being a parent; the rearing of a child or children; or the manner in which a parent raises a child". Other Medical Subject Headings descriptions closely related to parenting include maternal behaviour, paternal behaviour and parent-child relations (MeSH, National Library of Medicine 2008). The postpartum period begins after childbirth and lasts at least six to eight weeks. Other closely related terms include "postnatal" and "puerperal". In 2005, the term "puerperium" was replaced by "postpartum period" in the MeSH dictionary (National Library of Medicine 2008). During the postpartum period, the mother's body returns as quickly as possible to its pre-pregnant state. However, the postpartum period also involves many other challenges for both parents. These have to do with adjusting to the new role as a parent as well as interacting with the infant and the whole family (Pridham & Chang 1989; Mercer 2004).

2.1.1 Parent-child interaction model

Only very few nursing models include the element of parenting. Examples of models that do take it into account include Mercer's (1991) theory of Maternal Role Attainment and Barnard's (1994) Parent-Child Interaction Model (Marriner Tomey & Alligood 2006). This study was based on Barnard's (1994) Parent-Child Interaction Model. Barnard (1994) conceptualizes parent-child interaction as a process of mutual adaptation which is influenced by the unique characteristics of both parent and infant. This interaction can be facilitated by environmental resources such as the family. The family and its members is understood as a whole composed of different family members (Friedman 1998). Barnard's (1994) Parent-Child Interaction Model emphasizes the importance of support for parents during the first postpartum year. Interaction between parent and infant evolves over time, and it can be supported by helping parents to identify and respond to infants' cues and needs and to provide growth-fostering situations (Brazelton & Cramer 1990; Barnard 1994; Brazelton & Sparrow 2006). In this study, parent-infant interaction is measured from the parents' point of view. The focus is on parenting experiences: parenting satisfaction and parenting self-efficacy.

2.1.2 Parenting satisfaction

Satisfaction is defined as "the action of gratifying to the full, or contenting by complete fulfilment of a desire or supply of a want; the fact of having been gratified to the full or having one's desire fulfilled", or as "satisfied or contented state of mind; now usually, gratification or pleasure occasioned by some fact, event, or state of things" (The Oxford English Dictionary online 2010). Parenting satisfaction is not included in the MeSH dictionary, but the term "Personal satisfaction" is (National Library of Medicine 2008). In this study, parenting satisfaction is defined as the sense of pleasure and gratification gained from the parenting role. This includes satisfaction from carrying out infant care tasks, from learning to know the infant, and from meeting self-expectations regarding one's role as a parent. (Pridham & Chang 1989.)

2.1.3 Parenting self-efficacy

Self-efficacy beliefs influence the way that people think, feel, motivate themselves and act (Bandura 1997; Zukosky 2009). For parents to employ parenting behaviour successfully, they must both believe that it will produce the desired outcome and have confidence in performing the specific behaviour. Parents with high parenting self-efficacy beliefs are likely to make a greater effort than parents with low parenting self-efficacy. Self-efficacy has been studied in relation to numerous health behaviours (Bandura 1997; Polit & Beck 2004). Bandura (1997) defines parenting self-efficacy (PSE) as referring to parents' personal beliefs of what they can do with their capabilities under a certain set of conditions. In addition, PSE includes a set of organized actions to produce a set of situation-specific tasks under difficult circumstances. These tasks are related to parent-child interaction and reflect day-to-day tasks, but they also include interactive behaviours such as how to be sensitive to infants' cues and needs and how to respond to them in a growth-fostering way (Barnard 1994).

The definition of PSE adopted in this study describes it as "beliefs or judgements a parent holds of their capabilities to organize and execute a set of tasks related to parenting a child" (Montigny & Lacharite 2005, p. 387). Other concepts used for similar purposes include "efficacy", "competence", "confidence", "sense of infant care skills", "perceived role attainment" and "self-esteem" (Jones & Printz 2005; Montigny & Lacharite 2005).

2.1.4 Parent, infant and environmental factors contributing to parenting

Parent factors

Previous experiences, both positive and negative, or lack of experiences impact parents' perceptions of efficacy (Bandura 1997). First-time parents often have more negative parenting experiences during the early postpartum period (Pridham & Chang 1989; Tarkka et al. 2000; Drake et al. 2007; Ngai et al. 2007). In addition, previous research has shown

that parent's age (Froman & Owen 1990; Reece & Harkless 1998; Kiehl & White 2003), education (Barnard 1994; Ferketich & Mercer 1995; Mercer & Ferketich 1995), and self-concept or self-esteem (Mercer 1991, Ferketich & Mercer 1995; Mercer & Ferketich 1995; Drake et al. 2007; Ngai et al. 2007) may contribute to mothers' and/or fathers' parenting experience. There is also conflicting evidence as to whether these factors have a positive or negative impact on parenting experience (Froman & Owen 1990; Pridham et al. 1991; Pridham & Chang 1992; Tarkka 2000; Kiehl & White 2003). On the other hand, the meta-analysis by Yarcheski et al. (2009) showed that self-esteem, age, education, marital status, parity and depressive symptoms had only limited predictive power on maternal-fetal attachment.

Bandura (1997) maintains that parents' psychosocial state or mood also influences their parenting experience. There is evidence that well-adapted mothers (Kiehl & White 2003) and mothers with a positive attitude towards parenthood during pregnancy (Tarkka et al. 2000) have more positive experiences after childbirth than mothers with negative experiences during pregnancy. Positive experience of childbirth (Mercer 1991, Ferketich & Mercer 1995, Mercer & Ferketich 1995, Vehviläinen-Julkunen & Liukkonen 1998, Tarkka et al. 2000), lack of postpartum depressive symptoms (Ferketich & Mercer 1995, Porter & Hsu 2003, Ngai et al. 2007), small life change (Barnard 1994; Pridham et al. 1994, Pridham & Chang 1989), great infant centrality (Pridham et al. 1994), and parents' positive state of mind on hospital discharge (Mercer 1991, Tarkka et al. 2000) may also contribute positively to parenting experience. In general, mothers' perceptions of parenting tend to be more positive than fathers' (Reece & Harkless 1998, Hudson et al. 2001, Elek at al. 2003, Pelchat et al. 2004).

Infant factors

According to Bandura (1997), perceived task difficulty is associated with parenting experience. Therefore, challenges related to infant maturity, development, health and infant characteristics might reflect perceived task difficulty. Conflicting evidence has been published about the impact of infant sex on PSE during the first year of life (Froman & Owen 1990; Hudson et al. 2001; Elek et al. 2003; Rogers & Matthews 2004). Pelchat et al. (2004) found significant differences in parenting experience between parents with newborns who had cleft/lip palate or Down syndrome in favour of cleft/lip palate.

During the infant's first four months of life, parents' perceptions of their parenting may or may not change (Mercer & Ferketisch 1995; Reece & Harkless 1996). Again, there is conflicting evidence about the direction of change: parents' perceptions may change in a positive (Pridham & Chang 1989, 1992; Pridham et al. 1994, 1999; Hudson et al. 2001) or negative direction (Ferketisch & Mercer 1995; Mercer & Ferketisch 1995; Ngai et al. 2009). Further research is needed to gain stronger evidence about the connection between infant-related factors and parenting experience. However, researchers agree that challenges experienced with the infant indicate a negative parenting experience (Mercer 1991, Teti & Gelfand 1991; Porter & Hsu 2003; Tarkka 2003).

Environmental factors

Vicarious experiences as well as social and verbal persuasion contribute to parenting self-efficacy (Bandura 1997). Social and verbal persuasion can be received from family

members, peers and nursing professionals. Parents are expected to provide an environment that is conducive to their child's growth and development. Family is the primary social institution in which parenting takes place (Gage et al. 2006). Family is a resource, but the family situation can also become a source of stress. Family well-being is therefore a potential predictor of parenting experience (Ferketisch & Mercer 1995).

Hospital practices (rooming-in, fathers' overnight stays in maternity hospital, infant feeding practices) and social support from nursing professionals differ internationally, but often nationally as well. There is some evidence that social support and different hospital practices have a positive impact on parenting (Reece 1993; Tarkka et al. 2000; Svensson et al. 2005; Hildingsson 2007). It has been shown that active participation in child care improves mothers' closeness with their infants (Svensson et al. 2005) and fathers' parenting satisfaction (Hudson et al. 2001; Elek et al. 2003; Hildingsson 2007). On the other hand, there is also evidence that social support has only a moderate effect on maternal-fetal attachment (Yarcheski et al. 2009). Research has confirmed parents' desire and expectations to participate in their child's care during hospitalization (Power & Franck 2008). Parenting studies are often grounded in the assumption that the provision of support to parents benefits parents, infants and whole families (e.g. Guyer et al. 2000).

2.2 Parenting interventions

2.2.1 Defining intervention

Intervention

Intervention means "the action of intervening, stepping in, or interfering in any affair, so as to affect its course or issue" (The Oxford English Dictionary online 2010). In the research context interventions are typically defined as a set of actions aimed at bringing about change (Rychetnik et al. 2002; Eriksson et al. 2006), often in health (Burns & Grove 2001; Eriksson et al. 2006). The purpose of interventions is to produce change in the form of identifiable outcomes (Rychetnik et al. 2002; Frame 2004; Eriksson et al. 2006). Nursing interventions are additionally aimed at helping to cope with the strain caused by illness, or to help people near death (Burns & Grove 2001). Action is an integral part of every nursing intervention, which is something that a nursing professional does to a patient, family or community. Nonetheless intervention is a dynamic concept involving patient participation and intrinsic motivation guiding the process (Frame 2004).

Interventions can be targeted at individuals or groups, and they can be provided face-to-face, by printed media, by video and/or by telephone (Bryanton & Beck 2010). A distinction can be made between single-component and complex interventions. Nursing interventions can consist of a single act, a series of actions at a given point of time, a series of actions over time or a series of acts performed collaboratively with other professionals (Burns & Grove 2005). Interventions promoting parenthood can also be divided into individual education and support programmes, group programmes, parent-infant contact, home visiting, and multi-component programmes (Gardner & Deatrick 2006). Complex

interventions consist of multiple components or interconnecting parts (Campbell et al. 2000).

Surrogate concepts for interventions include education (Eriksson et al. 2006; Magill-Evans et al. 2006), guidance (Eriksson et al. 2006), treatment (Sidani & Braden 1998; Eriksson et al. 2006; Magill-Evans et al. 2006; Polit & Beck 2006), therapies (Parahoo 2006), information programme (Parahoo 2006), programme (Rychetnik et al. 2002; Magill-Evans et al. 2006), prevention (Magill-Evans et al. 2006), medication (Parahoo 2006) and experimental manipulation (Polit & Beck 2006). Without intervention, there is no experiment (Parahoo 2006). Lack of consistency in the implementation of nursing interventions represents one of the major challenges for nursing interventions and their evaluation (Burns & Grove 2005).

Intervention research has been described as a "systematic research approach distinguished not so much by a particular research methodology as by a distinctive process of planning, developing, implementing, testing and disseminating interventions" (Polit & Beck 2006, pp. 502). Intervention research shifts the focus from causal connection to causal explanation (Burns & Grove 2005). Nursing outcomes are the changes in nursing phenomena effected by nursing interventions (Moorhead & Johnson 2004; LoBiondo-Wood & Haber 2010). Evaluation is defined as a process of determining the value or worth of something by judging it against explicit and predetermined standards (Rychetnik et al. 2002).

Nursing, social support and intervention

Nursing has been defined as a human action aiming to promote health based on shared values and a deep understanding and respect of other humans (Eriksson et al. 2006). Nursing can be provided by patients themselves, by people close to the patient or by nursing professionals. Eriksson et al. (2006) define nursing care as comprising actions and interventions provided by nursing professionals. It is based on professional experience, established practice and previous research. Nursing activities can be divided into intervention, support, conservation, substitution and enhancement (Barnum 1998). Several nursing theories are built around interaction and use the concept of social support to describe nurses' actions in relation to the patient. The nursing process has been described as including assessing, diagnosing and intervening (Barnard 1994).

Interventions are important methods of providing support to parents in the nursing context. In this study, social support is defined as an interpersonal transaction that includes one or more of the following elements: affect, affirmation and aid. Affect refers to liking, admiration or respect. Affirmation includes expressions of agreement or acknowledgement of appropriateness of some act or statement by another person. Aid contains direct aid or assistance, such as money, information, time or entitlements. (Kahn 1979.) The relationship between intervention and social support has not been clearly defined in conceptual analyses of social support (see Langford et al. 1997; Williams et al. 2004; Finfgeld-Connett 2005). The difference between intervention and social support can be examined on the basis of the classification of nursing theories. According to intervention theories, nurses have an active role in decision-making and their aim is to try and achieve the desired change. Support theories, on the other hand, are less concerned with affecting

the course of the illness, for instance. Instead, their main concern is to help patients endure or cope (Barnum 1998).

2.2.2 Defining an internet-based intervention

An internet-based intervention is defined as a set of actions aimed at bringing about change or producing identifiable outcomes by means of information technology. Internet-based social support is a relatively new application of social support (Herman et al. 2005). Internet-based interventions usually consist of an information database, peer communication and/or expert advice (White & Dorman 2001; Herman et al. 2005). The concepts used in the literature describing internet-based interventions are numerous and include web-based intervention (Christakis et al. 2006), internet-based social support (Hudson et al. 2008), social support web-site (Herman et al. 2005), online support (White & Dorman 2001; Hudson et al. 2009), computer-mediated support (Bragadottir 2008), computer network (Hudson et al. 1999; Campbell-Grossman et al. 2009), virtual social support (Madge & O'Connor 2006) and telemedicine programme (Gray et al. 2000).

2.2.3 Literature search on parenting interventions

The aim of the literature search was to identify what kind of interventions have been undertaken among infants' parents, to see how those interventions had been evaluated and to evaluate their effectiveness among diverse groups of parents. The Medline search terms included: infant/ newborn+ parents/ parenting/ parenthood+ intervention. The original search was limited to full-text articles in the English language published from 1996 to 2006. In addition, an update search was conducted to trace articles published from 2007 to the present date (29 March 2010). The update search had the following revised search terms: infant/ newborn+ parents/ parenting/ child rearing/ parent-child relations/ mother-child relations/ maternal behaviour/ paternal behaviour + intervention/ intervention studies.

The results of the literature search were assessed by reference to its inclusion and exclusion criteria. The inclusion criteria were: 1) hospital or home care, 2) involves parents expecting a child or with infants aged less than one year, and 3) any kind of intervention to support parenting that involves support from nursing or multi-professional maternity and neonatal care professionals. Both qualitative and quantitative studies and review articles were included. The exclusion criteria were: 1) war setting, developing countries, 2) main focus on child abuse and neglect, child discipline, infant death/grief, infant pain, vaccination, psychotic and chronically ill parents, special health care unless concerned with neonates, 3) therapy, and 4) ambiguous articles (infant age, intervention performer or intervention timing not mentioned).

The titles of 257 articles were read during the systematic selection process, and 126 articles were excluded based on their title (Table 1). Then, the abstracts of the remaining 131 articles were read; at this stage a further 56 articles were excluded. The remaining 75 full texts were read several times, and of these 17 articles were excluded. Finally, a total of

58 articles were included in the literature review. In addition, the literature search was completed with Medic, Cinahl, Medline and Cochrane searches of full text review articles. The search terms included: newborn/ infant/ parenting/ parents/ mothers/ fathers/ intervention. This search produced 12 further review articles. The final review comprised 50 research and 20 review articles (Appendix 1).

Table 1. Phases of the literature search on parenting interventions

	Original search: 1996-2006	**Update search: 2007-29 March 2010**	**Total**
Citations found in MEDLINE	n=108	n=149	n=257
Excluded based on title	n=61	n=65	n=126
Abstracts of articles	n=47	n=84	n=131
Excluded based on abstract	n=13	n=43	n=56
Full text articles	n=34	n=41	n=75
Excluded based on full text	n=3	n=14	n=17
Articles included in the literature review	n=31	n=27	n=58

Several researchers recommended developing preventively arranged and population-based parenting support online, which sparked an interest in learning more about internet-based interventions for infants' parents (e.g. Nyström & Öhrling 2004; Thompson et al. 2004; Magill-Evans et al. 2006). However, only one article in the review described the use of information technology (IT). Therefore, another literature review was conducted in Medic, Cinahl, Medline and Cochrane. A variety of keywords were used to identify studies concerned with IT and parents as internet users. Therefore, different combinations of search terms were used, including internet/ internet-based/ web-based/ web-site/ computer/ computer-mediated/ online/ network/ virtual/ telemedicine/ intervention/ social support/ support/ programme/ mothers/ fathers/ parents/ parenting/ parenthood. The second search was also completed based on the lists of references in the articles retrieved in the initial search. No review articles were found on internet-based interventions or parents as internet users. A total of 29 articles were included in the second review (Appendix 2).

2.2.4 Description of parenting interventions

Study designs included RCTs as well as quasi-experimental, experimental, non-experimental, exploratory and pilot studies (Appendix 1 & 2). Both quantitative and qualitative methods were used. Sample sizes ranged from 10 to 14,786. Studies including internet-based interventions often lacked a control group. Most review articles only included studies based on RCTs (Lucassen et al. 1998; Levitt et al. 2004; Barlow et al. 2005; Shaw et al. 2006; Olds et al. 2007; Barlow et al. 2009; Britton et al. 2009; Brown et al. 2009; Gagnon & Sandall 2009; Bryanton & Beck 2010). The number of studies included in review articles ranged from 4 to 138. Recently published reviews are generally quite critical of the quality of research evaluating parenting interventions (e.g. Brown et al.

2009; Gagnon & Sandall 2009; Bryanton & Beck 2010). Studies including the use of IT often comprised parents' evaluations of information retrieval or internet use without an actual intervention (Tuffrey & Finlay 2002; Dhillon et al. 2002; Semere et al. 2003; Bernhardt & Felter 2004; Sarkadi & Bremberg 2005). On the other hand, articles also included descriptions of the implementation process (Kouri & Kemppainen 2000; Kouri et al. 2005a; 2005b Hudson et al. 2008), the testing of the interventions (Thornberry et al. 2002; Dornan & Oermann 2006), analysis of intervention use (Hudson et al. 1999; Thompson et al. 2007) and analysis of online conversations/messages (Kouri et al. 2006a, 2006b; Campbell-Grossman et al. 2009; Hudson et al. 2009).

Target groups

A clear majority of the interventions were aimed at mothers or the mother-infant dyad (Appendix 1 & 2). Previous research has indicated that mothers have been overrepresented in parenting research (Gage et al. 2006; Magill-Evans et al. 2006) and nursing research generally (Polit & Beck 2008, 2009). On the other hand, many researchers have highlighted the difficulties involved in motivating fathers to participate and to keep the attrition rate low (Maquire et al. 2007; Feeley et al. 2008; Halme 2009). Some interventions were clearly aimed at both mothers and fathers (e.g. Feldman et al. 2002; Lawhon 2002; Pelchat et al. 2004; Pelchat & Levebre 2004, Kaarensen et al. 2006; Bragadottir 2008). Some authors stated that their intervention was intended to support parents, parenting and/or families, but they did not clearly indicate whether the target group included mothers, fathers or both, or to what extent. This result is consistent with the findings of Gage et al. (2006), who found that some authors generalized their findings to both parents even though the research was conducted among mothers only.

Parenting interventions were often targeted at families with special needs. This finding is supported by a review of collaborative interventions for families with children (Halme et al. 2010). Review articles of interventions for families with special needs covered such issues as skin-to-skin contact (Ludington-Hoe & Swinth 1996), early stimulation programmes (Bonnier 2008), treatments for colicky infants (Lucassen et al. 1998) and high-risk families with infants or small children (Bardy & Öhman 2007). Most of the internet-based parenting interventions were focused on clearly defined problematic situations. Target groups included parents whose children were born prematurely (Gray et al. 2000), children who had cancer (Bragadottir 2008), teenage mothers (Hudson et al. 1999), vaginal birth after Caesarean section mothers (Wang et al. 2006), single low-income African American mothers (Herman et al. 2005; Hudson et al. 2008, 2009; Campbell-Grossman et al. 2009), and alcohol or substance abusing mothers (Thornberry et al. 2002; Ondersma et al. 2005).

Magill-Evans et al. (2006) found that interventions for fathers were typically aimed at fathers of healthy children. Many research articles and particularly review articles included parents with healthy infants (Levitt et al. 2004; Hannula et al. 2008; Britton et al. 2009; Brown et al. 2009; Moore et al. 2009) and unselected groups of parents (Barlow et al. 2005; 2009; Gardner & Deatrick 2006; Shaw et al. 2006; Kane et al. 2007; Olds et al. 2007; Fukkink 2008; Gagnon & Sandall 2009, Bryanton & Beck 2010). However, internet-based interventions were rarely conducted among parents with healthy infants (Christakis et al. 2008; Kouri et al. 2006a, b; Wallance et al. 2006).

Assessments of intervention effects

Intervention effects have been assessed in the literature from the point of view of the parent, infant, parent-infant interaction, partner relationship (Pelchat & Levebre 2004; Pelchat et al. 2004; Kramer et al. 2008), family/home environment (e.g. Gray et al. 2000; Campbell et al. 2008; Farber 2009) and professionals (Guyer et al. 2000; Sundelin et al. 2005; Melnyk et al. 2009; White-Trout & Norr 2009; Barilla et al. 2010). The father's perspective has been evaluated only rarely. Selected studies used both previously used and previously validated instruments, newly developed instruments and instruments of unknown origin. The same outcome variables were used in several studies, but the instruments were not used in a consistent way across different studies. This is supported by the findings of several review articles (e.g. Barlow et al 2009; Brown et al. 2009; Bryanton & Beck 2010; Halme et al. 2010). Each study evaluating the effects of internet-based interventions used different outcome measures.

Parent-related outcomes among unselected groups of parents most commonly included parental knowledge (Guyer et al. 2000; Colson & Joslin 2002; Robbins et al. 2003; Johnston et al. 2004; Farber 2009). Parental beliefs/attitudes (Guyer et al. 2000; Colson & Joslin 2002), parental behaviour/practices (Guyer et al. 2000; Colson & Joslin 2002; Johnston et al. 2004, 2006; Hannula et al. 2008; Kramer et al. 2008), parenting satisfaction (Hudson et al. 2003; Johnston et al. 2004) and parenting self-efficacy (Hudson et al. 2003; Robbins et al. 2003) were also evaluated. Parents' emotions and health have been addressed only rarely among unselected groups of parents (Johnston et al. 2004, 2006; Sundelin et al. 2005; Feinberg & Kan 2008).

Among families with special needs, outcomes typically included parents' emotions (Keefe et al. 1997; Butz et al. 2001; Horowitz et al. 2001; Feldman et al. 2002; Nair et al. 2003; Ohgi et al. 2004; Pelchat & Levebre 2004; Pridham et al. 2005; Kaarensen et al. 2006, 2008; Glazebrook et al. 2007; van der Pal et al. 2007; Olafsen et al. 2008; Melnyk et al. 2008; Turan et al. 2008; Newham et al. 2009). Parental knowledge (Maguire et al. 2007), parenting self-efficacy (Lawhon 2002; Maguire et al. 2007; van der Pal et al. 2007) and parental behaviour/practices (Laundry et al. 2003, 2006; Johnson 2007) were rarely assessed among parents with special needs. Infant-related outcomes mainly included infant development, behaviour, growth, health and irritability/crying (Appendix 1).

Mother-infant interaction was typically evaluated among families with special needs (Keefe et al. 1997; Schuler et al. 2000; Horowitz et al. 2001; Feldman et al. 2002; Pridham et al. 2005; Glazebrook et al. 2007; Johnson 2007; Kramer et al. 2008; Melnyk et al. 2008; Drotar et al. 2009; Newham et al. 2009; White-Traut & Norr 2009). Only one research article used parent-infant interaction (Feinberg & Kan 2008) as an outcome measure, and none of the research articles used father-infant interaction as an outcome.

2.2.5 Key findings of parenting interventions

The time-frame of parenting interventions ranged from short moments to intensive long-term meetings continuing beyond the first postpartum year. The scope of these interventions ranged from teaching a clearly defined skill or task to wide-ranging

programmes including a wide spectrum of information. Skin-to-skin contact and swaddling are examples of clearly defined interventions. Skin-to-skin contact was found to have significant health benefits for the premature and healthy infant and their parents (Ludington-Hoe & Swinth 1996; Feldman et al. 2002; Johnson 2007; Moore et al. 2009). In addition, reduced stimulation (Lucassen et al. 1998) produced good results with colicky infants and swaddling (Oghi et al. 2004) was effective with excessively crying infants with cerebral palsy. The line between different types of interventions was not always clear, since different combinations of methods and materials were often used even though authors had defined the intervention based on the main component.

Educational interventions included teaching infant behaviour/development (Colson & Joslin 2002; Lawhon 2002; Johnston et al. 2004; Thompson et al. 2004; Maguire et al. 2007; Turan et al. 2008; White-Traut & Norr 2009; Bryanton & Beck 2010), different parenting skills (French et al. 1998; Leitch 1999; Butz et al. 2001; Laundry et al. 2003; Robbins et al 2003; Kavanagh & Heining 2008; Bryanton & Beck 2010), breastfeeding (Hannula et al. 2008; Kramer et al. 2008; Britton et al. 2009) and parent-infant interaction (Dihigo 1998; Horowitz et al. 2001; Glazebook et al. 2007; Feeley et al. 2008; White-Traut & Norr 2009). In addition, several Cochrane reviews covered different types of perinatal parenting education (Barlow et al. 2009; Gagnon & Sangall 2009; Bryanton & Beck 2010). Educational interventions had a positive impact on mothers' knowledge about infant behaviour (Maquire et al. 2007; Bryanton & Beck 2010). In fact, education on infant behaviour and sleep seemed to have the strongest potential to enhance mother's knowledge (Bryanton & Beck 2010).

Educational interventions were found to impact parents' behaviour, for example by reducing child health visits (Robbins et al. 2003), promoting breastfeeding (Kramer et al. 2008) and promoting proper caring practices (Colson & Joslin 2002). Breastfeeding was significantly prolonged with the use of WHO/Unicef training (Britton et al. 2009) and the Baby Friendly Hospital Initiative (Hannula et al. 2008). Parental education on parent-child interaction also reduced the crying of colicky infants (Dihigo 1998). However, educational interventions also engendered feelings of reduced confidence and knowledge among parents (Robbins et al. 2003). This result does not mean that their knowledge actually got worse, but the change in parenting experience had the unfavourable effect of increasing uncertainty.

Support from nursing professionals was received in the form of advice (Guyer et al. 2000; Jonston et al. 2004; Sundelin et al. 2005), discussion (Robbins et al 2003; Sundelin et al. 2005; Kaarensen et al. 2006; Glazerbrook et al. 2007), role modelling (Colson & Joslin 2002), phone calls (Dihigo 1998; Johnston et al. 2006) and home visits. Home visits seemed to produce health benefits for mothers, infants and/or mother-infant interaction (Keefe et al. 1997, 2005; Butz et al. 2001; Horowitz et al. 2001; Laundry et al. 2003, 2006; Nair et al. 2003; Pridham et al. 2005). However, the strongest evidence of the effectiveness of home visits was found in high-risk populations (Gardner & Deatrick 2006; Shaw et al. 2006).

Educational videos were used to demonstrate infant behaviour to parents (French et al. 1998; Leitch 1999; Keefe et al. 2005). Professionals also used video photography to record parent-infant interaction and to give feedback to parents (Horowitz et al. 2001; Laundry et al. 2006; Fukkink 2008). The use of videos was associated with better mother-infant

interaction (Leitch at al. 1999; French et al. 1998; Lawhon 2002; Melnyk et al. 2008). A meta-analysis of family programmes using video feedback confirms that those programmes produce positive effects related to parenting attitude, behaviour and experience, as well as infant development and parent-child interaction (Fukkink 2008). Based on the meta-analysis by Magill-Evans et al. (2006), the most effective interventions for fathers included opportunities to learn how to observe and interpret child behaviour, and the interventions helped fathers to perceive their child more positively and to feel more confident in fathering.

Several interventions involving multiple components had positive effects on parent, infant and family health. However, Britton et al. (2009) suggest that further research is needed to ascertain which components of the interventions are the most effective. Kane at al. (2007) suggest that knowledge, skills and understanding gained from professionals be combined with support from other parents. Peer support was offered in the form of group-based parent training programmes (Barlow & Parsons 2003; Johnston et al. 2006; Barlow et al. 2009), workshops (Hegarty et al. 2007) and online discussions. There is evidence to support the short-term benefits of group-based parenting programmes (Barlow et al. 2005, 2009). Interventions including guided observation and participation in programmes including interaction with the child and discussions with peers, had the strongest potential to support fathers (Magill-Evans et al. 2006).

Peer support was also effective in reducing depressive symptoms among mothers at high risk of postnatal depression (Shaw et al. 2006). Professional support combined with peer support has proved highly effective in supporting mothers' breastfeeding (Hannula et al. 2008). Peer support is important because people who are in the same kind of social situation are well placed to offer support that is consistent with the needs of the support recipient. Effective social support is therefore more likely to come from people who are socially similar and who have experienced similar stressors or situations as the recipient (Logsdon & Davies 2003). Mothers in online discussion forums create online communities. (Drentea & Moren-Cross 2005; Kouri et al. 2006a; 2006b). However, professional support including informational support is often required because it may be difficult for peers to provide such support (Logsdon & Davies 2003).

Internet-based interventions typically contained three components: an information database, peer discussion forum and expert advice (Hudson et al. 2003; Herman et al. 2005; Kouri et al. 2006a, b; Hudson et al. 2008, 2009; Campbell-Grossman et al. 2009). Online support improved parents' knowledge, attitudes and/or motivation (Hudson et al. 2003; Ondersma et al. 2005; Wallace et al. 2006; Wang et al. 2006). There is also evidence that online support strengthened first-time fathers' self-efficacy and parenting satisfaction four to eight weeks postpartum (Hudson et al. 2003) and improved family satisfaction among parents with premature infants (Gray et al. 2005). In addition, online support improved the overall quality of care (Gray et al. 2000), promoted preventive practices (Christakis et al. 2006; Thompson et al. 2007), and activated parents to discuss prevention topics with the child's care provider (Christakis et al. 2006; Thompson et al. 2007).

The literature review indicates that almost all interventions benefited parents or infants in some ways, since a clear majority of them reported at least one significant finding. This is consistent with the findings of several earlier literature reviews (Gardner & Deatrick 2006; Magill-Evans et al. 2006). Bonnier (2008) concluded that the greatest benefit is

obtained in families with several risk factors. The results of Hannula et al. (2008) indicate that longer term interventions expanding from pregnancy to the postpartum period are more effective in supporting the breastfeeding of mothers of healthy infants. Longer term interventions including multiple exposures are also recommended for fathers (Magill-Evans et al. 2006; Maquire et al. 2007). However, recent review articles suggest that the effects of parenting interventions still remain largely unknown (Shaw et al. 2006; Olds et al. 2007; Gagnon & Sandall 2009; Barlow et al 2009; Bryanton & Beck 2010).

2.3 Summary of the literature review

The postpartum period involves several challenges related to learning infant care tasks, getting to know the infant and confronting one's self-expectations as a parent (Pridham & Chang 1989; Mercer 2004). Parents today often feel overwhelmed (Nyström & Öhrling 2004; Paajanen 2005). Barnard's (1994) model describes parent-infant interaction as a process of mutual adaptation. In this study, parent-infant interaction is measured from the parents' point of view. The focus is on parenting experiences: parenting satisfaction and parenting self-efficacy.

Parenting satisfaction and parenting self-efficacy are important parts of parental well-being (Coleman & Karraker 1997; Elek et al. 2003; de Montigny & Lacharite 2004; Jones & Prinz 2005). Parenting satisfaction is defined as a sense of pleasure and gratification gained from the parenting role. This includes satisfaction in carrying out infant care tasks, how well the parent knows the infant, and the extent to which self-expectations as a parent are being met (Pridham & Chang 1989). Self-efficacy beliefs influence the way that people think, feel, motivate themselves and act. For parents to employ parenting behaviour successfully, they must both believe it will produce the desired outcome and have confidence in performing that particular behaviour (Bandura 1997). Parenting self-efficacy is defined as "beliefs or judgements a parent holds of their capabilities to organize and execute a set of tasks related to parenting a child" (Montigny & Lacharite 2005, p. 387). These tasks are related to parent-child interaction and reflect day-to-day tasks, but they also include interactive behaviours such as how to be sensitive to infants' cues and needs and how to respond to them in a growth-fostering way (Barnard 1994).

Parent-infant interaction is influenced by several parent, infant and environmental factors (Barnard 1994). Previous research indicates that parent's age, education, marital status, parity, attitude towards parenthood, life change, infant centrality, depressive symptoms and state of mind on discharge may contribute to parenting experience. There is also evidence that the infant's sex, maturity, health, age and other characteristics are associated with parenting experience. Environmental attributes including family functioning, family health, social support from nursing professionals and different hospital practices may also have an impact. Finnish parents have expressed the need for extended support from nursing professionals and peers. However, further research is needed to evaluate both mothers' and fathers' perceptions as well as factors contributing to their perceptions. Different kinds of parenting interventions have proven to have health benefits for the parents, infants and the whole family.

Further efforts are needed to develop preventively oriented parenting interventions. Most of the previous intervention research on parenting has concentrated on mothers. Despite the limitations of this research, it has been shown that information technology has the potential to provide important social support to childbearing women and men. An internet-based intervention is defined as a set of actions with the coherent objective of bringing about change or producing identifiable outcomes using information technology. Interventions designed to support parenting have better chances of succeeding if they include interactive elements. The literature review support the use of longer term support interventions that include both education, peer support and support from nursing professionals.

3. Aims of the study

The aims of this study were to evaluate Finnish mothers' and fathers' parenting satisfaction and parenting self-efficacy after childbirth and to identify contributing factors. Furthermore, the aim was to investigate changes in parenting satisfaction and parenting self-efficacy during the postpartum period, and to evaluate the effectiveness of an internet-based intervention.

The following research questions were addressed:

1. How do mothers and fathers perceive their parenting satisfaction and parenting self-efficacy after childbirth?

2. What are the factors contributing to mothers' and fathers' parenting satisfaction and parenting self-efficacy after childbirth?

3. How do mothers' and fathers' parenting satisfaction and parenting self-efficacy change during the postpartum period?

4. How does an internet-based intervention affect intervention and control mothers' and fathers' parenting satisfaction and parenting self-efficacy during the postpartum period?

4. Materials and methods

4.1 Study design

Baseline study (Articles I-III)

A correlational and cross-sectional study design was used to evaluate and compare the parenting satisfaction and parenting self-efficacy of mothers and fathers in the intervention and control hospitals after childbirth.

Follow-up study (Article IV)

A quasi-experimental study design with repeated measures was used to evaluate and compare parenting satisfaction and parenting self-efficacy in the intervention and control hospitals. Comparisons were made within and between different groups of mothers and fathers during the six to eight week period following the birth of a child. The internet-based intervention was developed on a multi-professional basis in the intervention hospital.

4.2 Settings

The study was conducted at two public university-level maternity hospitals in southern Finland. Both the intervention (Articles II-III: hospital A) and control (Articles II-III: hospital B) hospitals recommend the practice of rooming-in, aim to offer continuity of care and family-centred care. However, in contrast to the intervention hospital where fathers' overnight stays on the maternity unit are common practice, the control hospitals allow fathers' overnight stays only for exceptional reasons. In addition, the intervention hospital has made important advances in recent years in developing breastfeeding support. The main focus of development efforts at the control hospital has been on supporting early discharge parents through nurse/midwife home visits and telephone calls. Early discharge is also an option in the intervention hospital, but nurse/midwife home visits are not.

In Finland maternity care is provided by a network of public maternity clinics and public hospitals that specialize in obstetric care. In 2007 a total of 58,025 children were born in Finland. The country's total fertility rate (1.8 in 2007) is one of the highest in Europe, while the perinatal mortality rate (4.8 deaths per 1000 births) is among the lowest in the world. In 2008 the average duration of hospital stays after childbirth was 3.2 days (National Institute for Health and Welfare 2008). A large proportion of parents in Finland have a high level of education, and all families have access to comprehensive social security benefits, including health care, parental leave and child benefits. The rate of

mothers' postnatal depression is estimated at around 10-15% (Tammentie et al. 2004a, b). At the beginning of 2007 almost 80% of the population reported using the internet. In the age group under 40, the figure was close to 100% in all regions across the country (Statistics Finland 2007).

4.3 Participants

The data were collected with a convenience sample of mothers and/or fathers or mothers' partners (N=2,600 families). The inclusion criteria were: a primiparous or multiparous parent, and at least one parent in the family willing to participate. The exclusion criteria were: multiple births, not able to understand Finnish and early discharge parents receiving support at home by nursing professionals. The sample size was determined using power analysis (Cohen 1988). In cohort I, power analysis showed that a sample size of 300 would achieve 81% power to detect a R-squared of 0.05 attributed to 8 independent variables using an F-test with a significance level of 0.05. In cohort II, a power analysis was performed using a test variable of Parenting satisfaction with means of 7.9 (mothers) and 7.8 (fathers). Thus the desired difference was 0.1. Equal group sizes and equal variances (SD 0.64) were assumed. The level of alpha was set at 0.05, and power was 0.80. In addition, the response rate was assumed to be 60%. With these assumptions, a sample size of N=1,300 families was planned.

4.4 Data collection

Baseline study (Articles I-III)

The baseline data (N=1,300) in cohort I were collected between October 2006 and April 2007. A total of 4,779 mothers gave birth in the target hospitals during data collection (Figure 1). Eligible parents were informed about the study one day before discharge from the maternity ward. Participants were asked to complete a structured questionnaire at the hospital or no later than one week after discharge. Each participant was advised to answer the questionnaire independently. A total of 961 mothers and 580 fathers agreed to participate. In the end 1,388 questionnaires were returned by 863 mothers (66%) and 525 fathers (40%): 469 mothers and 307 fathers in the intervention hospital, and 394 mothers and 218 fathers in the control hospital. The number of couples was 487; in addition, 38 fathers and 376 mothers participated without their partners.

Follow-up study (Article IV)

The follow-up data (N=1,300) in cohort II were collected between August 2007 and April 2008. A total of 8,827 mothers gave birth in the target hospitals during that period.

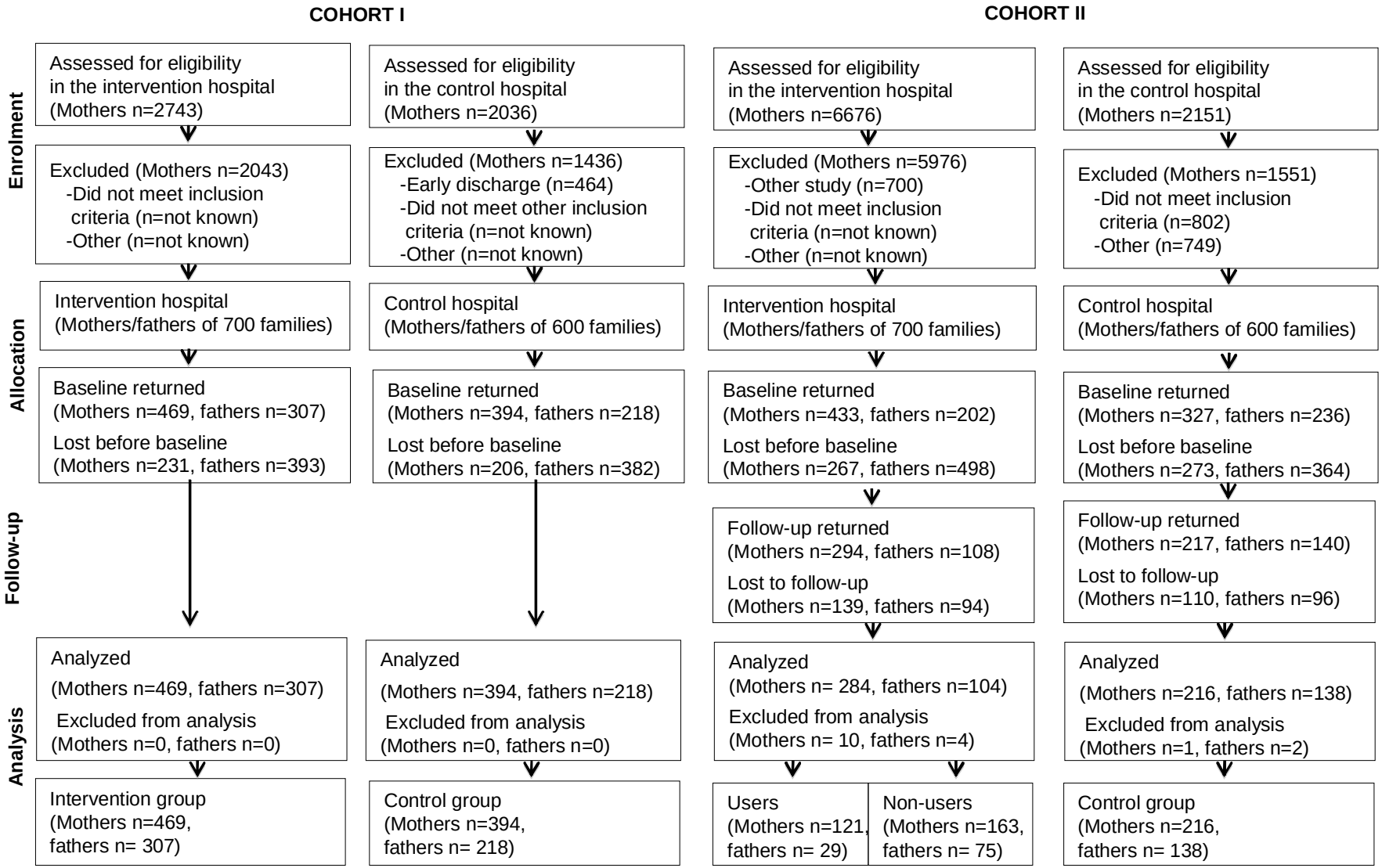

Figure 1. Flow diagram of enrolment, allocation, follow-up and analysis of cohort I and cohort II data

A registered midwife recruited intervention parents when parents visited the maternity hospital for an ultrasound screening during 18-21 gestational weeks. Control parents were recruited by nursing professionals during the postpartum in-patient stay. All participants were asked to complete the first questionnaire independently at the maternity hospital or no later than one week after discharge. After childbirth, a total of 1,196 questionnaires were returned by 760 mothers (58%) and 436 fathers (34%): 433 mothers and 202 fathers in the intervention hospital, and 327 mothers and 236 fathers in the control hospital. The follow-up questionnaires including pre-paid postage envelopes were sent home six weeks postpartum to those participants who completed the questionnaire after childbirth. Completed six-to-eight week follow-up questionnaires were returned by 500 mothers (66%) and 242 fathers (56%): 284 mothers and 104 fathers in the intervention hospital, and 216 mothers and 138 fathers in the control hospital.

4.5 Description of the internet-based intervention

The intervention was designed to strengthen parenting satisfaction and parenting self-efficacy by offering online support for parenting, infant care and breastfeeding. The internet-based intervention consisted of three major components: 1) an information database, 2) an online peer discussion forum, and 3) a questions/answers service. In addition, it included training for nurses and midwives so that they could use the online answering service. In addition, the nurses and midwives answering parents' questions took part in a training programme developed on the basis of social constructionism, open dialogue and a reflective process. The content of the internet resource was based on tacit knowledge, previous research, cohort I study, and the nationwide infant care recommendations issued by the Finnish Ministry of Social Affairs and Health (Finnish Ministry of Social Affairs and Health 2004; Hasunen et al. 2004). Intervention parents were able to register with the internet resource using individual user names and passwords beginning from midway through pregnancy. During their pregnancy, intervention parents had access to the information database and peer discussion forum. In addition, parents were able to contact a registered nurse or midwife to ask anonymous questions online for two weeks postpartum. These services complement the care and guidance given at the intervention hospital after childbirth. Parents were encouraged to use the internet resource based on their individual needs. The internet resource was pilot tested with parents (Hannula et al. 2010). (Article I.)

4.6 Instruments

Parenting satisfaction and parenting self-efficacy were used as the dependent variables. Independent variables included several parent, infant and environmental attributes. Both dependent and independent variables, including the number of items, scales, scoring technique used and the instruments used during both cohort I and II data collection, are listed in Table 2. All instruments except PSE and parental perception of infant had been

previously validated and had shown good internal consistency reliability. In addition, all instruments were pilot-tested with doctoral-level maternity care professionals (N=7) and infants' parents (N=70 families; response rate for mothers 71% and fathers 55%) in a university hospital setting.

4.6.1 Parenting satisfaction instrument

Parenting satisfaction was assessed with the Evaluation subscale (11 items) of the revised What Being the Parent of a New Baby is Like instrument (WPBL-R, Pridham & Chang 1989). This study was the first time that the WBPL-R instrument was used among Finnish parents. Therefore, it was translated into Finnish using the back translation technique, that is, the instrument was translated into Finnish and then back into English in order to ascertain the adequacy of the translation (Polit & Beck 2006).

4.6.2 Parenting self-efficacy instrument

The parenting self-efficacy instrument was specially developed for this research. The PSE instrument was based on Bandura's (1997) self-efficacy theory, previous research (e.g. Brazelton & Cramer 1990, Brazelton & Sparrow 2006), national infant care recommendations (Finnish Ministry of Social Affairs and Health 2004) and tacit knowledge. The PSE is composed of three dimensions: level, strength and generality (Bandura 1997). All items were worded positively as recommended by Bandura (1997). The items reflect day-to-day infant care tasks as well as interactive behaviours (Barnard 1989). In this study, level refers to task difficulty, strength to the person's degree of confidence and generality to the modalities in which different tasks are expressed. Factor analysis was performed to test the selected three modalities. The results supported the use of the affective, cognitive and behavioural skills related to PSE (Article III).

4.6.3 Parent, infant and environmental attributes

Parent attributes

The parent attributes were age, parity, education, marital status and delivery type. Self-concept was evaluated using an instrument developed by Saari and Majander (1985). The self-concept instrument measures the individual's level of self-esteem. Depressive symptoms were measured using the Edinburgh Postnatal Depression Scale (EPDS; Cox et al. 1987, 1993). Individual scores for self-concept and depressive symptoms (EPDS) were calculated by summing the scores for all items in the instrument. Cox et al. (1993) recommend an EPDS score of 13 or more as a cut-off point for depressive symptoms; therefore, it was also used as a cut-off point in this study. Attitude towards parenthood during pregnancy evaluated whether the parent was feeling afraid, concerned, insecure, relaxed or confident about their imminent parenthood. In addition, the respondents rated

their experience of childbirth in terms of how pleasant, painful, frightening, demanding, enjoyable, "as expected" and "under control" the delivery was (Tarkka et al. 2000). Life change and infant centrality were measured with the subscales of the What Being the Parent of a New Baby is Like-Revised (the WBPL-R; Pridham & Chang 1989). Parent's state of mind on discharge was measured with an instrument measuring whether the parent was fearful, strained, tired and saddened (Tarkka et al. 2000). Computer skills, computer use in general and use of the internet-based intervention were evaluated among the parents in cohort II. (Table 2.)

Table 2. List of variables including number of items, scales, scoring technique and use of instruments in different cohorts

Variables	Items	Scale	Score	Cohort
Dependent variables				
Parenting satisfaction, WBPL-R	11	9-point Osgood scale	M, 1-9$^{\uparrow}$	I, II
Parenting self-efficacy, PSE	27	From 1="strongly disagree" to 6="strongly agree"	M, 1-6$^{\uparrow}$	I, II
Cognitive skills	11			
Affective skills	7			
Behavioural skills	9			
Independent variables				
Parent attributes				
Age, parity, education, marital status, delivery type	5	Scale/ Ordinal/ Nominal	-	I, II
Self-concept	10	5-point Likert scale	S, 10-50$^{\uparrow}$	I
Depressive symptoms, EPDS	10	From 0 to 3 according to severity of symptoms	S, 0-30$^{\downarrow}$	I, II
Parenting attitude during pregnancy	1	Ordinal	-	I
Experience of childbirth	8	5-point Osgood scale	M, 1-5$^{\uparrow}$	I
Centrality, WBPL-R	8	9-point Osgood scale	M, 1-9$^{\uparrow}$	I
Life change, WBPL-R	6	9-point Osgood scale	M, 1-9	I
State of mind on hospital discharge	4	5-point Osgood scale	M, 1-5$^{\uparrow}$	I
Computer use, computer skills, intervention use	4	Scale/ Ordinal/ Nominal	-	II
Infant attributes				
Gestational weeks, birth weight, gender	3	Scale/ Nominal	-	I, II
Current age, health	2	Scale/ Nominal	-	I
Perception of infant	9	5-point Osgood scale	M, 1-5$^{\uparrow}$	I
Environmental attributes				
Family functioning, FAFHES	21	From 1="strongly disagree" to 6="strongly agree"	M, 1-6$^{\uparrow}$	I
Family health, FAFHES	21			
Social support from nursing professionals, FAFHES	21	From 1="no support at all"to 6="a great deal of support", 0="no need for support"	M, 0-6$^{\uparrow}$	I, II
Advice	8	5-point Likert scale	M, 1-5$^{\uparrow}$	I
Rooming-in, father present, feeding practices	3	Nominal	-	I

WBPL-R, What Being the Parent of a New Baby is Like-Revised; EPDS, Edinburgh Postnatal Depression Scale; FAFHES, Family Functioning, Health and Social Support; S, Sum of scores; M, mean score of all items; $^{\uparrow}$The higher the better; $^{\downarrow}$The lower the better

Infant attributes

The infant attributes were gestational weeks, birth weight, current age and gender (Table 2). Parents' perception of the infant was measured with an instrument specially developed for this study. Perceptions measured included those of eating, sleeping, contentment, activity level, clarity of cues, adaptability, soothability and general perception of the child's health and how demanding the infant is. An open-ended question evaluated the infant's health problems. For analysis, the responses were divided into two categories: no problems or any kind of health problem. (Table 2.)

Environmental attributes

The environmental attributes were family functioning, family health and social support, which were evaluated with subscales of the Family Functioning, Health and Social Support instrument (FAFHES, Åstedt-Kurki et al. 2002, 2009). Family functioning includes variables related to structural characteristics of the family, family relationships, relationships outside the family, family resources, and risk factors (Paavilainen 1998). Family health as an everyday experience consists of values, knowledge, activities, well-being and ill being (Åstedt-Kurki 1992). Social support from nursing professionals consisted of three modes of support: affect, affirmation and concrete aid (Kahn 1979; Tarkka et al. 2000). Advice from nursing professionals was measured with a variable in which the respondents were asked to evaluate whether the advice was adequate, accurate, encouraging, understandable, individual, consistent with previous knowledge, consistent among ward personnel and whether both parents were acknowledged (Tarkka et al. 2000). The practice of rooming-in, father's presence on the maternity ward and infant's feeding practices were also evaluated. (Table 2.)

4.7 Data analysis

The data were analysed using SPSS 16.0 software (SPSS, Inc., Chicago, IL, USA). Descriptive statistics included frequencies, percentages, means, standard deviation and range. Comparisons were made between the scores for mothers and fathers in the intervention and control hospital. Statistical significance in comparisons of the parents in the target hospitals was determined by chi-square or Fisher's exact test for percentages and one-way ANOVA test for means (Polit & Beck 2004; Burns & Grove 2005). In comparisons of mothers and fathers, statistical significances were determined by GEE models (Generalized Estimating Equations, Liang & Zeger 1986; Zeger & Liang 1986) for means. Correlations were determined by Pearson's or Spearman's correlation coefficients (Munro 2005; Burns & Grove 2005).

Multiple regression analysis (Gillis & Jackson 2002; Munro 2005) was used to determine the effect (R square) of the most and the least significant infant, parent and environmental attributes as well as their combined effect. The most significant attributes included in the models had p-values of 0.01 or below in all groups of parents. Attributes

that did not fulfil this criterion were called “the least significant“ attributes and they were included in the other models. In regression analysis categorical variables were treated as fixed factors. In all regression models multicollinearity was weak. In the models, tolerances were between .447 and .963. The variance inflation factors ranged from 1.038 to 2.236. Factor analysis for the PSE instrument was performed using maximum likelihood as an extraction method (Munro 2005; Burns & Grove 2005), rotation was Varimax with Kaiser normalization. The internal consistency reliability of the instruments was measured using item analysis and Cronbach’s alpha (Polit & Beck 2006). During cohort I and cohort II data collection all instruments reached alpha values of 0.66 or higher (Table 3).

Effectiveness was evaluated by comparing different groups of mothers and different groups of fathers in the intervention and control hospital. In addition, intervention parents were divided into two categories (Users/Non-users) based on intervention use. P-values of change during the postpartum period were determined by Paired Samples Test (within-group comparisons). P-values in multiple comparisons between Users, Non-users and the Control group were determined using Tukey’s HSD test.

Table 3. Internal consistency reliability of instrument variables

	Cronbach’s alpha					
	COHORT I		**COHORT II**			
	After childbirth		**After Childbirth**		**Six-to-eight Weeks**	
Variables	**Mother**	**Father**	**Mother**	**Father**	**Mother**	**Father**
Parenting satisfaction	0.88	0.85	0.89	0.89	0.91	0.91
Parenting self-efficacy	0.96	0.95	0.96	0.95	0.95	0.95
Cognitive	0.91	0.88	0.91	0.90	0.87	0.88
Affective	0.92	0.90	0.91	0.91	0.89	0.89
Behavioural	0.93	0.90	0.92	0.90	0.89	0.86
Self-concept	0.81	0.76	N/A	N/A	N/A	N/A
Depressive symptoms	0.84	0.78	0.83	0.76	N/A	N/A
Centrality	0.67	0.68	N/A	N/A	N/A	N/A
Life change	0.69	0.69	N/A	N/A	N/A	N/A
Experience of childbirth	0.84	0.79	N/A	N/A	N/A	N/A
State of mind on discharge	0.69	0.66	N/A	N/A	N/A	N/A
Family functioning	0.91	0.89	N/A	N/A	N/A	N/A
Family health	0.77	0.78	N/A	N/A	N/A	N/A
Social support from nursing professionals	0.92	0.96	0.91	0.96	N/A	N/A
Advice from professionals	0.86	0.87	N/A	N/A	N/A	N/A

N/A, not applicable

4.8 Ethical considerations

Ethical considerations should cover the whole research process starting from the choice of research topic and extending to the publication of the results (Burns & Grove 2005). In this study, the basic principles of research ethics were followed throughout the research process (ETENE 2001; The World Medical Association's Declaration Helsinki 2004; European Commission 2007; Eriksson et al. 2008).

The choice of infants' parents as the target group and an internet-based intervention as the main intervention tool for this research was based on the evidence from previous research that infants' parents often feel overwhelmed and that the provision of social support would benefit from the use of information technology. (e.g. Nyström & Öhrling 2004; Magill-Evans et al. 2006). Infants' parents are considered a vulnerable group immediately after childbirth. Therefore, sample size was calculated using power analysis to ensure that the minimum necessary number of parents were burdened with the questionnaire during this sensitive period. The data were collected immediately before discharge so that parents would be able to concentrate without unnecessary distractions on their infant, and they would also feel free to give their honest opinions without being afraid that their answers might affect their care. The participants could also return their questionnaires after discharge if they preferred to.

This study was approved by the Research Ethics Committees of the hospitals concerned (Statement 153/2006, Dnro 243/E9/06; R06176H). Permission to collect the data was obtained from the nursing/medical directors in the target hospitals. Potential participants received written and oral information about the study and the principles of voluntary participation. They were able to contact the researcher if they had any further questions and to abstain from participation without giving a reason. All participants signed consent forms, and they were able to withdraw from the study at any stage. Both parents in the family were advised to participate independently, and each participant returned their questionnaire in a sealed envelope. Permission to use the instruments was obtained from the copyright holders. The data were treated and reported confidentially. In addition, the results were reported openly and honestly.

The quality criteria defined by eEurope (2002) were observed to increase the reliability and credibility of the content produced for the internet resource and to ensure good ethical practice. The internet-based intervention complemented the usual care given, and intervention parents were able to use the intervention based on their individual needs.

5. Results

5.1 Respondents

A total of 1,633 mothers and 961 fathers participated in this study. The mean age for cohort I mothers was 30.2 years (SD 5.1, range 17-47) and cohort II mothers 30.6 years (SD 4.6, range 18-44). Intervention mothers were statistically significantly older than control mothers in both cohorts. The corresponding figures for fathers were 31.9 (SD 5.6, range 18-62) and 31.7 (SD 5.1, range 20-55). Mothers and fathers were highly educated, with more than half having a college or academic degree. However, intervention mothers were statistically significantly higher educated than their controls. Intervention fathers had a higher education than control fathers as well, but the difference was statistically significant only in cohort I. Almost all mothers and fathers lived with a partner. The most common type of delivery was vaginal or instrumental delivery. The mean scores for postnatal depressive symptoms were 6.7 (SD 4.4, range 0-25) among cohort I and 6.4 (SD 4.2, range 0-24) among cohort II mothers. The corresponding scores for fathers were 3.3 (SD 3.1, range 0-20) in cohort I and 3.3 (SD 3.0, range 0-17) in cohort II. Depressive symptoms (EPDS score ≥13) occurred among 10.4% of cohort I and among 7.5% of cohort II mothers; and among 1.9% of cohort I and 1.1% of cohort II fathers. The total number of children varied from 1-8 in both cohorts of parents. The majority of respondents were first-timers, and intervention parents in cohort II were first-timers statistically significantly more often than their controls. (Table 4, Articles I-IV.)

More than half of cohort I mothers had a male infant, but cohort II intervention mothers had male infants significantly more often than their controls. In cohort I, infant birth weight ranged from 590 to 5,150 grammes and gestational age from 25.0 to 43.0 weeks. The corresponding figures for cohort II were 1,135 to 5,380 grammes and 27.4 to 43.0 gestational weeks. Among cohort I fathers, infant birth weight ranged from 590 to 4,730 grammes and gestational weeks from 25.0 to 43.0. The corresponding figures for cohort II fathers were 1,585 to 4,950 grammes and from 30.0 to 43.0 gestational weeks. There were no statistically significant differences between intervention and control parents in marital status, type of delivery, depressive symptoms, infant gender or birth weight.

Perceptions of social support from nursing professionals during the postpartum in-patient stay did not differ between intervention and control mothers. Intervention fathers' perceptions of social support during the in-patient stay were statistically significantly higher than control fathers' perceptions in both cohorts. However in cohort II intervention users and intervention non-users were better comparable than intervention group users and control parents. Intervention use ranged from 0 to 6.0 hours per week among mothers and from 0 to 5.0 hours per week among fathers. (Article IV.)

Table 4. Characteristics of mothers (N=1,633) and fathers (N=961) participating in the study

	COHORT I (2006-2007)						COHORT II (2007-2008)						
	MOTHERS			FATHERS			MOTHERS			FATHERS			National
Variables	Inter (n=469)	Ctrl (n=394)	P	Inter (n=307)	Ctrl (n=218)	P	Inter (n=443)	Ctrl (n=327)	P	Inter (n=202)	Ctrl (n=234)	P	statistics 2007*
Age	30.7 (5.0)	29.8 (5.2)	.006	32.0 (5.8)	31.8 (5.3)	.616	30.9 (4.4)	30.1 (4.7)	.015	31.8 (4.9)	31.7 (5.3)	.885	30.0
Education (%)			.007			.022			.000			.059	
≤ Comprehensive	5.6	5.1		7.5	6.5		3.7	3.7		5.0	3.0		-
High school/vocational	27.4	36.3		33.6	34.7		19.7	31.5		25.7	36.8		-
College	31.4	32.7		23.5	33.8		31.1	36.4		27.7	27.4		-
Academic	35.7	25.9		35.5	25.0		45.5	28.4		41.6	32.9		-
Marital status (%)			.133			.152			.279			.388	
Married	63.5	56.9		66.4	58.3		69.0	64.2		72.3	67.5		59.3
Cohabitation	32.6	38.8		32.6	40.8		29.4	33.0		27.7	32.1		32.8
Other	3.8	4.3		1.0	0.9		1.6	2.8		0.0	0.4		7.9
Type of delivery (%)			.777			.359			.323			.657	
Vaginal	74.4	75.6		71.1	74.2		67.1	70.8		67.2	70.4		74.9
Instrumental	9.4	9.9		11.5	12.9		14.4	10.8		13.9	11.2		8.6
C-section	16.2	14.5		17.4	12.9		17.2	18.5		18.9	18.5		16.5
Depressive symptoms	6.6 (4.2)	6.9 (4.5)	.236	3.3 (2.9)	3.3 (3.4)	.873	6.2 (4.2)	6.6 (4.2)	.264	3.5 (3.1)	3.2 (2.9)	.351	-
≥ 13 score (%)	9.0	12.2	.146	1.3	2.8	.332	7.9	7.0	.781	2.0	0.4	.187	-
Parity	1.7 (0.9)	1.7 (0.9)	.795	1.5 (0.8)	1.5 (0.8)	.795	1.5 (0.8)	1.7 (0.9)	.005	1.3 (0.6)	1.6 (0.9)	.001	58.0
First-timers (%)	55.4	53.6	.584	64.7	65.0	.949	62.9	54.2	.017	72.5	57.8	.002	1.8
Infant gender (%)			.338			.131			.040			.067	
Boys	50.3	53.7		49.8	56.9		50.8	43.3		50.5	41.6		51.3
Birth weight	3559.0 (505.9)	3484.8 (556.0)	.041	3537.6 (483.5)	3521.8 (479.2)	.712	3493.1 (520.6)	3512.7 (515.2)	.606	3509.6 (486.7)	3470.8 (479.2)	.404	3492
Gestational age	39.9 (1.6)	39.5 (2.0)	.001	39.9 (1.5)	39.7 (1.8)	.151	39.9 (1.7)	39.7 (1.7)	.097	39.9 (1.7)	39.7 (1.6)	.175	-
<37 weeks (%)	3.0	5.9	.043	2.6	4.2	.331	4.4	5.2	.608	4.0	4.4	.999	5.7
Social support	3.6 (1.0)	3.6 (0.9)	.999	3.7 (1.2)	3.2 (1.3)	.000	3.7 (0.9)	3.6 (0.9)	.226	3.8 (1.1)	2.8 (1.4)	.000	-

Numbers are mean (SD) unless otherwise stated; intervention (Inter) is a comparison for the control parents (Ctrl); significance (p) is determined by Chi-Square or Fisher's exact test for percentages and One Way ANOVA for means; *National Institute for Health and Welfare (2008)

5.2 Parenting satisfaction and parenting self-efficacy after childbirth

Parenting satisfaction after childbirth (Article III)

All groups of parents scored highly on parenting satisfaction after childbirth. Both intervention and control mothers scored higher than fathers on parenting satisfaction. The differences between mothers and fathers were statistically significant in both hospitals (Table 5).

Table 5. Mothers' and fathers' parenting satisfaction and parenting self-efficacy after childbirth

	Mean (SD)	p
PARENTING SATISFACTION		
Intervention mothers (n=469)	7.9 (0.7)	0.004
Intervention fathers (n=307)	7.8 (0.7)	
Control mothers (n=394)	7.9 (0.7)	≤0.001
Control fathers (n=218)	7.6 (0.8)	
PARENTING SELF-EFFICACY (total)		
Intervention mothers (n=469)	5.0 (0.6)	≤0.001
Intervention fathers (n=307)	4.7 (0.6)	
Control mothers (n=394)	4.9 (0.6)	≤0.001
Control fathers (n=218)	4.6 (0.6)	
Cognitive skills related to PSE		
Intervention mothers (n=469)	5.1 (0.6)	≤0.001
Intervention fathers (n=307)	4.7 (0.6)	
Control mothers (n=394)	5.0 (0.6)	≤0.001
Control fathers (n=218)	4.6 (0.6)	
Affective skills related to PSE		
Intervention mothers (n=469)	4.6 (0.8)	≤0.001
Intervention fathers (n=307)	4.3 (0.7)	
Control mothers (n=394)	4.6 (0.8)	≤0.001
Control fathers (n=218)	4.3 (0.8)	
Behavioural skills related to PSE		
Intervention mothers (n=469)	5.2 (0.6)	≤0.001
Intervention fathers (n=307)	4.8 (0.6)	
Control mothers (n=394)	5.1 (0.6)	≤0.001
Control fathers (n=218)	4.7 (0.7)	

Parenting satisfaction, scale 1-9; Parenting self-efficacy (PSE), scale 1-6; The higher the total scores the better; Statistical significance (p) between mothers and fathers in the intervention hospital and mothers and fathers in the control hospital is determined by one-way ANOVA.

Parenting self-efficacy after childbirth (Article I-II)

Mothers scored statistically significantly higher than fathers on total PSE and cognitive, affective and behavioural skills related to PSE (Table 5). Intervention fathers experienced the lowest cognitive self-efficacy related to infant's nutritional recommendations, normal development and infant's cues and behaviour. Both mothers' and fathers' evaluations were lowest for their affective skills related to PSE. Individual statements measuring PSE indicate that in the intervention group both parents experienced the lowest self-efficacy related to infant's daily rhythm and sleep, and the lowest sensitivity to infant's cues and behaviour. Evaluations of behavioural skills were the highest. However, fathers experienced low self-efficacy in such areas as how to comfort the infant to sleep, how to take account of the infant's states of consciousness and how to console a crying infant.

5.3 Factors contributing to parenting satisfaction and parenting self-efficacy after childbirth

Most significant factors contributing to parenting satisfaction (Article III)

Self-concept, depressive symptoms, infant centrality and parent's state of mind on discharge were the most significant ($p \leq 0.001$) parent attributes contributing to mothers' and fathers' parenting satisfaction. Positive parenting attitude during pregnancy was a significant ($p \leq 0.001$) predictor of higher parenting satisfaction among mothers. The combined effect of self-concept, depressive symptoms, infant centrality and parent's state of mind on discharge explained 34-45% of the variation in mothers' and 34-36% of the variation in fathers' parenting satisfaction. Among infant attributes, parent's positive perceptions of the infant correlated significantly with both parents' satisfaction. In fact, perception of the infant explained 20-28% of the variation in mothers' and 13-21% of the variation in fathers' parenting satisfaction. (Figure 2.)

Family functioning, family health and advice from nursing professionals were perceived as the most significant ($p \leq 0.001$) environmental attributes. Together, these attributes explained 19-29% of the variation in mothers' and 25-36% of the variation in fathers' satisfaction. The combined effect of the most significant parent (self-concept, depressive symptoms, infant centrality, state of mind on discharge), infant (perception of infant) and environmental attributes (family functioning, family health, advice from nursing professionals) explained 42-52% of the variation in mothers' and 47-48% of the variation in fathers' satisfaction.

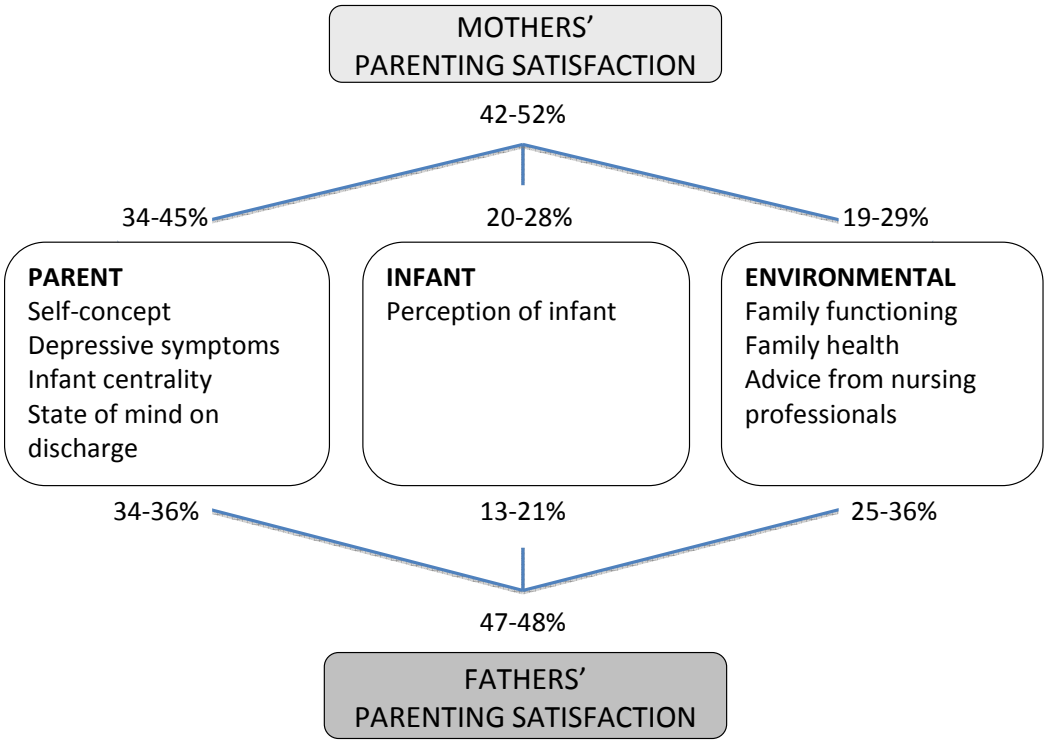

Figure 2. Most significant explanatory factors for variation in mothers' (N=863) and fathers' (N=525) parenting satisfaction

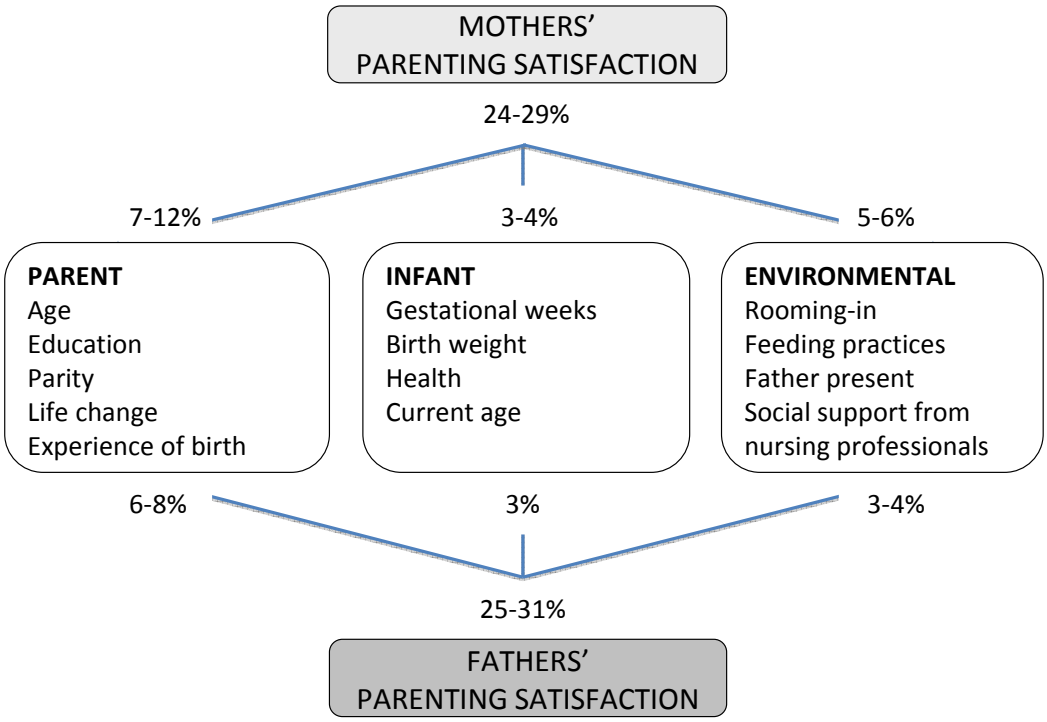

Figure 3. Least significant explanatory factors for variation in mothers' (N=863) and fathers' (N=525) parenting satisfaction

Least significant factors contributing to parenting satisfaction (Article III)

Age did not correlate significantly with parenting satisfaction, but life change did show a significant correlation among control mothers ($p \leq 0.001$). Higher education had a negative effect, but significant ($p \leq 0.01$) differences were only seen among control mothers and intervention fathers. Marital status did not significantly contribute to parenting satisfaction. Mothers' parity predicted significantly ($p \leq 0.05$) higher parenting satisfaction. In addition, a positive experience of birth contributed significantly both to mothers' ($p \leq 0.05$) and fathers' ($p \leq 0.01$) parenting satisfaction. Life change had a significant ($p \leq 0.001$) negative effect only among control mothers.

The combined effect of age, education, parity, life change and experience of childbirth explained 7-12% of the variation in mothers' and 6-8% of the variation in fathers' satisfaction. Gestational weeks, birth weight and current age did not show a significant correlation with parenting satisfaction. Infant gender did not have a significant influence either, but infant health problems were accociated with lower satisfaction scores. However, significant differences ($p \leq 0.01$) only occurred among intervention fathers and control mothers. The combined effect of gestational weeks, birth weight, infant health and current age explained 3-4% of the variation in mothers' and 3% of the variation in fathers' parenting satisfaction. (Figure 3.)

Type of delivery, different practices of rooming-in and father's presence at the maternity unit did not contribute significantly to parenting satisfaction, except for rooming-in among intervention mothers. Mothers who relied exclusively on breastfeeding were the most satisfied, but significant differences were only seen among control mothers ($p \leq 0.01$). Social support from maternity unit nursing professionals did not show a significant correlation with parenting satisfaction. Social support, rooming-in, feeding practices and father's presence together explained 5-6% of the variation in mothers' and 3-4% of the variation in fathers' parenting satisfaction. The combined effect of the least significant parent attributes (age, education, parity, life change, experience of birth), infant attributes (gestational weeks, birth weight, health, current age) and environmental attributes (rooming-in, feeding practices, father present at the maternity unit, social support from nursing professionals) explained 24-29% of the variation in mothers' and 25-31% of the variation in fathers' parenting satisfaction.

Most significant factors contributing to parenting self-efficacy (Article II)

Self-concept, parity, depressive symptoms and parent's state of mind on discharge were the most significant parent attributes contributing to both mothers' and fathers' PSE. A relaxed or confident parenting attitude during pregnancy predicted significantly ($p \leq 0.001$) higher PSE in all groups of parents except control fathers. Experiences of childbirth ($p \leq 0.01$) and life change ($p \leq 0.05$) correlated significantly with mothers' and control fathers', but not with intervention fathers' PSE. The combined effect of self-concept, parity, depressive symptoms and parent's state of mind on discharge explained 34-43% of the variation in mothers' and 24-29% of the variation in fathers' PSE. (Figure 4, Appendix 3.)

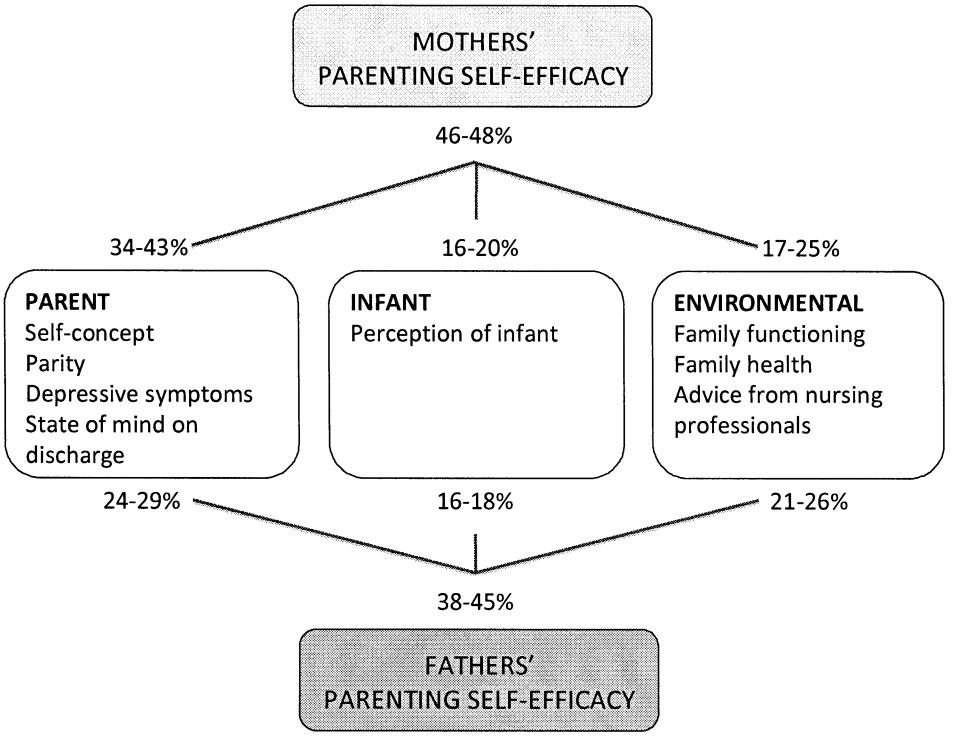

Figure 4. Most significant explanatory factors for variation in mothers' (N=863) and fathers' (N=525) parenting self-efficacy

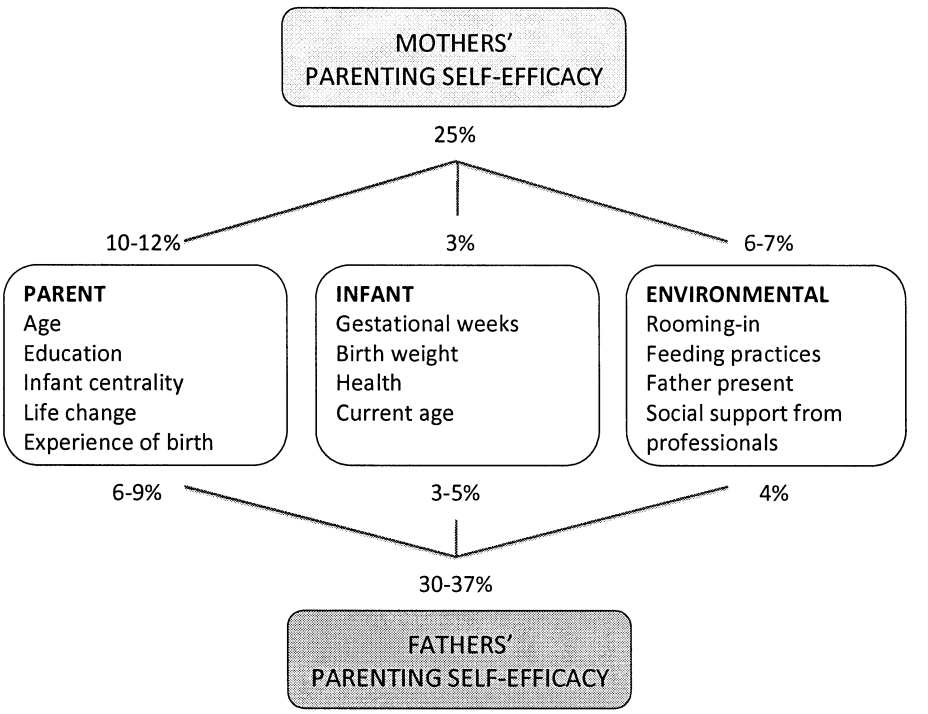

Figure 5. Least significant explanatory factors for variation in mothers' (N=863) and fathers' (N=525) parenting self-efficacy

Parents' perceptions of the infant correlated significantly with PSE, explaining 16-20% of the variation in mothers' and 16-18% of the variation in fathers' PSE. Infant gender did not have a significant influence. Family functioning, family health and advice from ward nursing professionals were major contributory factors. Their combined effect explained 17-25% of mothers' and 21-26% of fathers' PSE. The combined effect of the most significant parent (self-concept, parity, depressive symptoms, state of mind on discharge), infant (perception of infant) and environmental attributes (family functioning, family health, advice from nursing professionals) explained 46-48% of the variation in mothers' and 38-45% of the variation in fathers' satisfaction.

Least significant factors contributing to parenting self-efficacy (Article II)

Age, marital status and infant centrality did not have a clear effect on PSE. Academic parents had the lowest PSE scores. However, significant differences were seen only among intervention parents. The combined effect of age, education, infant centrality, life change and experience of childbirth explained 10-12% of the variation in mothers' and 6-9% of the variation in fathers' PSE. Infant health problems were accociated with lower PSE scores in all groups except control fathers. Gestational weeks, birth weight, health and current age did not show a strong correlation with PSE, even though there were significant differences. The combined effect of these four attributes explained 3% of the variation in mothers' and 3-5% of the variation in fathers' PSE. (Figure 5, Appendix 4.)

Type of delivery, different practices of rooming-in and father's presence at the maternity unit did not have a significant influence, with the exception of rooming-in among control mothers and father's presence among intervention mothers. Exclusive breastfeeding was associated with the highest PSE scores among mothers. Feeding practices did not have a significant influence on fathers' PSE. Social support from nursing professionals did not have a significant influence. The combined effect of rooming-in, feeding practices, father's presence at the maternity ward and social support from nursing professionals explained 6-7% of the variation in mothers' and 4% of the variation in fathers' PSE. The combined effect of the least significant parent attributes (parental age, education, infant centrality, life change, experience of birth), infant attributes (gestational weeks, birth weight, health, current age) and environmental attributes (rooming-in, feeding practices, father present, social support from nursing professionals) explained 25% of the variation in mothers' and 30-37% of the variation in fathers' parenting satisfaction.

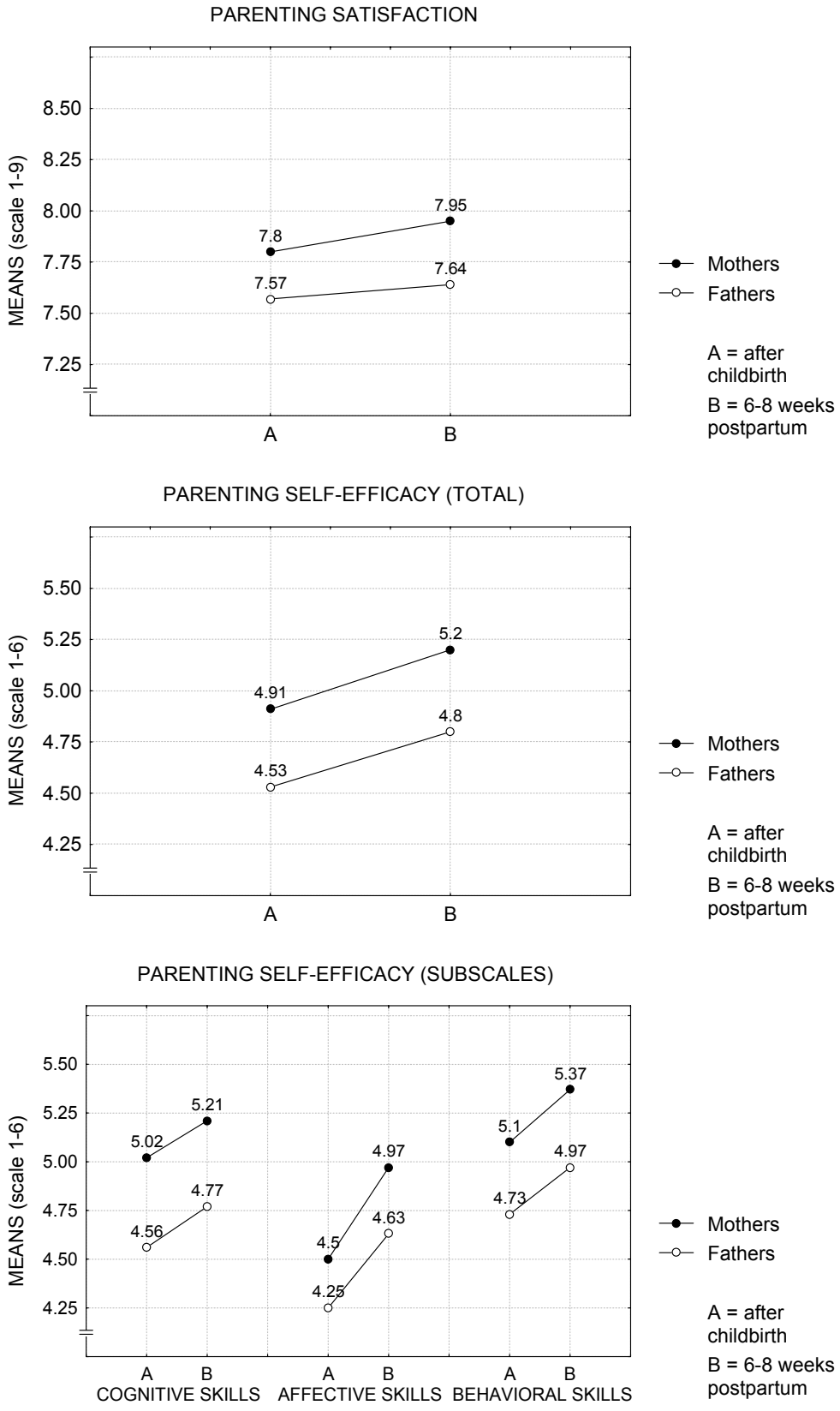

Figure 6. Mothers' (N=500) and fathers' (N=242) parenting satisfaction and parenting self-efficacy during the postpartum period

5.4 Changes in parenting satisfaction and parenting self-efficacy during the postpartum period

Changes in parenting satisfaction (Article IV)

Mothers scored significantly (p=0.000) higher on parenting satisfaction at six to eight weeks postpartum than after childbirth (Mean 7.80, SD 0.7 vs. Mean 7.95, SD 0.8). Fathers' scores were also higher at six to eight weeks postpartum (Mean 7.57, SD 0.8 vs. Mean 7.64, SD 0.9), but this difference was not statistically significant (p=0.155). There was no statistically significant difference in the magnitude of change between mothers and fathers during this period. (Figure 6.)

Changes in parenting self-efficacy (Article IV)

Both mothers (Mean 4.91, SD 0.6 vs. Mean 5.20, SD 0.5) and fathers (Mean 4.53, SD 0.6 vs. Mean 4.80, SD 0.6) scored higher on PSE at six to eight weeks postpartum than after childbirth. However, there was no statistically significant difference in the magnitude of change between mothers' and fathers' total scores for PSE during this period.

Mothers scored systematically higher than fathers on all cognitive, affective and behavioural skills related PSE. Both mothers' and fathers' PSE scores were the highest related to behavioural skills and the lowest related to affective skills after childbirth. Mothers' scores for cognitive (Mean 5.02, SD 0.6 vs. Mean 5.21, SD 0.5), affective (Mean 4.50, SD 0.7 vs. Mean 4.97, SD 0.6) and behavioural (Mean 5.10, SD 0.6 vs. Mean 5.37, SD 0.5) skills related to PSE changed in a more positive direction during the postpartum period. Fathers' scores for all cognitive (Mean 4.56, SD 0.7 vs. Mean 4.77, SD 0.6), affective (Mean 4.25, SD 0.8 vs. Mean 4.63, SD 0.7) and behavioural (Mean 4.73, SD 0.6 vs. Mean 4.97, SD 0.6) skills related to PSE became more positive during the postpartum period. The change in mean scores was greatest for affective skills and smallest for cognitive skills among both parents. All changes in PSE scores during the postpartum period were statistically significant (p=0.000). However, there was no statistically significant difference in the magnitude of change between mothers and fathers. (Figure 6.)

5.5 Intervention effects on parenting satisfaction and parenting self-efficacy during the postpartum period

The effects of the intervention were evaluated by comparing intervention users, non-users and control parents. Mothers' mean parenting satisfaction scores after childbirth were 7.79 (SD 0.7) among intervention users, 7.80 (SD 0.7) among intervention non-users and 7.82 (SD 0.7) among control mothers. The corresponding figures for fathers were 7.51 (SD 0.8), 7.58 (SD 0.8) and 7.58 (SD 0.9). At six to eight weeks postpartum, intervention user

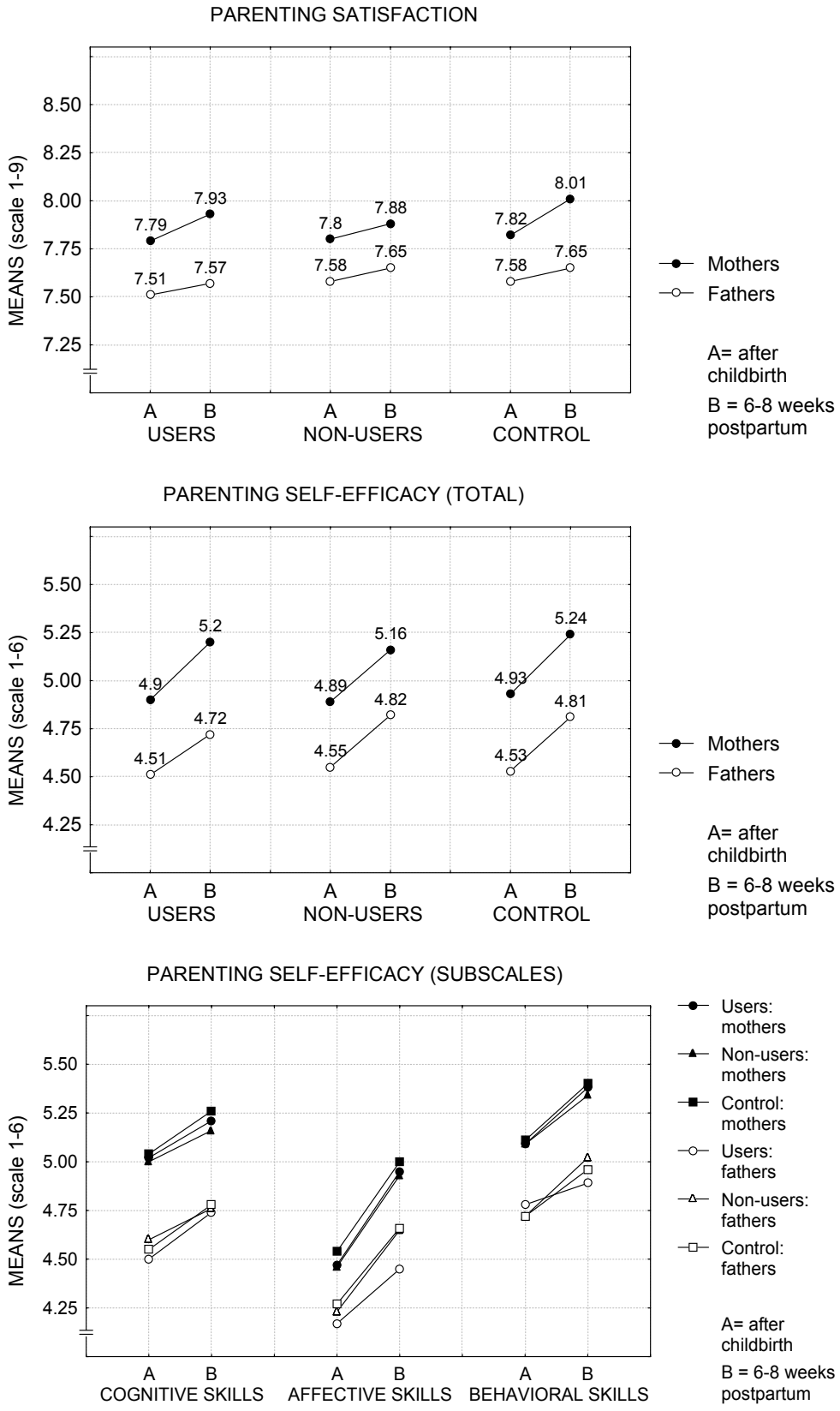

Figure 7. Change in different groups of mothers' (N=500) and fathers' (N=242) parenting satisfaction and parenting self-efficacy during the postpartum period

mothers' mean parenting satisfaction scores were 7.93 (SD 0.8), for non-users 7.88 (SD 0.8) and for control mothers 8.01 (SD 0.7). The figures for fathers were 7.57 (SD 0.6), 7.65 (SD 0.9) and 7.65 (SD 0.9), respectively. Mothers' mean PSE scores after childbirth were 4.90 (SD 0.6) among users, 4.89 (SD 0.6) among non-users and 4.93 (SD 0.6) among controls. The corresponding figures for fathers were 4.51 (SD 0.6), 4.55 (SD 0.6) and 4.53(SD 0.6). At six to eight weeks postpartum, mothers' mean PSE scores were 5.20 (SD 0.4) among users, 5.16 (SD 0.5) among non-users and 5.24 (SD 0.5) among controls. The corresponding PSE figures for fathers were 4.72 (SD 0.5) among users, 4.82 (SD 0.5) among non-users and 4.81 (SD 0.6) among controls. Changes in mothers' and fathers' parenting satisfaction and PSE scores during the puerperal period did not differ between the different groups of parents. When the three groups of parents were compared based on parity, no statistically significant differences were found between first-timers and experienced parents. (Figure 7, Article IV.)

5.6 Summary of the results

Mothers were significantly more satisfied than fathers with their parenting after childbirth. Self-concept, depressive symptoms, infant centrality, state of mind on discharge and perception of infant contributed significantly to both parents' parenting satisfaction. Parity and parenting attitude during pregnancy contributed significantly to mothers' parenting satisfaction, but the impact was not clear among fathers. Family functioning, family health and advice from nursing professionals were major contributory factors for parenting satisfaction among both parents. On the other hand, hospital practices and social support from nursing professionals did not correlate significantly with parenting satisfaction, but they had a fairly large effect size while combined with other attributes.

Mothers' parenting self-efficacy after childbirth was also systematically more positive than fathers'. Both mothers and fathers had a weaker assessment of their affective skills related to parenting self-efficacy than of their cognitive and behavioural skills. They felt they needed more support with infants' cues and behaviour and with their daily rhythm and sleep. Self-concept, depressive symptoms, parity, infant centrality, state of mind on discharge and perception of infant contributed significantly to both parents' parenting self-efficacy. Family functioning, family health and advice from nursing professionals were major contributory factors as well. Rooming-in, infants' feeding practices, fathers' overnight presence at the maternity hospital, and social support from nursing professionals did not show a clear correlation with either mothers' or fathers' parenting self-efficacy. These attributes had a significant effect size when combined with other attributes.

Mothers' and fathers' parenting satisfaction increased during the postpartum period, but the change was statistically significant only among mothers. However, both mothers' and fathers' parenting self-efficacy increased significantly during this period. Affective skills related to parenting self-efficacy were perceived as the weakest after childbirth, but on the other hand they improved the most during the postnatal period.

Different groups of mothers and different groups of fathers showed equally positive changes in their parenting satisfaction and parenting self-efficacy.

6. Discussion

6.1 Validity and reliability of the study

Comparative research designs are challenging in many ways (Polit & Beck 2006). The methodological challenges are even greater in connection with intervention research (Bradley et al. 1999; Medical Research Council 2000; Blackwood 2006; Polit & Beck 2006; Forbes 2009). The Consolidated Standards of Reporting Trials (CONSORT) group has issued a set of recommendations for designing, reporting and evaluating studies (Altman et al. 2001; Moher et al. 2001). The CONSORT and its extension can and should be used for designing and reporting any experimental study in nursing (Forbes 2009; Borglin & Richards 2010). The CONSORT extension describes four biases that pervade clinical research: selection bias, performance bias, attrition bias and detection bias (Zwarenstein et al. 2008; Borglin & Richards 2010). These biases are related to the data, the instruments and the research process.

6.1.1 Validity related to the data

Selection bias refers to differences between the groups being compared (Polit & Beck 2006; Zwarenstein et al. 2008; Borglin & Richards 2010). RCTs are considered as the method par excellence for the elimination of selection bias. In this study, hospital personnel were exposed to the intervention since it was developed on the basis of multi-professional collaboration at the intervention hospital. In addition, intervention parents were recruited during pregnancy and it was impossible to predict in advance on which wards they would be treated after childbirth. Therefore, randomization within the intervention hospital was not an option. Quasi-experimental studies are considered the second best choice after RCTs (Polit & Beck 2006). There are some limitations regarding the validity of the data collected in this research.

First, the respondents in the intervention group and control group were not entirely comparable. Control mothers were slightly younger and less educated than intervention mothers. Control fathers, too, had a lower educational level than intervention fathers. These differences can be explained by regional differences in Finland (National Institute for Health and Welfare 2008). On the other hand, figures released by Statistics Finland (2008) indicate that there are no regional differences in internet use. In cohort II, intervention parents were more often first-timers, they were more active internet users and had stronger computer skills than control parents. It is therefore possible that first-timers and active internet users were more willing to participate in the cohort II study. However, intervention users and non-users were well comparable in respect of all background

variables, which increases the reliability of the evaluation. The results also indicate that mothers used online parenting support more actively than fathers.

The second limitation is the low response rate of the study. Recommendations for acceptable response rates vary widely (Badger & Werrett 2005). Badger and Werrett (2005) recommend the use of 60% as a desirable response rate across all methodologies, because this figure reflects a consensus among several textbooks. On this basis the response rate achieved for mothers can be considered adequate. When the data collected for this research are compared with the national statistics for birthing women, it seems that the mothers here were quite representative of Finnish parturients in respect of age, marital status, parity and delivery type (National Institute for Health and Welfare 2008). However, although the target hospitals are large university hospitals that care for the sickest and smallest children in the country, the number of parents with premature babies was lower than the national average. The prevalence of postnatal depression has been estimated at around 10-15% for mothers (Tammentie et al. 2004) and 3% for fathers (Ramchandani et al. 2008). The postnatal depressive symptoms observed in these cohorts were therefore lower than anticipated.

The response rate was calculated from the total number of participating families, but not all fathers could be reached to be informed about the study. Nevertheless the response rate for father has to be regarded as low. Other researchers have also reported difficulties in recruiting fathers (e.g. Maguire et al. 2007; Feeley et al. 2008; Halme 2009). Altogether, this study produced valuable information on fathers' perceptions, since mothers have been very much overrepresented in parenting research (Gage et al. 2006; Magill-Evans et al. 2006) and in nursing research more generally (Polit & Beck 2008, 2009). Unfortunately, the target hospitals and national agencies do not compile statistics that could be used to reliably assess the representativeness of samples of fathers (National Institute for Health and Welfare 2008; Statistics Finland 2008). To increase the validity of this research, detailed information was included in the articles about the parents who took part.

Third, the attrition rate was quite high in this study. Attrition bias is controlled by ascertaining that there are no systematic differences in drop-out rates from different groups included in the comparison (Borglin & Richards 2010). In this study there were non-significant differences in drop-out rates from different groups. In addition, a flow diagram of the participants is presented as recommended by CONSORT (Altman et al. 2001; Moher et al. 2001; Zwarenstein et al. 2008). Only limited statistical data related to the enrolment process was available. In addition, the reasons for refusal and drop-out were not inquired. Therefore, the flow diagram mainly shows when the participants were lost: it does not answer the questions how and why. Fourth, the mothers and fathers who took part in the study came from widely different backgrounds. The results may well have been different had inexperienced and experienced parents been analyzed separately. The results can only be generalized to parents with similar backgrounds and receiving treatment in similar environments.

6.1.2 Validity and reliability of the instruments

Detection bias can be controlled by using appropriate and well validated instruments to assess the outcomes (Borglin & Richards 2010). In addition, the CONSORT group recommend defining primary and secondary outcome measures (Altman et al. 2001; Moher et al. 2001; Zwarenstein et al. 2008). In this study, parenting satisfaction was used as the primary outcome, and it was measured with a previously validated instrument (Pridham & Chang 1989). The instrument was translated into Finnish with a widely used translation technique (Polit & Beck 2006). The secondary outcome measure, PSE, was assessed using an instrument specially developed for this study. It was based on Bandura's theory (1997), previous research, national infant care recommendations and tacit knowledge. The factor analysis performed to evaluate construct validity supported the use of the selected theory base.

With the exception of parents' perception of the infant, the instruments used to measure parent, infant and environmental attributes had been previously validated. In addition, all instruments were pilot tested with an expert panel and parents. They were also used among cohort I parents before the actual outcome evaluation. The instruments used in measuring parenting satisfaction and PSE reached alpha values of 0.86 or higher, and therefore showed high internal consistency reliability (Gillis & Jackson 2002; Polit & Beck 2006). In addition, other instruments reached alpha values of 0.66 or higher, which can be considered an adequate level (LoBiondo-Wood & Haber 2010).

6.1.3 Validity related to the research process

Controlling performance bias, according to CONSORT, means that there are no systematic differences in care provided for different groups apart from the actual intervention under evaluation (Zwarenstein et al. 2008; Borglin & Richards 2010). The target hospitals differed from each other not only in terms of their location, but also hospital practices. There were significant differences in exclusive breastfeeding in favour of the intervention hospital, and postpartum hospital practices differed significantly with respect to fathers' possibilities to participate day and night. Mothers' evaluations of social support from nursing professionals during the postpartum in-patient stay did not differ between the groups, but both cohorts of control fathers perceived less social support from nursing professionals than intervention fathers. This study also included some limited control of extraneous factors, and therefore the criteria for causality are not completely fulfilled (Polit & Beck 2006).

This study was guided by Barnard's (1994) Parent-Child Interaction Model, Bandura's (1997) theory of self-efficacy and previous research on parenting. The internet-based intervention developed in this study was relatively complex, involving an information database, peer discussion forum and expert advice. The whole development process including problem definition, the identification of the building blocks for the intervention design, the intervention design itself and intervention validation was reported using a model developed by van Meijel et al. (2004), and it was published in detail (Article I). In addition, the identification of the building blocks for the intervention design begun with

literature reviews of parenting interventions. The validity of the literature review is limited, since the quality of the selected research articles was not rated (Rychetnik et al. 2002; Polit & Beck 2006; Forbes 2009; Pluye et al. 2009), and only limited search terms and databases were used. However, the research articles reviewed are listed in the appendices, which increases the validity of the research. In addition, the intervention was pilot tested with parents (Hannula et al. 2010).

Performance bias means that intervention fidelity is ensured (Rychetnik et al. 2002; Zwarenstein et al. 2008; Borglin & Richards 2010). Fidelity is related to the constancy of data collection (LoBiondo-Wood & Haber 2010). In this study, the participants were informed and recruited by nursing professionals working in the target units. In addition, Forbes (2009) has stressed the importance of defining an appropriate intervention timing and dose. The sample for this study consisted of parents from diverse backgrounds, and therefore it was impossible to define an appropriate intervention dose. Instead, the intervention parents were advised to use the proposed intervention based on their individual needs. For analysis, the intervention group was divided into two groups (Users/ Non-users).

6.2 Discussion of the results

Parenting satisfaction and parenting self-efficacy after childbirth

The mothers and fathers who took part in this study differed from each other in many respects. Mothers were younger, they scored lower on self-concept, had more depressive symptoms and had more negative perceptions of childbirth than fathers. Mothers also experienced greater life change and infant centrality. However, mothers' assessments of their parenting satisfaction and parenting self-efficacy were systematically more positive than fathers' assessments. Overall, both mothers and fathers experienced parenting satisfaction and PSE very positively. This finding supports the results of previous studies (Reece & Harkless 1998; Hudson et al. 2001; Elek at al. 2003). Generally this is very positive and beneficial since it is known that high parenting satisfaction and PSE are important for parents' sense of well-being (Coleman & Karraker 1997; Hudson et al. 2001; Elek et al. 2003). However, the immediate postpartum period is a very emotional one, which may have impacted parents' positive perceptions, and parents who participated in the baseline study were still at the maternity hospital and had not yet cared for their infant independently. It is possible that in the protective hospital environment, parents may overestimate their abilities (Ferketisch & Mercer 1995). On the other hand, Bandura (1997) has argued that parents' beliefs in their efficacy motivate and guide their actions, and high PSE beliefs make parents try more.

However, both mothers' and fathers' biggest challenges were related to their affective skills. They needed extensive support in interpreting and responding to infants' cues and behaviour as well as with their daily rhythm and sleep. Barnard (1994) emphasizes parents' ability to identify and respond to the infant's cues and needs in the Parent-Child Interaction Model. Based on a review by Bryanton and Beck (2010), educational interventions on infant sleep and infant behaviour seemed to have great potential to support mothers'

parenting. In fact, parents' emotional skills are perceived as the most critical parts of parental sensitivity, which will ultimately have an impact on infant health (Shin et al. 2008; Bryanton & Beck 2010). Overall, both mothers' and fathers' parenting satisfaction and PSE were at such a high level that there is only limited room for improvement. However, parent-child interaction is a process (Barnard 1994) that may go well or not so well after the immediate postpartum period.

Factors contributing to parenting satisfaction and parenting self-efficacy after childbirth

Barnard (1994) says that parent-child interaction is influenced by various parent, infant and environmental factors. Parents at risk can be supported by identifying these factors, since they will help professionals strengthen parents' resources and remove possible obstacles limiting family well-being. Any factors that impact parenting also affect the infant and the whole family and therefore have public health significance.

In this study, first-time mothers scored lower on parenting satisfaction and both first-time mothers and fathers scored significantly lower on PSE than experienced parents. It is important therefore that professionals remain sensitive to the insecurity of inexperienced parents (Ferketisch & Mercer 1995; Mercer & Ferketisch 1995; Bandura 1997; Tarkka et al. 2000). Bandura (1997) also emphasizes that parents' physiological state is strong predictor of PSE. In this study, low self-concept and depressive symptoms were strongly associated with negative parenting experience. In addition, attitude towards parenthood during pregnancy was found to predict mothers' parenting satisfaction and parenting self-efficacy during the immediate postpartum period. Around 7-14% of parents felt afraid, concerned or insecure during pregnancy. Therefore, if professionals can recognize at-risk parents who are afraid, concerned or insecure during pregnancy, they can offer them extended support even before the child is born.

At-risk parents can be identified by risk screenings using validated instruments or by conducting face-to-face discussions at the hospital or child health clinics. The findings indicate that the most significant topics that should be raised with parents include parents' attitude towards parenthood during pregnancy, depressive symptoms and infant centrality. Mothers may also benefit from discussions about experiences of childbirth and life change. Exclusively breastfeeding mothers had the highest scores in parenting satisfaction and parenting self-efficacy. More intensive breastfeeding support should therefore be offered to mothers experiencing breastfeeding difficulties in order to provide more positive parenting experiences for mothers. The results of previous research support the use of WHO/Unicef training (Britton et al. 2009) as well as the Baby Friendly Hospital Initiative and longer-term interactive interventions in order to develop breastfeeding support (Hannula et al. 2008). Overall, it could be useful to inquire about parents' state of mind before they leave the maternity hospital. This includes evaluating whether the parent is feeling fearful, strained, tired or sad (Tarkka 1996).

Most importantly, parents' perception of the infant proved to be the most significant single factor associated with parenting satisfaction and PSE. This result is supported by several previous studies (Teti & Gelfand 1991; Porter & Hsu 2003; Tarkka 2003). Infant health and maturity did not contribute significantly to parenting experience. However, this finding must be interpreted with some caution, since the health and the conditions of the

infants in this study varied so widely. Therefore, these measures do not logically reflect the perceived task difficulty related to infant care (Bandura 1997). It is recommended that interventions are developed that help parents gain a positive perception of the infant and themselves as parents. In line with earlier research, the results reported here underscore the importance of developing interventions that can help support parents' emotional skills. However, the easiest way to support both parents' and infants' well-being is to encourage and make skin-to-skin contact possible (Ludington-Hoe & Swinth 1996; Feldman et al. 2002; Magill-Evans et al. 2006; Johnson 2007; Moore et al. 2009).

The literature review indicates that almost all interventions benefited parents or infants in some ways among particular populations. However, recent reviews suggest that the true effectiveness of parenting interventions remains largely unknown (Shaw et al. 2006; Olds et al. 2007; Gagnon & Sandall 2009; Barlow et al 2009; Yarcheski et al. 2009; Bryanton & Beck 2010). During the past 20 years, the methods of choice in developing nursing care have included rooming-in, infants' feeding practices, fathers' overnight presence at the maternity hospital, and social support from nursing professionals. These four attributes did not show a clear connection with parenting experience, but they had a significant effect while combined with other attributes. In this study, family functioning and family health had a significant effect on mothers' and fathers' parenting experience. The effect size of these attributes was greater among fathers than mothers. This indicates that parents, and fathers in particular, may benefit from more family-focused care and sound advice from nursing professionals.

Changes in parenting satisfaction and parenting self-efficacy during the postpartum period

Conflicting evidence has been published about the direction of change in parenting experience during early parenthood. The findings indicate that both mothers' and fathers' parenting satisfaction and parenting self-efficacy became more positive during the postpartum period. This result is consistent with the findings of Pridham and Chang (1989, 1992), Pridham et al. (1994, 1999) and Hudson et al. (2001). Measurements of PSE revealed greater changes in parenting experience than measurements of parenting satisfaction. Both mothers and fathers thought their affective skills were the weakest after childbirth, but on the other hand these skills showed the greatest improvement during the postpartum period. Based on Bandura's (1997) self-efficacy theory, experience with parenting tasks is the most importance source of parents' sense of efficacy. Therefore, these findings should be interpreted with some caution, since the results for inexperienced parents and experienced parents were analysed together.

Intervention effects on parenting satisfaction and parenting self-efficacy during the postpartum period

Several researchers have recommended developing preventively arranged and population-based parenting support online (Nyström & Öhrling 2004; Thompson et al. 2004; Magill-Evans et al. 2006). The proposed intervention was developed based on evidence indicating that parenting interventions have the potential to produce different kinds of health benefits for parents and infants (Appendix 1 & 2). On the other hand, recently published reviews indicate that the effectiveness of parenting interventions remain largely unknown (Shaw et

al. 2006; Olds et al. 2007; Gagnon & Sandall 2009; Barlow et al 2009; Bryanton & Beck 2010). Intervention research in nursing has been also criticized for its poor quality (Brown et al. 2009; Gagnon & Sandall 2009; Bryanton & Beck 2010) and its tendency to publish only significant findings (Forbes 2009). In this study, it was expected that mothers and fathers exposed to the internet-based intervention would score higher than their controls in parenting satisfaction and parenting self-efficacy during the postpartum period. However, the results indicate that there is no intervention effect. On the other hand, the intervention did not have a negative effect on parenting experience either, as happened in the study by Robbins et al. (2003).

The evaluation of effectiveness is only concerned with one aspect of the intervention, i.e. its positive and expected effects. However, the intervention may also have positive and unexpected effects, or expected and unexpected negative effects (European Commission 1997). For example, it is possible that the information in the internet resource promoted preventive caring practices or activated parents to discuss the topics with the child's care provider (Christakis et al. 2006; Thompson et al. 2007), or created an environment that helped parents approach professionals when necessary (Hegarty et al. 2007). There is also evidence that online support might not benefit all parents equally (Herman et al. 2005; Sarkadi & Bremberg 2005; Madge & O'Conner 2006). Based on the literature review, families with clear risk factors benefited the most (Shaw et al. 2006; Bonnier 2008). Most importantly, online support has the potential to reach substantial numbers of parents. Our results indicate that the internet has the potential to reach Finnish parents coming from diverse backgrounds. Therefore, online screenings have the potential to identify risk parents and offer them support focused on their main problem (C'de Baca et al. 1997; Guyer et al. 2000; Thompson et al. 2004; Sundelin et al. 2005; Johnston et al 2004, 2006; Bardy & Öhman 2007).

Finally, the proposed intervention was evaluated on the basis of its outcomes. However, outcomes research has been criticized for its many weaknesses. When the findings are non-significant, outcomes research lacks an understanding of what went wrong, and it is unable to rule in or out potential threats to statistical conclusions, internal and construct validity, and poor intervention conceptualization or implementation. (Sidani & Braden 1998.) The internet-based intervention developed in this study was relatively complex, involving an information database, peer discussion forum and expert advice. There are several factors that may have contributed to the non-significant findings of this study. These factors are related to the selection of outcome measures, the selection of the target group, limitations regarding validity and reliability as well as implementation issues. The internet-based intervention was developed and implemented as a part of a larger collaborative project. Implementation issues are related to the activities required to follow through the whole process. By evaluating the whole project and process, it is possible to gain a broader and more reliable overview of the research process (European Commission 1997; Sidani & Braden 1998; Rychetnik et al. 2002).

7. Conclusions

Mothers scored lower on several parent attributes and had more depressive symptoms than fathers after childbirth. Even so, mothers had systematically higher parenting satisfaction and parenting self-efficacy than fathers. Affective skills were considered to present the greatest challenges by both mothers and fathers. The results indicate that interventions on infant behaviour and sleep may have the greatest potential to support parenting.

Parents with negative perceptions of themselves, their infant or their family were at greater risk of having a negative parenting experience. The most significant parent attributes had a similar effect size on both mothers' and fathers' satisfaction, but infant attributes had a larger effect size among mothers. Parent attributes had a slightly larger effect size on mothers' than on fathers' parenting self-efficacy, while infant attributes had a similar effect size on both parents' parenting self-efficacy. Environmental attributes had a larger effect size on fathers' parenting satisfaction and parenting self-efficacy. On this basis it seems that parents, and fathers in particular, may benefit from more family-focused care and sound advice. More intensive breastfeeding support should be offered to mothers experiencing breastfeeding difficulties. Most importantly, if professionals can recognize at-risk parents, particularly mothers who are afraid, concerned or insecure during pregnancy, they can offer parents extended support even before the child is born.

Both mothers and fathers experienced positive changes in parenting satisfaction and parenting self-efficacy. These changes were similar for both parents, although they occurred at a different pace. Affective skills, which were rated the weakest, improved the most among both mothers and fathers. The differences between mothers' and fathers' parenting experiences were greater in measurements of parenting self-efficacy than in measurements of parenting satisfaction.

The evaluation of the intervention indicates that there are no intervention effects on parenting satisfaction and parenting self-efficacy during the postpartum period.

8. Suggestions for further research

Further research is needed to evaluate parenting satisfaction and parenting self-efficacy among inexperienced and experienced mothers and fathers as well as among parents of families with special needs during the first postpartum year. It would also be interesting to examine the links of parenting satisfaction and parenting self-efficacy with parenting practices and infant health/development.

More research is also needed to evaluate in more detail different hospital practices and their mediated and long-term effects on parenting experience. It could also be useful to determine the risk scores for instruments used in this study in order to identify at-risk parents and to provide an important diagnostic tool.

Furthermore, more work is needed to evaluate the long-term effects of the proposed intervention as well as the intervention effects achieved when supporting different risk-groups or using narrow-domain measures such as breastfeeding or infant sleep.

In order to gain a broader and more reliable overview of the internet-based intervention, further studies are needed to evaluate the research process related to the Urban parenthood project. Further research is also needed to evaluate parents' preferences of internet use and gender differences.

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Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
UNSELECTED GROUPS OF PARENTS						
Leitch 1999, Canada	Video (45min) education on infant's behaviour, states and cues 2 weeks before due date	Education	Quasi-experimental	29 first-time mothers with their infant	Mother-infant interaction	Intervention mothers showed better sensitivity to infants' cues and socio-emotional growth-fostering behaviours 24 hours after childbirth compared with the controls.
Guyer et al. 2000, USA	The Healthy Steps Initiative including home visit, risk screening developmental and behavioural advice. Prenatal and postnatal, and postnatal only.	Multiple component	Quasi-experimental and RCT, 3-group	5565 parents	Parent knowledge, beliefs and practices Child health, behaviour and development User satisfaction Provider satisfaction	The article describes the evaluation design, Healthy Steps sites and sample for the evaluation.
Colson & Joslin 2002, USA	Infant prone sleeping position education and role modelling to prevent SIDS	Education Single procedure	Quasi-experimental; one sample before and another sample after	200 parents with 2-week-old healthy infants	Parent knowledge Parent attitudes Parent behaviour	Before the intervention, parents reported that professionals told them to place their infant to sleep in the supine position rarely compared with after the intervention (41% vs. 81%). Before the intervention, parents reported that the nursery staff placed their infant rarely to sleep in the supine position compared with after (37% vs. 88%). Before the intervention, parents reported that they usually placed their infants to sleep in the supine position at home rarely compared with after (42% vs.75%).
Hudson et al. 2003, USA	The New Fathers Network	Multiple component	Quasi-experimental; two groups with repeated measures	34 first-time fathers of healthy full-term infants	Parenting satisfaction Parenting self-efficacy User satisfaction	Intervention fathers' parenting self-efficacy and parenting satisfaction scores improved significantly from 4 to 8 weeks after childbirth. No significant change was found among control fathers. Intervention fathers were mainly satisfied with the New Fathers Network.

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Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
Robbins et al. 2003, UK	Minor illness education: mailed info booklet and home visit six weeks post-partum	Education Home visit	RCT	120 parents of full-term and healthy infants	Parental confidence Parental knowledge User satisfaction Parental coherence Self-confidence	Intervention parents showed a greater certainty towards home care options, and a reduction in parents' intentions to consult a doctor. Despite this, intervention parents reported feelings of reduced confidence and knowledge. The intervention resulted in a reduction in visits to child health clinic, but had little effect on other services.
Johnston et al. 2004, USA	The Healthy Steps Initiative (HS) including home visit, postnatal developmental and behavioural advice, and risk screening. Two intervention groups: Prenatal and postnatal, and postnatal only.	Multiple component	Quasi-experimental; with partly randomized study	439 pregnant mothers	Parental well-being Parental knowledge Parental satisfaction Parenting practices	Intervention parents experienced positive outcomes related to depressive symptoms and social support, parental knowledge of infant development/ behaviour, parental practices (e.g. reading to the infant), parental role satisfaction three months postpartum. Mothers in both intervention groups breastfed more often than their controls (91%vs.76%). First-timers benefited more from practical knowledge and its application to practice than experienced mothers.
Thompson et al. 2004, USA	The Healthy Steps for Young Children Program (HS) including home visit, postnatal developmental and behavioural advice, and risk screening. Planning and implementation was based on the Precede/ Proceed model. Two intervention groups: Prenatal and postnatal, and postnatal only.	Multiple component	Quasi-experimental; with partly randomized study	-	Reviewing previous results related to the HS project	Implications: Developmental and behavioural services can be delivered successfully in practice using dedicated professionals to deliver and integrate services. The added focus on satisfaction and cost helps to develop "the business" case for broad scale implementation. Bonding of parents to organizations has marketing implications. The programme provides positive effects for all parents, not just high-risk parents. Several research questions emerge, including persistence of effects on health outcomes, cost and utilization.
Sundelin et al. 2005, Sweden	Study protocol of a preventive public health intervention based on Infant Heath and Developmental Pro-	Multiple component	Quasi-experimental; 3-group	1358 mothers	Child health Maternal depression Communication	Mothers in intervention and control groups were comparable in many respects, but intervention mothers were more educated and had non-Nordic ethnicity more often. Mothers in privileged areas

Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
	gram (IDHP), which includes parent education/ discussions, follow-up LBWC, screening of depression and interaction difficulties, and infant developmental problems.				Organizational	differed from other mothers in several respects. Intervention nurses devoted fewer hours per week to child health services than control nurses.
Johnston et al. 2006, USA	The Healthy Steps for Young Children Program (HS) including home visit, postnatal developmental and behavioural advice, and risk screening. Two intervention groups: Prenatal and postnatal, and postnatal only.	Multiple component	Quasi-experimental; with partly randomized study	439 pregnant mothers	Child health and development Parenting practices Parental well-being	Intervention was associated with positive outcomes in timely well-child care, immunization rates, television viewing, injury prevention, and discipline strategies. Prenatal initiation was associated with larger expressive vocabularies at 2 years. Intervention mothers reported more depressive symptoms, but there was no increase in clinically significant depression. Intervention was associated with positive impact on parenting practices and infant health.
Hegarty et al. 2007, Australia	Multi-professional educational programme for pregnant women called a new approach (ANEW) including 4 interactive workshops using role play and feedback with simulated parents, and 6 group sessions every two weeks. A comprehensive workbook.	Multiple component Educational	Quasi-experimental; two cohorts (pre+post) with before and after	1065 pregnant women (<20 gestational weeks)	Health professionals' communication skills Comfort in discussing psychosocial difficulties	After ANEW mothers were more likely to report that midwives asked questions that helped them to talk about psychosocial problems and they would feel comfortable discussing a range of psychosocial issues if they were experiencing them. The ANEW programme evaluation suggests better trends of communication by health professionals.
Campbell et al. 2008, Australia	Study protocol of an early intervention to prevent childhood obesity	Multiple component	RCT	600 first-time parents of newborns	Dietary intake, sedentary behaviour and physical activity of infant and parent Family food	No results reported.

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Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
					environment & physical activity	
Kramer et al. 2008, Belarus	The Promotion of Breast-feeding Intervention Trial (PROBIT) based on baby Friendly Hospital Initiative	Educational	RCT (cluster)	13,889 healthy mother-infant dyads	Infant behaviours Mother-infant relationship Partner relation-ship Breastfeeding	Intervention group breastfed exclusively signifi-cantly more often at three months (43% vs. 6%) and all ages up to 12 months. No intervention effects were found in infant behavioural problems (total difficulty, emotional symptoms, conduct problems, hyperactivity, peer problems, or pro-social behaviour). No treatment effect was found in partner relationship or marriage, or mother-infant relationship. However, the intervention increased the duration of breastfeeding and intent to breastfeed in the future.
Feinberg & Kan 2008, USA	Preventive intervention aiming to enhance co-parenting including partici-pation in 8 Family Founda-tions classes	Educational	RCT	152 hetero-sexual cou-ples expecting their first child	Parental relation-ship Parental mental health Parent-child relationship Emotional and physiological regulation	Intervention parents showed greater co-parental support, less maternal depression and anxiety, less distress in parent-child relationship, and several positive effects on infant regulation. These effects were not moderated by income, but positive im-pact was found for lower educated parents, and for families with a father who reported higher levels of insecure attachment in close relation-ships. These results indicate that co-parenting is a potentially malleable intervention target that may influence family relationships and parent and infant well-being.
Kavanagh & Heinig 2008, USA	Education on satiety cues (slower sucking, sleepiness, losing interest in the feed, turning away, dribbling milk, biting, falling asleep, spitting up) and discourag-ing bottle feeding before 4 months	Educational	RCT	38 caregivers and their infants	Formula intake Infant weight gain	Intervention was perceived positively, but there was no difference between the groups in formula intake at 4-5 months. Contrary to the hypothesis, infant growth was statistically greater between 1-2 months and 4-5 months in the intervention group.

Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
Drotar et al. 2009, USA	Born to learn (BTL) curriculum coaching parents to impact child development by enhancing the quantity and quality of stimulation and relationship beginning 9 months postpartum.	Multiple component	RCT	564 families of healthy infants	Cognitive development Infant behaviour Attachment Mastery motivation Language development Pre-reading skills Social competence	BLT intervention children showed higher mastery motivation related to task competence at 3 years and better cognitive development at 2 years. No other effects were found with other developmental outcome measures.
Barilla et al. 2010, USA	Psychosocial support and postpartum follow-up (baseline, comprehensive and limited intervention)	Multiple component	Comparison of three cohorts	14,786 mothers and their normal newborns	Readmission Cost-benefit	Readmission rate was significantly lower with comprehensive support (1%) as compared with baseline 2.3%) and limited (2.3%) intervention period. There was no significant difference in cost per readmitted newborn across the three cohorts. The costs for normal newborns readmitted during the comprehensive intervention time period were lower compared with the non-intervention group. There was a cost-benefit of 513,540 dollars due to fewer readmissions during the total period, but it did not exceed the cost of the intervention.
FAMILIES WITH SPECIAL NEEDS						
Feldman et al. 2002, Israel	Skin contact/ Kangaroo care beginning 31-34 gestational weeks, for a minimum of 2 weeks and 1 hour/day.	Skin-to-skin contact	Matched	146 parents with their premature infant	Mother-infant interaction Depressive symptoms Home environment Infant tempera-	Mother-infant interaction was better at 37 gestational weeks: intervention mothers showed more positive affect, touch and adaptation to infant cues. Intervention infants showed more alertness and less gaze aversion. Intervention mother reported less depressive symptoms and perceived infants as less abnormal. At 3 months, interven-

Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
					ment Cognitive development	tion mothers and fathers were more sensitive and provided a better home environment. At 6 months, intervention mothers were more sensitive and their infants scored higher in mental and motor development
Lawhon 2002, USA	Individualized facilitation using video recordings and discussions of understanding infant's cues and responding to them supportively.	Education/ counselling	Exploratory	10 premature (≤1500 grammes, ≤32 weeks), 10 mothers and 8 fathers	Parents' ability to appraise infant behaviour, and integrate critical appraisal into practice, and parent and infant competence	The intervention enhanced parents' ability to appraise their infant's behaviour critically and respond in a supportive manner.
Landry et al. 2003, USA	Home facilitation programme (10 weeks) including playing and learning strategies (PALS).	Home visits	RCT	84 mothers with infants born very low birth weight (VLBW), and 53 mothers with full-term infants	Maternal behaviour Infant development Communication development	Intervention mothers showed increased ratings of behaviours of warm sensitivity and contingent responsiveness. The children of intervention mothers showed greater changes in cognitive/ mental development and greater gains in appropriate social responses at the age of eight.
Broedsgaard & Wagner 2005, Denmark	Education programme for parents during hospitalization, visit and orientation by family's health visitor, and written materials. During NICU period and until 2 years.	Multiple component	Non-experimental, exploratory and descriptive	37 families with preterm (<34) infants	Semi-structured interview and focus group: Intervention's ability to meet the need	Most of the intervention initiatives were experienced as supportive and met parents' needs. Parents found that the intervention contributed positively to their confidence in caring and to the preterm infant's well being.
Johnson et al. 2005, UK	Home visits based on The Avon Premature Infant Project (APIP) using two intervention groups: Developmental education intervention (Portage), and	Multiple component	3-group RCT	284 parents of preterm (<33 weeks) infants and, and 109 reference parents of	Cognitive development Motor development Behavioural development	Preterm infants showed weaker cognitive performance than their term controls at 5 years. There were no significant differences between preterm groups in general conceptual ability, indicating no effect of intervention on behavioural or motor outcomes.

Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
	non-developmental supportive counselling (Parent adviser).			full-term infants		
Pridham et al. 2005, USA	Guided Participation (GP) supports parental competencies related to infant care and feeding. Weekly home visits by a nurse for first month after discharge, and weekly, bi-weekly or monthly during the first year based on parents' needs.	Home visit	RCT	42 mothers and their VLBW (≤1250 g) preterm infants.	Infant development Infant feeding skills Feeding interaction Depressive symptoms	The hypothesized GP effect on feeding competencies across infant age received support for infants at 1 and 8 months postpartum, and for mothers at 4 months postpartum. The hypothesized GP moderator effect on the relationship between depressive symptoms and maternal competency was supported for negative affect and behaviour at eight months postpartum.
Kaaresen et al. 2006, Norway	Modified Mother-Infant Transaction Program (MITP). Discussion sessions to vent hospital experiences before discharge and 4 home visits by nurses focusing on infant's unique characteristics, temperament, and developmental potential, and interaction with the infants.	Multiple component	RCT with another non-random control group	210 preterm (<2000g) intervention infants, preterm control infants, and full-term control infants and their mothers (n=209) and fathers (n=179)	Parenting stress	Parents in the intervention group reported significantly lower stress scores than preterm controls in child domain, parent domain, and total stress on all occasions except mother reported child domain at 12 months. The stress level of the preterm intervention group was comparable to that among term controls. Both parents in the intervention group had consistently lower scores in several subscales than preterm controls.
Landry et al. 2006, USA	Playing and learning strategies (PALS). Videotaped examples, problem-solving activities and mothers' critique of their own behaviour. Coaching mothers to use target be-	Home visits	RCT	144 mothers with infants born very low birth weight (VLBW), and 120 mothers with	Maternal behaviour Infant behaviour Infant play Infant development	Intervention mothers showed a greater increase in responsiveness at 6-13 months postpartum. Emotionally supportive behaviours were strongest among mothers of VLBW infants. Increased responsiveness facilitated greater growth in infants' social, emotional, communication and cognitive competence among intervention group infants.

Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
	haviours, giving immediate feedback by commenting on infants' responses.			full-term infants		Social and emotional skills showed greater change for those born VLBW. The results support a causal relationship between responsiveness and infant development.
Glazebrook et al. 2007, UK	The Parent Baby Interaction Program at the NICU including four components: tactile, discussions (e.g. infant development), verbal and observation. Lasted up to 6 weeks after discharge.	Educational/ Multiple component	RCT (clusters, cross-over design)	233 premature infants (<32 weeks) and their mothers	Parenting stress Responsive parenting Neurobehavioural function	Intervention and control groups did not differ from each other in comparisons of parenting stress, mother-infant interaction or infant neurobehavioural function at three months postpartum.
Johnson 2007, USA	Kangaroo holding sessions (60 minutes) in the NICU	Skin-to-skin contact	Qualitative, triangulation of demographic data, observation and interviews	18 primiparous mothers with premature (mean 28.8 weeks) infants	Maternal behaviours Interaction Related nursing and environmental interactions	The results support the use of kangaroo holding as a method to improve maternal confidence in caring for premature infants. Mothers reported feeling "being needed" and "feeling comfortable" with holding experience regardless of the infant's physical health status.
Klenberg et al. 2007, Sweden	Newborn Individualized Developmental Care and Assessment Program (NIDCAP)	Educational	RCT	20 mothers and their premature infants (<32 weeks)	Maternal role Parental perception of infant Perception of neonatal care	Intervention mothers perceived more closeness to their infant than control mothers, and this feeling demonstrated no significant correlation with the infant's gestational age, weight or severity of illness. Intervention mothers also experienced better social support (p=ns), but at the same time they expressed more anxiety than did the control mothers, which may reflect the fact that intervention mothers had already bonded to their infants during the NICU stay.
Maguire et al. 2007, Netherlands	Four sessions of instructions on preterm infant behaviour	Educational	Quasi-experimental; two group time-lag control trial,	20 sets of parents and their premature infants (<32 weeks)	Parental knowledge Parental confidence Nursing support	Intervention mothers showed a significant improvement in knowledge in preterm infant behaviour cues, and had more positive perceptions of support from nurses than controls. Intervention mothers showed no significant improvement in

Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
			before and after			parental confidence. Only half of the fathers participated in the educational sessions, and there were no significant differences in fathers' scores. A longer, more intensive programme and finding ways of incorporating more participation from fathers are recommended.
van der Pal et al. 2007, Netherlands	Standard care versus basic developmental care (standardized nests and incubator covers) in NICU, and basic developmental care versus NIDCAP	Educational	2 RCTs	283 parents and their premature infants (<32 weeks)	Parental confidence Parental stress Nursing support	No significant differences were found in parental confidence, parental stress or perceptions of support from nurses two weeks postpartum. The difference in parental stress between mothers and fathers was smaller in the NIDCAP group (p=0.03). The results indicate that fathers' increased involvement in care during NIDCAP intervention might decrease paternal stress.
Feeley et al. 2008, Canada	Cognitive-behavioural intervention called Promoting Mothers' Ability to Communicate (PMAC) during NICU stay, six 1-hour sessions beginning 6 weeks postpartum.	Educational	Quasi-experimental pilot study; One group before and after	33 mothers with preterm (<1500 grams) infants	Feasibility and acceptability of the PMAC program	There were several challenges related to recruiting the participants, and the attrition rate was also high. Mothers found the content and format of the programme to be acceptable.
Kaaresen et al. 2008, Norway	Modified Mother-Infant Transaction Program (MITP). Discussion sessions to vent hospital experiences before discharge and 4 home visits by nurses focusing on infant's unique characteristics, temperament, and developmental potential, and interaction with the infants.	Multiple component	RCT	210 preterm (<2000g) intervention and control infants, and their mothers (n=122) and fathers (n=103)	Cognitive development Motor development Infant behaviour Parenting stress	At two years corrected age, there were no statistically significant differences between the groups in cognitive and motor development, or in infant behaviour. Intervention mothers scored significantly lower in parenting stress in the parent and child domain, and intervention fathers reported lower parenting stress related to the child domain than control fathers.
Olafsen et al. 2008,	Modified Mother-Infant Transaction Program	Multiple component	RCT with another non-	214 preterm (<2000g)	Infant temperament	Infant temperament did not differ between the groups at 6 and 12 months. Parent stress and

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Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
Norway	(MITP). Discussion sessions to vent hospital experiences before discharge and 4 home visits by nurses focusing on infant's unique characteristics, temperament, and developmental potential, and interaction with the infants.		random control group	intervention infants, preterm control infants, and full-term control infants with their mothers	Parenting stress	negative reactivity correlated strongly with each other in the control group at 12 months. There was a strong negative correlation between stress and regulatory competence among intervention infants. The intervention seemed to change the relationship between stress and temperament, since the intervention sensitized mothers to temperamental regulatory competence of their preterm infants.
Melnyk et al. 2008, USA	Educational-behavioural intervention called Creating Opportunities for Parent Empowerment (COPE). Information about infants (behaviour, cues, development, interaction) and parent participation. Audiotaped information and workbook activities.	Multiple component	Secondary analysis of a larger RCT	246 mothers with premature infants (26-35 weeks)	Mother's anxiety Mother's stress Mother's beliefs about the infant and role Depressive symptoms Interaction	COPE intervention was associated with increased maternal beliefs, less maternal depressive symptoms and less anxiety during the NICU stay, and post-hospital stress and anxiety. The intervention was also associated with better mother-infant interaction.
Turan et al. 2008, Turkey	30-minute educational programme about the infant and NICU stay within one week of admission to the NICU	Educational	RCT	20 preterm infants (<37 weeks) and their mothers and fathers	Parent stress Parent anxiety	Intervention mothers showed statistically significantly lower stress scores than control mothers after 10th day of NICU stay. Intervention fathers also scored lower, but the difference was not statistically significant.
Melnyk et al. 2009, USA	A manualized educational-behavioural intervention called Creating Opportunities for Parent Empowerment (COPE) beginning 2-4 days after NICU admission. Audiotaped information about infants and parent participation, and workbook.	Multiple component	Secondary analysis of a larger RCT	260 premature infants (26-35 weeks) and their 258 mother and 155 fathers	Cost of the development and implementation of COPE	COPE program resulted in cost savings of at least 4,864 dollars per infant.

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Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
Newnham et al. 2009, Australia	Modified Mother-Infant Transaction Program (MITP). Nine sessions during hospitalization and home visit. Written materials, video observation and instructions. Information also about kangaroo care, massage and infant bath session.	Multiple component	RCT	68 mothers with preterm (<37 weeks) infants	Infant temperament Infant development Interaction Parenting stress Depressive symptoms	Intervention infants were temperamentally better approachable and easier, and had fewer regulatory problems (colic, sleep, excessive crying), and had better communication skills. Intervention dyad showed better interaction than the controls. Intervention mothers were less stressed by their infant at 3 months postpartum.
White-Traut & Norr 2009, USA	Study protocol of an ecological model for premature infant feeding including remediation to support infant's behavioural organization and education for the mother about recognition of infant cues	Home visit Education	RCT	252 premature infants (29-34 weeks) and their mothers with socio-environmental risks	Mother-infant interaction Infant growth and development Costs (discharge, hospital visits, later health care and special education)	No results presented in this article.
Ohgi et al. 2004, Japan	Swaddling vs. infant massage	Single practice	RCT	25 parents with their excessive crying infants (<3 months) with cerebral injury	Home environment Anxiety Infant behaviour User satisfaction	The amount of daily crying decreased significantly in the swaddling group, but it did not decrease in the massage group. Positive outcomes related to infant behaviour and maternal anxiety were noticed after the intervention in the swaddling group. Parents in the swaddling group were also more satisfied with the intervention's ability to reduce crying than parents in the massage group.
Pelchat et al. 2004, Canada	PRIFAM program based on partnership between nurse practitioner and the family. Includes written materials, 2-3 meetings at the hospital, and 4-6 home visits	Multiple component	Quasi-experimental	39 mothers and 27 fathers of Snr Down or clef/lip palate infants	Satisfaction (individual-emotional, individual-cognitive, marital, parental, extended family,	Most of the participants were satisfied with the intervention. Most parents felt that the programme helped them adapt better to an unexpected situation. They received guidance in discussing their own and their partner's emotions. The support gave them confidence about child care. Parents'

Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
					printed material)	perceptions varied based on sex, income and the infant's diagnoses. Mothers of newborns with Snr Down were more satisfied than fathers with emotional support. Low-income parents were more satisfied than higher income parents on all subscales. On the parental subscale, parents of newborns with clef/lip palate infants were more satisfied than parents of children with Snr Down.
Pelchat & Levebvre 2004, Canada	PRIFAM program based on partnership between nurse practitioner and the family. Includes written materials, 2-3 meetings at the hospital, and 4-6 home visits	Multiple component	Quasi-experimental	74 parents of Snr Down or clef palate/lip infants	Stress Anxiety Spousal support	Parents who participated in the programme adapted better. They experienced less sense of threat about to their situation at six, 12 and 18 months postpartum than the control group, and felt better control over the situation. They reported experiencing less distress, less anxiety and fewer depressive feelings. Intervention parents were also more satisfied with the support they received from their partners. The result were relatively similar for parents of Snr Down and clef palate/lip infants, as well for mothers and fathers.
French et al. 1998, USA	Video education on comforting and interaction within 24 hours postpartum	Education	RCT, 3-group	60 substance-abusing mothers and their infants	Infant feeding	Mother-infant interaction in infant feeding situations improved significantly among intervention mothers and their infants at 48-72 hours postpartum.
Schuler et al. 2000, USA	Weekly home visits	Home visits	RCT	171 substance-abusing mothers and their infants	Mother-infant interaction	The intervention had no direct effect on mother-infant interaction based on observations of feeding. In the control group, drug using mothers showed lower responsiveness than drug free mothers. Drug use was not associated with lower responsiveness in the control group. Weekly home visits may be a protective strategy for children of drug-using women, because it disrupts the relationship between ongoing maternal drug use and low maternal responsiveness.

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Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
Butz et al. 2001, USA	Educational home visits (16) enhancing parenting skills, and support available 24/7 (beeper).	Home visit Education	RCT	100 substance-abusing mothers and their infants	Infant behaviour Parenting stress	Intervention children had fewer emotional and behavioural problems than control children when the children were two and three years old. Intervention mothers reported less parenting distress than controls parents.
Nair et al. 2003, USA	Home-based early intervention with weekly/ bi-weekly visits (18 months)	Home visit	RCT	161 substance-abusing mothers and full-term infants	Mental development Motor development Language development Parenting stress Child abuse potential Environmental risks	Children in the intervention group had significantly higher motor development scores at 6 and 18 months, and had marginally better scores in mental development at 6 and 12 months than the controls. Parenting stress and child abuse potential were higher for mothers with five risk factors or more as compared with mothers with four or less.
Horowitz et al. 2001, USA	Three home visits between 4-18 weeks postpartum including video recording and coaching.	Home visits Coaching	RCT	117 depressed mothers and their healthy infants	Responsiveness Depressive symptoms	Intervention mothers showed significantly higher mother-infant responsiveness after the intervention. Intervention did not affect depression scores.
Keefe et al. 2005, USA	The REST routine (Reassurance, empathy, support, time-out) for Infant Irritability, which included weekly home or office visits, Fussy babies/Frantic Families video, and individualized nursing assessment and counselling.	Home visits Multiple component	RCT+ third group post-test only	164 parents with colicky infants (2-6 weeks) + 43 parents with colicky infants (>6 weeks)	Infant irritability	Following the intervention infants in REST group cried 1.3 hours per day on average, while control group infants cried 3 hours daily (p=0.02). Infant irritability was resolved in 62% of the infants in the intervention group, compared to only 29% in the control group at the time of the 8-week follow-up visit (p=0.04).
Keefe et al. 1997, USA	The REST Regimen (Reassurance, empathy, support, time-out) for colicky infants including weekly home or office visits, Fussy	Home visits Multiple component	Quasi-experimental; one group before and after	22 families with colicky infants	Infant fussyness Parenting stress Interaction User satisfaction	Statistically significant improvement was seen in infant fussyness, mother-infant interaction and parental stress.

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Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
	babies/Frantic Families video, and individualized nursing assessment and counselling for one month.					
Dihigo 1998, USA	Individualized parental counselling in parent-child interaction, flow charts and handouts, daily phone calls.	Counselling Telephone calls	Quasi-experimental; 2 group before and after	23 parents with colicky infants	Infant behaviour	Crying time in the intervention group decreased significantly and this difference was significant. Crying time among control infants did not change from the baseline to post-test times.
Huhtala et al. 2000, Finland	Infant massage by parents vs. crib vibrator three times daily for colicky infants	Single practice	RCT	58 parents with colicky infants (<6 weeks)	Infant crying	The total amount of crying decreased in both groups during the four week intervention period. The reduction in crying was similar in both groups.
Farber 2009, USA	Parent mentoring about parenting practices to support child development and family needs.	Multiple components	Quasi-experimental; One group before anf after; Matched	35 high risk and low-income families with infants	Family needs Parental knowledge Infant immunization Development Language competency	Intervention parents and infants showed statistically significant parent and infant outcomes comparing with matched community sample of controls.
REVIEWS						
Ludington-Hoe & Swinth 1996, USA	Kangaroo care (KC) for a minimum of 2weeks and 1 hour/day	Skin-to-skin contact	A review of the literature	78 reference	Reviews KC findings related to autonomic, motor, state, interactive and state-regulatory functioning.	KC fulfils the positive impacts by handling, containment, prone positioning and gentle touch, and self-soothing, by nesting, offering non-nutritive sucking opportunities and by providing access to breast. In addition, it has a positive impact on parenting by involving parents in caregiving and having parents provide containment and holding. KC is strongly recommended.
Lucassen et al. 1998, Netherlands	Treatments for infantile colic	Different kinds (including non-nursing)	A review of RCT	27 studies	Crying Colic	Elimination of cow's milk protein was effective when substituted with hypoallergenic formula. The effectiveness of substitution by soy formula or by low lactose formula was unclear. Di-

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						cyclomine was effective, but serious side effects were reported. Simethicone was not beneficial. The advice to increase carrying or holding did not seem to decrease crying. However, the advice to reduce stimulation was beneficial.
Levitt et al. 2004, Canada	A routine recommended postpartum intervention in women beginning immediately after childbirth for up to one year postpartum	Routine care Different kinds	A systematic review of RCTs	138 articles	Multiple	41 studies were related to breastfeeding, 33 to postpartum pain, and 63 to other topics (postpartum support, postpartum depression/anxiety, early discharge, effects of early contact and several mother's health topics). The results are presented in other articles.
Barlow et al. 2005, UK	Group-based parenting programmes for children less than 3 years	Group-based	A review of literature of RCTs and meta-analysis of them	5 studies	Infant/child emotional and behavioural adjustment	The combined parent reports showed a non-significant difference favouring the intervention group, while the combined independent observations showed a significant difference favouring the intervention group. There is insufficient evidence to assess whether the short-term benefits are maintained over time, or the role such programmes might play in preventive programmes.
Gardner & Deatrick 2006, USA	Interventions to promote effective mothering	Different kinds	A review of literature	27 studies	Multiple	Interventions were categorized as home visiting, skin-to-skin contact, individual, infant-focused education/ counselling, and theory based group interventions. All of these seemed to have a specific applicability for promotion of mothering in particular populations. The evidence was strongest for nurse home-visiting interventions in high-risk populations.
Magill-Evans et al. 2006, Canada	Literature review of interventions for fathers with child aged 0-5 years from Medline, CINAHL and PsycINFO 1983-2003, in English	Different kinds: Treatment Programme Education Prevention	Systematic review	14 articles describing 12 intervention	Only few studies used the same outcome measures. Outcome measures were often developed for specific stud-	Studies included fathers of newborns/ infants (in 9/12 articles) and toddlers-5 years (in 3/12 articles). Interventions for fathers of newborns/ infants addressed awareness or sensitivity to infant behaviour (4/12), educated specific skills such as infant care, massage or kangaroo care (4/12), and addressed the social and physical environment for

Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
					ies.	labour and delivery (1/12). Interventions for fathers of toddlers comprised multiple components (3/12). Most interventions included fathers of healthy infants. All studies except one reported at least one significant finding. Studies were rated strong (2/12), medium (8/12) and weak quality (4/12).
Shaw et al. 2006, Canada	A systematic review of postpartum care of women	Different kinds	A systematic review of RCTs	22 trials	Maternal parenting Mental health Quality of life Physical health	Universal postpartum support to unselected low risk women did not result in statistically significant improvements for any outcomes examined. In women at high risk for family dysfuction and child abuse, nurse home visits combined with case conferencing produced a statistically significant improvement in home environment quality using the HOME program. Also women at high risk for postnatal depression and family dysfuction, home visitation or peer support produced a statistically significant reduction in depressive symptoms (EPDS). Maternal satisfaction was higher with home visitation programmes.
Bardy & Öhman 2007, Finland	A review of international intervention studies for high-risk families with infants and small children published in 1995-2005	Different kinds	A literature review	42 articles	Multiple	International intervention studies for high-risk families (teenage, substance abuse, child abuse etc.) with infants and small children were divided into five categories: 1) Home visits (8/42), 2) multiple component interventions (9/42), 3) interventions based on risk evaluation (10/42), 4) service system development (8/42), and 5) reviews and meta-analysis (7/42). Interventions had better chances to succeed if they included: 1) interactive components, 2) optimal duration and timing, and 3) multiple problems should include multiple components, however, the primary factor should be the main focus with high-risk families.

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Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
Kane et al. 2007, UK	A systematic review and synthesis of parenting programmes	Parenting programme	Systematic review and synthesis	4 articles	-	Five key concepts were identified as important when planning and delivering parenting programmes. A lines-of-argument synthesis was developed which suggest the acquisition of knowledge, skills and understanding, together with feelings of acceptance and support from other parents in the group, enabled parents to regain control and feel more able to cope. This led to a reduction of feeling of guilt and social isolation, increased empathy with their children and confidence in dealing with their behaviour.
Olds et al. 2007, USA	A review of programmes for parents of infants and toddlers	Several kinds	A literature review of RCTs	Includes 135 references of articles	Multiple	Parenting programmes include promises for enhancing health and well-being and also reducing health care costs. The results of the studies indicate the opposite. The quality of the studies could be enhanced by developing a sound theory base and careful pilot testing to ensure the feasibility, participant commitment and usefulness of the selected outcome measures. After this, the programmes could be more readily applicable to controlled trials. This could enable better policy and guidelines. So far, only few programmes have met the high quality demands for intervention evaluation.
Bonnier 2008, Belgium	Interventions in early stimulation programmes for enhancing brain development (children with or at risk for neurodevelopmental disorders)	Different kinds	Literature review	2 meta-analyses and 5 studies	Infant development	Early stimulation programmes are aimed at the child, the parent or both. The programmes receiving the highest evaluations are the NIDCAP (Newborn Individualized Developmental Care and Assessment Program) in Sweden for infant<1500 grams in NICU and the longitudinal multi-site program IDHP (Infant Health and Development Program), which was created in the United States for infants <37 weeks or <2500 grams. These programmes produced similar ef-

Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
						fects, and efficacy was greatest with programmes involving both the parent and the infant. Long-term stimulation improved cognitive outcomes and parent-child interaction. Larger benefits were obtained in families with several risk factors.
Hannula et al. 2008, Finland	Professional support interventions for breastfeeding	Different kinds	A systematic literature review	36 studies	Breastfeeding	Complex interventions including various methods of education and support from well-trained professionals were more effective than single method interventions. Longer term interventions with interactive components expanding from the pregnancy to postpartum period were more effective than interventions concentrating on shorter period.
Fukkink 2008, Netherlands	Family programmes using video feedback	Educational (video)	Meta-analysis	29 studies including 1844 families	Parenting behaviour Parenting attitude Child development	16/ 29 studies included children with a mean age of ≤1 year and trainer background varied widely in the studies. The results indicate that video feedback interventions on parenting behaviour, parenting attitude and development of the child. Parents showed better interaction with their child, experienced fewer problems and gained more pleasure from their role as parent. Shorter programmes appeared to be more effective, and the effects were smaller for the parenting attitude domain.
Barlow et al. 2009, UK	Group based parent-training programmes for improving maternal psychosocial health	Group-based Several kinds	COCHRANE review and meta-analysis of RCTs	23 (26) studies	Anxiety Depression Self-esteem Social support Partner relationship	Studies were categorized based on their theory base: 1) programme-behavioural, 2) cognitive-behavioural, 3) multi-modal, 4) behavioural-humanistic, and 5) rational-emotive. A total of 64 assessments were performed, but only five outcome measures were sufficient for analysis. meta-analysis showed statistical significant short-term effects favouring the intervention group for depression, anxiety, self-esteem, and partner relationship. No long-term evidence exists, but inter-

Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
						ventions seem have the potential to enhance short-term the psycho-social health of the mothers. The meta-analysis of the social support data showed no evidence of effectiveness.
Brown et al. 2009, Australia	Early postnatal discharge from hospital for healthy mothers and term infants	Caring practice Service system development	COCHRANE review and meta-analysis of RCTs	10 trials (involving 4489 mothers)	Safety (health and well-being of mother and infant) Satisfaction with care Health care costs	The quality of the studies was generally poor. The definitions of early discharge varied. Antenatal preparation and home care following discharge also varied. Six trials randomized women during pregnancy and four after childbirth. No statistically significant differences in infant or maternal readmissions were found in eight trials. Five trials showed no significant difference or result favouring early discharge for the outcome of maternal depression, although only three used well-validated instruments. The results of eight trials showed that breastfeeding rates did not differ significantly between the early discharge group and the control group. Further studies are needed to study the rare, but serious adverse effects such as infant mortality.
Britton et al. 2009, UK	Extra support for breastfeeding	Several kinds	COCHRANE review of RCTs or quasi-RCTs	34 trials 829,385 (mother-infant pairs)	Breastfeeding Infant morbidity Maternal satisfaction with care or feeding method	All forms of extra support analysed together showed an increase in duration in "any breastfeeding". All forms of extra support together had a larger effect on duration of exclusive breastfeeding than any other breastfeeding. Lay and professional support alone and together extended duration of any breastfeeding significantly. Exclusive breastfeeding was significantly prolonged with use of WHO/UNICEF training. Further research is needed to identify the aspects of support that are the most effective. Maternal satisfaction was poorly reported.
Gagnon & Sandall 2009,	Individual or group antenatal education for childbirth	Education	COCHRANE review of	9 trials (including 2284	Knowledge Anxiety	Nine studies were included and 37 were excluded. Interventions varied greatly. Despite this, details

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Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
Canada/ UK	or parenthood, or both		RCTs	mothers)	Sense of control Pain Support Breastfeeding Infant care abilities Adjustment	of the randomization procedure, allocation concealment and/or attrition were poorly reported. Sample sizes were very small to moderate (10-318). No consistent results were found. No data were reported on anxiety, breastfeeding success or general social support. Knowledge acquisition, sense of control, factors related to infant care competencies, and some labour and birth outcomes were measured. The effects of general antenatal education for childbirth or parenthood, or both, remain largely unknown.
Moore et al. 2009, USA	COCHRANE review of early skin-to-skin contact (SSC) for mothers and their healthy newborn infants	Skin-to-skin	RCTs or quasi-RCTs	31 studies including 1925 mother-infant dyads	Breastfeeding Infant physiological parameters Infant stabilization Hospital stay NICU transfer Economic data Morbidity Behavioural changes Bonding Maternal psychological changes	Data from more than two trials were available for only 8/64 outcome measures. SSC had positive effects on breastfeeding at one to four months postbirth, and breastfeeding duration. Maternal affectionate love/touch during observed breastfeeding was noticed, and also maternal attachment behaviour with early SSC. SSC infants cried for a shorter length of time, and late preterm infants had better cardio-respiratory stability with early SSC. No adverse effects were found.
Bryanton & Beck 2010, USA	Intervention review of postnatal parental education	Educational	COCHRANE review of RCTs	15 trials (including 3689 mothers and 793 fathers)	Infant general health Parent-infant relationship	Educational interventions included: infant sleep enhancement (4/15), infant behaviour (13/15), general post-birth health (2/15), infant care (2/15), infant safety (3/15), and father involvement/skills (1/15) with infant. Details of randomization, allocation, blinding and participant loss were often not reported. Only measures used were similar enough to be combined in meta-analysis. Of these

Appendix 1. Articles included in the review of parenting interventions

Reference	Intervention	Type	Design	Participants	Outcomes	Key findings
						six, only two were found to have a low enough level of heterogenity to provide an overall estimate of effect. Education on sleep enhancement resulted in a mean difference of 29 more minutes of infant sleep in 24 hours than usual care. Education on infant behaviour increased maternal knowledge of infant behaviour. The benefits of educational programmes to participants and their newborns remain unclear. Education on sleep and infant behaviour potentially enhances mothers' knowledge. However, more, larger and well-designed studies are needed.
Halme et al. 2010, Finland	Collaborative interventions in services for families with children	Collaborative, different kinds	A systematic review of studies (2000-05/2008)	22 articles	Multiple	Interventions were aimed at children, their parents and/or families, or the work community, the system or working process. Most of the interventions were aimed at problematic situations, such as children with development, behaviour or learning difficulties. Only five studies were aimed at maintaining health. The intervention comprised a variety of different types: guidance, groups, multi-professional meetings, home visits etc. Many different outcome measures were used; therefore, it was not possible to draw reliable conclusions regarding the impact of different interventions.

Appendix 2. Internet-based parenting interventions and parents as internet users

Reference	Intervention	Aim	Methods	Control	Results/ conclusions
C'de Baca et al. (1997), USA	The Pregnancy Information Program including computer-assisted interview to provide risk factor information	To determine whether data gathered from a computer interview have predictive validity in determining pregnancy outcomes.	-Quantitative, computer-assisted interview -Pregnant mothers (N=190)	-	After known risk factors were controlled for, father's self-reported psychosocial problems, low social support, and substance abuse were associated with pregnancy complications.
Hern et al. (1998), USA	NetWellness Consumer women's health information resource including expert advice	To review results published elsewhere	- Not included in the article	-	The most popular part of the website was the ask-on expert service, where two expert nurses provided advice about pregnancy, breastfeeding and newborn care. The most frequently asked questions were related to pregnancy.
Hudson et al. (1999), USA	A computer network to provide health information and support one year after the childbirth. -Information section -Email access to peers and APNs	To describe the use of the Young Parents Project among adolescent mothers	-Qualitative, exploratory, pilot study -Content analysis of e-mail messages -Telephone interview -Adolescent mothers (N=9), primiparas	-	Adolescent mothers had primarily a positive assessment of the computer network, it provided information and support for them. Eight different themes emerged in mothers' e-mail messages: introductions, emotional support, social support systems, infant sharing, infant issues, postpartum issues, finances and education, and computer support.
Gray et al. (2000), USA	Baby CareLink -A multifaceted telemedicine programme (videoconferencing, information) to enhance interaction between family, staff and community providers.	To evaluate an Internet-based telemedicine programme designed to reduce the costs of care, and to enhance medical, informational, and emotional support for families of very low birth weight (VLBW) infants during and after their neonatal intensive care unit (NICU) stay.	-RCT within 10 days postpartum -A cohort of VLBW infants (N=56) -Quality of care, hospital length of stay, family visitation, and interaction with infant and staff.	Usual care	Intervention group reported higher overall quality of care and fewer problems. Intervention group reported greater satisfaction with the unit's physical environment and visitation policies. The frequency of visits, telephone calls, holding the infant and the duration of hospitalization until ultimate discharge did not differ between the groups. Among children born weighing less than 1000 grams there was a tendency towards shorter hospital stays. All infants in the intervention group were discharged directly home from NICU, whereas 20% of controls were transferred to community hospitals before ultimate discharge. Carelink significantly improved family satisfaction and lowered costs of hospital to hospital

Appendix 2. Internet-based parenting interventions and parents as internet users

Reference	Intervention	Aim	Methods	Control	Results/ conclusions
					transfer. Data suggest that internet use supports the emotional and educational needs of families with VLBW infants.
Thornberry et al. (2002), UK	Audio computerized self-report interview used in initial prenatal clinics to detect alcohol consumption among pregnant women	To evaluate the feasibility of the selected method and its acceptability by pregnant women.	-Quantitative -Computerized self-report structured interview -Pregnant mothers among disadvantaged population (N=631)	-	Nearly all of (96%) this highly disadvantaged population of pregnant mothers reported that the computer was not difficult to use, and approximately 90% liked answering the questions using a computer.
Tuffrey & Finlay (2002), UK	Parenting websites	To assess parental use of internet to find medical information about their child's condition, and to ascertain what information is sought and found.	-Quantitative, questionnaire -Parents in the paediatric outpatient clinic (N=577)	-	Most participants (69%) owned a computer and had internet access (52%). Many parents (22%) had searched the internet for medical information about the problem their child had before they came to the clinic that day. Parents were more likely to search for medical information on the internet if they knew their child's diagnosis than if they knew their child's symptoms only.
Dhillon et al. (2003), Canada	Parenting websites	To assess parental use of internet resources for medical information before and after the birth of an ill baby, to determine parental perception of the reliability of various sources of information, and to ascertain the sosiodemographic factors associated with access to internet and internet use.	-Quantitative, questionnaire -Parents in the NICU (N=100)	-	The number of parents using the internet decreased significantly after childbirth (before non-medical searches 84% and medical searches 47%; after childbirth non-medical searches 40% and medical searches 29%, $p<0.0001$ & $P<0.03$). High education correlated with internet access ($p=0.0006$) and fluency of reading English ($p=0.05$). NICU doctor was considered to be a reliable source of medical information by 80% of the parents, the internet by only 10%.
Hudson et al.	The New Fathers	To test the effectiveness	-Quantitative, questionnaire	Usual care	Intervention fathers perceived the New Fathers

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Reference	Intervention	Aim	Methods	Control	Results/ conclusions
(2003), USA	Network -Information section -Discussion forums -Expert advice	of internet-based interventions for first-time fathers.	- Pilot study -First-time fathers (N=34)		Network as helpful in providing information and support. The intervention had positive effects on fathers' self-efficacy and parenting satisfaction as compared to the control group.
Sanghavi (2003), USA	Waiting room educational kiosk -Computerized tutorials to give guidance at well-child visits	To design a waiting room educational kiosk that uses interactive, self-guided, computerized tutorials	-Quantitative, questionnaires -Parents of six-week-old and four-month-old infants (N=101)	Usual care	The intervention group parents had superior knowledge compared to control parents in all test areas. The study results favoured the use of computerized guidance over printed materials alone.
Semere et al. (2003), USA	Parenting websites	To determine parents' access to and use of the internet for information relating to their child's health; to investigate parents' methods of searching for such information; and to evaluate the information found in relation to its readability, accuracy, and influence.	-Quantitative, questionnaire -Parents in the paediatric surgery outpatient clinic (N=150)	-	The majority (98%) of the parents agreed or somewhat agreed that the information they found on the internet was comprehensible and helpful. All respondents at least somewhat trusted the information they found on the internet. More than half (52%) were influenced by online information when making a medical decision.
Bernhardt & Felter (2004), USA	Parenting websites	To explore why and where mothers of young children look for health information and how they determine whether the information they receive is trustworthy.	-Four focus groups, in-depth exploration of web-related behaviours and beliefs -Mothers of young children	-	Most mothers sought information on the internet during pregnancy and nearly all sought online information after the child was born, primarily to diagnose or treat paediatric problems, to seek advice on parenting and infant development, and to seek support from other mothers. Commercial websites were mainly used, but participants expressed their concern about the trustworthiness of the information and disdain for commercial pages.
Kouri & Kemppainen	Implementation of the Net Clinic[1]	To describe the implementation and security	- Qualitative - Development research approach	-	Intervention families formed a virtual sense of community, which gradually evolved into a real-life

Appendix 2. Internet-based parenting interventions and parents as internet users

Reference	Intervention	Aim	Methods	Control	Results/ conclusions
(2000), Finland[1] Kouri et al. (2006a), Finland[2] Kouri et al. (2006b), Finland[3]	-Information section -Peer discussion forums -Email access to experts Use of the Net Clinic for one year period beginning from 8-12 gestational weeks[2,3]	in distributed infant and maternity care[1] To analyze the conversations between expectant families [2] To find out what aspects of parenthood parents revealed, and how they expressed their thoughts concerning maternity care services in an online communication forum [3]	-Conversations with families (N=21) experiencing normal pregnancy, both primiparas and multiparas[2,3] -Inductive content analysis		sense of community by finding resemblances of their life situations, by giving peer support to each other and by giving feedback concerning their experiences about maternity care. Two main categories were found in the discussion forum: 1) knowledge sharing and mutual support, and 2) trust-based gateway to other parents' lives. The Net Clinic also served as a mirror of the maternity service available and offered maternity care professionals a deeper understanding of how to support pregnancy and parenting. [2,3]
Kouri et al. (2005a), Finland	The Net Clinic	To evaluate the commitment of project participants.	-Quantitative and qualitative -Questionnaires for project workers with open-ended questions (N=80)	-	Positive commitment was related to a confidential and open atmosphere during the project. Exploitation of unique skills and experience was appreciated. Differences in working culture and principles were a challenge. Internal communication and effective realization of tasks were considered very important in the project.
Kouri et al. (2005b), Finland	The Net Clinic	To describe the experiences of maternity care professionals using internet-based network service, and the opportunities and obstacles they encountered while organising their work and developing their knowledge.	-Qualitative -Semi-structured thematic interviews of maternity care professionals (midwives, public heath nurses and doctors) (N=10)		Professionals supposed that especially young parents would be eager to use the service. Privacy issues were considered to be a requirement for the development of an internet-based service for parents. Managerial support in the form of providing time and equipment was considered very important. Three types of users were identified among professionals: doubters, accepters and future confidents.
Ondersma et al. (2005), USA	Computer-based brief motivational enhancement system (MES) for perinatal	To evaluate the effectiveness of systems using Illicit drug use as an outcome (measured	Study 1: -Qualitative and quantitative -Mothers (N=47) using drugs Study 2:	- -	Participants rated the MES as highly acceptable and easy to use. They also reported significant increases in state motivation at post-intervention and at 1-month follow-up.

Appendix 2. Internet-based parenting interventions and parents as internet users

Reference	Intervention	Aim	Methods	Control	Results/ conclusions
	drug use	by qualitative urinalysis and self-report)	-Quantitative -Mothers (N=50) using drugs Study 3: -Quantitative -Mothers (N=30) using drugs	Study 3: Usual care	These preliminary results seem encouraging and suggest further work.
Herman et al. (2005), USA	The Healthy Pregnancy Website -Health information -Ask-a-nurse -Discussion board	To examine the feasibility and patterns of use of a social support website.	-Quantitative and qualitative, descriptive -Number of visits to website, most popular pages, content analysis of postings, and e-mails to a nurse. -African American, low-income, primiparous, low risk mothers (N=19)	-	Participants learned easily how to use the website. They accessed the discussion board most frequently, followed by changes during pregnancy by month, ask-a-nurse feature, ultrasound, stories about pregnant women, and spirituality. The discussion board is the most effective way of delivering informational social support on a comprehensive social support website.
Sarkadi & Bremberg (2005), Sweden	A general Swedish parenting website	To investigate whether users perceived support in parenting role, and, if so, whether this support was socially biased because of the digital divide phenomenon.	-Quantitative, eSurvey¨ -Users of the web site (N=2221), 95%female, 3% male, 2%unknown	-	Educational level was slightly, but not significantly higher than among the general population, but 68% had an income level at or under the national average. Social support was perceived as high. Low income levels and living without a partner increased perceived support. The perception that other parents' opinions were more valuable than the advice from experts was influential in the regression equation for social support scores, which indicates that peer support is important in online support. Internet use for general parenting issues does not seem to follow the digital divide phenomenon. The internet provides an opportunity for infant/child health work. Gender bias was introduced into this medium.
Christakis et al. (2006), USA	MyHealthyChild 1) Parental content: Information about preventive topics. 2) Provider notifica-	To test the hypothesis that parental activation could occur through directed use of an Internet site before a well-child visit, and that	-RCT -887 children were randomized into 4 groups: 1) Parental content 2) Provider notification 3) Parental content, and Provider	Usual care	Parents in the Parental content/ Provider notification group and in the Provider notification-only group reported discussing more MyHealthy topics with their provider. In addition, Parents in the Parental content/ Provider notification group and in the Parental content-only group reported implementing

Appendix 2. Internet-based parenting interventions and parents as internet users

Reference	Intervention	Aim	Methods	Control	Results/ conclusions
	tion: Communicated to physicians topics that were of interest to parents.	activation would promote the discussion of evidence-based prevention topics with providers, and would result in increased parental and physician adoption of preventive measures.	notification 4) Usual care -Telephone follow-up survey 2 to 4 weeks after the visits		more MyHealthy topic suggestions (e.g. safety device). A web-based intervention can activate parents to discuss prevention topics with their child's provider. Delivery or tailored content can promote preventive practices.
Dornan & Oermann (2006), USA	Websites on breast-feeding	To evaluate the quality of websites on breast-feeding for patient education.	-Quantitative -Descriptive design: American Academy of Paediatrics (AAP) Breastfeeding Content Criteria and Health Information Technology Institute (HITI, 1999) criteria -Most commonly used we site (N=30) in the three most common search engines (Year 2004: Google, Yahoo & MSN)	-	Seven of the 30 sites included all eight of the Breastfeeding Content criteria from AAP, and three did not include any of the AAP criteria. Nurses should be able to recommend best patient education materials for their patients. The five best websites for breastfeeding education are identified in this article. HITI criteria are explained to nurses so that they can learn how to evaluate websites for themselves and their patients.
Wallance et al. (2006), Australia	Evidence-based decision aid aiming to impact parents' attitudes about measles, mumps and rubella (MMR) vaccine.	To determine whether an evidence-based decision aid changed parents' attitudes towards vaccination.	-Quantitative, questionnaire before and after the intervention -Participants (N=158) recruited from popular web pages for parents	-	Significantly more participants indicated that they were "learning towards" vaccination after using the decision aid (39% vs. 55%, P<0.001). Intervention improved attitudes to MMR vaccination, participants were more likely to know their options and felt they had enough information to make a decision.
Wang et al. (2006), Taiwan	A web-based childbirth education programme for VBAC (vaginal birth after C-Section) mothers.	To develop a web-based childbirth education programme, and to compare the knowledge about and attitude towards VBAC before and after attending the education programme.	-Quantitative & qualitative (phenomenological, Colaizzi) -10 mothers who experienced C-section previously and currently pregnant over 32 weeks.	-	A 90-minute (Call to confirm the minimum use: 60 min) education programme and its goals, content and teaching methods were established. The outcomes indicate a significant difference in VBAC knowledge ($p<0.01$) and attitudes ($p<0.05$) before and after the curriculum. Participants evaluated the programme to be thorough. This programme can be offered to nursing staff as a means to promote VBAC.

Appendix 2. Internet-based parenting interventions and parents as internet users

Reference	Intervention	Aim	Methods	Control	Results/ conclusions
Thompson et al. (2007), USA	Touch-screen Computer Kiosks for child health promotion in urban, low-income, community setting Includes 14 modules related to different child health topics	To evaluate the use of Touch.screen Computer Kiosks	-Quantitative, eSurvey -3 kiosks/ 1846 sessions: in public library, a Department of Motor Vehicles office, and McDonald's restaurant. - Entering age-appropriate modules	-	Users sought information for children of all ages. At-risk children were identified in 52% of the sessions. 28% of users responded to questions on an exit survey. Of those, 48% had less than high school education, 26% had never used the internet, but they found the internet easy to use (57%). 55% planned to try some of the things they had learned, and 49% intended to talk to their doctor about what they had learned. Users found them easy to use. Further research is needed.
Bragadottir (2008), Iceland	A computer-mediated support group (CMSG) An unstructured list serve group including email communication over 4-month period.	To evaluate the feasibility of a CMSG intervention for parents whose children had been diagnosed with cancer in Iceland.	-An evaluative design, one-group, before-and-after: Before (1), at 2 months (2) and at the end at 4 months (3). -Measures: anxiety, depression, somatization, and stress; perceived mutual support and use of CMSG. -Parents (mothers n=11; fathers n=10) whose children had completed cancer treatment during the past 5 years.	-	Mothers' depression decreased significantly from time 2 to 3 ($p<0.03$). Fathers' anxiety decreased significantly from time 1 to 3 ($p<0.01$), and stress from time 2 to 3 ($p<0.02$). Mothers and fathers experienced some mutual support from participation. Both mothers and fathers used CMSG to read messages. Messages were primarily written by mothers. The findings support the further development of CMSGs for parents whose children have been diagnosed with cancer. CMSG can be used in addition to or as a substitute for traditional face-to-face support groups, and might suit both genders equally.
Hudson et al. (2008), USA[1] Hudson et al. (2009), USA[2] Campbell-Grossman et	The New Mothers Network (NMN) for improving single, low-income African American mothers' health and parenting abilities. Available for 6 months postpartum	To describe the development of a theoretically based social support Internet intervention. [1] To enhance understanding of the phenomenon of being a single, low-income African American	-Qualitative: Thematic analysis of 174 messages posted in the NMN discussion forum by 19 single, low-income African American mothers.[2] -Qualitative: Thematic analysis of e-mail messages of 12 single, low-income African American mothers. [3]	-	The development is described in six stages. The theoretical base and functional components are also described. [1] The following themes emerged in the discussion forum: 1) Dealing with the father of the baby, 2) mourning losses, 3) positive and negative support, 4) financial needs and concerns, 5) career and educational goals, 6) balancing act, 7) trust issues, and 8) tuned in to baby. [2]

Appendix 2. Internet-based parenting interventions and parents as internet users

Reference	Intervention	Aim	Methods	Control	Results/ conclusions
al. (2009), USA[3]	-Information section -Discussion forums -Email access to Advanced practice nurses (APN)	mother through their discussions and use of an Internet-based social support intervention. [2] To describe themes representing the content of e-mail messages to nurses. [3]			The following themes emerged in e-mail messages: 1) Life logistics: day-to-day concerns; 2) relationships of support; and 3) personal reflections about being a new mother. [3] Nurses are in a key position with respect to providing support, and can support single, low-income African American mothers via e-mail messages to assist them with infant care and self-care. [3]
Larsson (2009), Sweden	Pregnancy-related information on the internet	-To investigate whether pregnant Swedish women used the Internet to retrieve pregnancy-related information, how they perceived the reliability of the information, and whether they discussed this information with their midwife during antenatal care visits.	-Quantitative, waiting-room questionnaires. -Descriptive, cross-sectional design. -11antenatal clinics in central Sweden -Women (N=182) at least 32 weeks pregnant. Response rate 85%.	-	Most (91%) of the woman had access to the internet, and used it to retrieve information to a great extent (84%), most often during the early stages of pregnancy. Fetal development and stages of childbirth were the two most often mentioned topics of interest. The most common child-related topics were products for baby and breastfeeding. Most participants considered the information to be reliable, and the two most important criteria for judging the trustworthiness of web-based information were whether the facts were consistent with information from other sources and whether references were provided. Most (70%) of the women did not discuss the information they had retrieved from the internet with their midwife, but more than half of them (55%) searched for information on topics brought up by the midwife. Swedish pregnant women often use the internet to search for information related to pregnancy, childbirth and the expected baby. They perceive this information to be reliable, but do not discuss it during antenatal visits. Care providers should be able to guide pregnant women to high-quality, web-based information, and then discuss this information with them during antenatal visits.

Appendix 3. Most significant infant, parent and environmental attributes and their cumulative effect (R square) on parenting self-efficacy

Attributes	**PARENTING SELF-EFFICACY**							
	INTERVENTION HOSPITAL				CONTROL HOSPITAL			
	Mothers (n=469)		**Fathers (n=307)**		**Mothers (n=394)**		**Fathers (n=218)**	
	Pearson Sig	Cum R^2	Pearson Sig	Cum R^2	Pearson Sig	Cum R^2	Pearson Sig	Cum R^2
PARENT								
Parity	.450 .000	.202	.225 .000	.051	.275 .000	.076	.242 .000	.059
Self-concept	.341 .000	.333	.268 .000	.147	.309 .000	.178	.175 .010	.103
Depressive symptoms	-.307 .000	.353	-.227 .000	.165	-.334 .000	.212	-.256 .000	.136
State of mind on discharge	.512 .000	.425	.498 .000	.291	.530 .000	.336	.444 .000	.238
INFANT								
Perception of infant	.402 .000	.440	.418 .000	.338	.441 .000	.378	.396 .000	.273
ENVIRONMENTAL								
Family functioning	.280 .000	.457	.417 .000	.421	.389 .000	.452	.403 .000	.355
Family health	.305 .000	.463	.304 .000	.425	.346 .000	.452	.327 .000	.359
Advice from nursing professionals	.351 .000	.463	.397 .000	.448	.399 .000	.480	.337 .000	.375

Significance (p) is determined by Pearson's correlation (two-tailed), Cumulative R^2 is determined by Multiple Regression Analysis.

Appendix 4. Least significant infant, parent and environmental attributes and their cumulative effect (R square) on parenting self-efficacy

	PARENTING SELF-EFFICACY							
	INTERVENTION HOSPITAL				CONTROL HOSPITAL			
Attributes	**Mothers (n=469)**		**Fathers (n=307)**		**Mothers (n=394)**		**Fathers (n=218)**	
	R Sig	Cum R^2	R Sig	Cum R^2	R Sig	Cum R^2	R Sig	Cum R^2
PARENT								
Parent age	.019 .682	.000	.025 .671	.001	.017 .742	.000	.032 .645	.001
Education	-.120 .009	.024	-.160 .005	.035	-.112 .026	.015	-.107 .119	.012
Infant centrality	.073 .118	.025	.149 .010	.046	.081 .112	.019	.097 .158	.017
Life change	-.232 .000	.082	-.058 .315	.051	-.163 .001	.049	-.137 .045	.046
Experience of childbirth	.203 .000	.117	.110 .060	.062	.249 .000	.102	.198 .004	.091
INFANT								
Gestational weeks	.099 .032	.128	.043 .463	.064	.047 .352	.101	.078 .256	.094
Infant birth weight	.062 .177	.130	.026 .655	.066	.070 .168	.102	.084 .218	.134
Infant health	.143 .002	.138	.145 .012	.086	.147 .004	.117	.074 .279	.155
Infant current age	-.012 .794	.138	-.024 .674	.086	-.065 .198	.116	.055 .421	.164
ENVIRONMENTAL								
Rooming-in	-.060 .198	.150	-.143 .016	.145	-.096 .058	.169	-.067 .342	.224
Feeding practices	-.123 .007	.203	-.110 .057	.174	-.207 .000	.217	-.096 .162	.278
Father present at the hospital	.141 .002	.267	.005 .926	.298	.078 .126	.255	.040 .559	.366
Social support from nursing professionals	-.138 .003	.254	.080 .176	.304	.033 .521	.245	-.004 .955	.373

Correlation coefficient R and significance (p) are determined by Pearson's or Spearman's (two-tailed) correlation tests; Cumulative R^2 is determined by Multiple Regression Analysis, categorical variables treated as fixed factors.

JAN ORIGINAL RESEARCH

Development of an internet-based intervention for parents of infants

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Abstract

Title. Development of an internet-based intervention for parents of infants.

Aim. This paper reports on a study to describe the development of an internet-based intervention for parents with infants and to compare the participants and hospitals at baseline.

Background. There is a need for interventions to support parenting and for more research into the use of information technology as an intervention strategy. The design and development of healthcare interventions is a complex task, but these are rarely discussed in research reports.

Methods. A quasi-experimental study was conducted. The data (N = 1300 families) were collected using a structured questionnaire at the hospital or no later than 1 week after discharge during the winter of 2006. The results were used to develop the intervention and to compare the participants at baseline. Statistically significant differences were determined by chi-squared or Fisher's exact tests for percentages and one-way ANOVA for means. The internal consistency relialibility of the scales was analysed using Cronbach's alpha coefficients.

Findings. Participants in the intervention (n = 469 mothers, n = 307 fathers) and control (n = 394 mothers, n = 218 fathers) hospitals were comparable in respect of parent and infant attributes. There were statistically significant differences between the hospitals in fathers' overnight stays and their access to social support from professionals on the maternity ward. Exclusive breastfeeding was more common in the intervention hospital. More support for infants' cues and behaviour, and day-rhythm and sleep were needed in the intervention hospital.

Conclusion. More research is needed to gain a clearer understanding of the effect size of the differences for a reliable evaluation of the effectiveness of the proposed intervention.

Keywords: family nursing, infants, internet, intervention studies, midwifery, parents, quasi-experimental design

Introduction

Families with infants often live some distance from their relatives and social networks in modern societies. On the other hand, people live in close proximity to their neighbours without knowing most of them (Giddens 2001). Parents have a need to belong to a larger community of people who share the same kind of life situation. The birth of a child and becoming a parent requires adaptation (Barnard 1994) and is a risk for family well-being (Åstedt-Kurki *et al.* 2002).

Therefore, interventions to support parenting are needed, especially preventively-oriented support that makes use of information technology (Nyström & Öhrling 2004, Magill-Evans *et al.* 2006). Furthermore, there have been calls to apply standardized methods to evaluation of the effectiveness of interventions (Hudson *et al.* 1999, Thompson *et al.* 2004).

The design and development of healthcare interventions is a complex task (Bradley *et al.* 1999, Blackwood 2006). The evaluation of these interventions also involves several methodological challenges, and various models have been developed to ease these difficulties (e.g. Bradley *et al.* 1999, Medical Research Council 2000, van Meijel *et al.* 2004). The CONSORT statement (Altman *et al.* 2001, Moher *et al.* 2001) helps authors improve the quality of research reports using a checklist and flowchart. It presents randomized controlled trials (RCT) as the method par excellence for evaluating the effectiveness of interventions. However, other methods can also give insights into the reasons why an intervention is or is not effective (Bradley *et al.* 1999, Blackwood 2006). Information about the development and implementation of interventions is crucially important for evaluating their strengths and weaknesses, yet these aspects are rarely discussed in research reports (Bradley *et al.* 1999, van Meijel *et al.* 2004).

In this study, it was reported that we applied a model for developing evidence-based nursing interventions to report the development of an internet-based intervention for parents of infants. This model involves four steps: (1) problem definition; (2) accumulation of building blocks for intervention design; (3) intervention design and (4) intervention validation (van Meijel *et al.* 2004).

Background

Problem definition

In order to form a thorough and comprehensive impression of the research problem, it was necessary to take account of the views of mothers, fathers and professionals. Therefore, in defining the problem we consulted previous research, the clinical experience of the project team and hospital professionals. Today, many parents of infants feel overwhelmed (Nyström & Öhrling 2004), and the lack of consistent advice and social support is obvious (Tarkka *et al.* 1998, 2000, Tarkka 2003, George 2005). There is also direct evidence from nursing practice of a perceived lack of support and social networks during pregnancy and the infant's first year of life. The WHO's (2004) recommendations for 6-month exclusive and partial breastfeeding during the infant's first year of life are not put into practice in many western countries including Finland, where the study was conducted.

Accumulation of building blocks for intervention design

The building blocks for the intervention design consisted of (1) a literature review; (2) problem analysis; (3) needs analysis and (4) current practice analysis. The aim of our first literature review was to identify what kinds of interventions have been undertaken to support parents of infants and how their effectiveness has been measured. This review sparked an interest in learning more about internet-based interventions, which were subsequently covered in another review. Internet use and internet-based interventions have been studied among different groups of parents, including those with healthy infants (Sanghavi 2005, Kouri *et al.* 2006a, 2006b, Wallace *et al.* 2006), first-time fathers (Hudson *et al.* 2003), teenage mothers (Hudson *et al.* 1999), parents with a sick infant (Tuffrey & Finlay 2002, Dhillon *et al.* 2003, Semere *et al.* 2003) and substance abusing and other high-risk mothers (C'de Baca *et al.* 1997, Thornberry *et al.* 2002, Ondersma *et al.* 2005).

Computer-assisted methods have been used in evaluating health risks (C'de Baca *et al.* 1997, Thornberry *et al.* 2002) and in motivating parents (Ondersma *et al.* 2005). In addition, the internet has proved to be a powerful forum of communication and allows parents to find their sense of community (Hudson *et al.* 1999, Kouri *et al.* 2006b). For example, in a study by Hudson *et al.* (2003), online support was found to strengthen fathers' self-efficacy and parenting satisfaction 4–8 weeks postpartum. However, these studies have been conducted with small sample sizes, and most have included no control group. No review papers were found on computer use or internet-based interventions for parents of infants, and several researchers (e.g. Hudson *et al.* 1999, de Montigny & Lacharite 2005, Ondersma *et al.* 2005) have suggested that further research is needed on internet-based interventions for parents.

The problem and needs analysis was based on literature reviews and collaborative meetings between hospital professionals and the project team. An important starting point in developing internet applications is to identify the users of those applications and their needs (Stamm 1998, Gustafson & Wyatt 2004). We found an abundance of earlier research on the needs and expectations of mothers, but very little evidence on fathers' needs, factors influencing fathers' well-being and comparisons between mothers and fathers (de Montigny & Lacharite 2005, Magill-Evans *et al.* 2006).

Before embarking on an intervention, it is important to consider what it will add to current practice (Stamm 1998,

Randolph *et al.* 1999, Gustafson & Wyatt 2004). Therefore, we analysed current practice by reference to previous studies, the experiences of professionals and national statistics. In Finland, maternity and child health care is provided by a network of public maternity and child healthcare clinics and public hospitals that specialize in obstetric and neonatal care. These organizations care for almost all mothers in the country from pregnancy through to birth. National statistics for Finland (STAKES 2007) show that its total fertility rate (1·8 in 2006) is one of the highest in Europe, and its perinatal mortality rates (4·8 deaths per 1000 births) are among the lowest in the world. The mean weight of newborns in 2006 was 3499 g. The number of children born before 37 weeks (5·9%) has increased during the past decade. The mean age (30 years) of all parturients has remained stable for many years, as has the mean age (28 years) of primiparas. Most Finnish parturients are married (59·9%) or cohabiting (30·3%), and fathers are actively present during labour and hospital stays. In 2006, the average duration of hospital stays after childbirth was 3·4 days. As in several other western countries, the rate of postnatal depression is estimated at around 10–15% (Tammentie *et al.* 2004).

Shorter hospital stays are challenging healthcare professionals to offer effective support to facilitate parents' self-care. Parents in Finland are highly educated, which is an excellent foundation for widespread internet use. At the beginning of 2007, 79% of the Finnish population reported using the internet, and in the age group under 40 the figure was close to 100% in all regions (Statistics Finland 2007). In fact, parents are actively searching for information about child care, development and health problems from the internet in the privacy of their homes and at the time of their choice (Tuffrey & Finlay 2002, Dhillon *et al.* 2003), and also make decisions based on this information (Semere *et al.* 2003). However, there is no guarantee that this information is either current or accurate (Lamp & Howard 1999, Dhillon *et al.* 2003). The internet therefore seems to have great potential for supporting parents and strengthening their resources, but there still remain challenges for professionals to produce reliable health information.

Intervention design

The goal set for the development of the intervention was to create a reliable, attractive and easy-to-use interactive resource that provides practical, essential and consistent information and social support for both parents. This ongoing study is a part of a collaborative project called 'Urban Parenthood', which is aimed at enhancing the well-being of families with infants, supporting parents and developing instruments for the evaluation of family well-being and support. Social support is understood as intentional human interaction that involves one or more of the following supportive elements: (1) affect, which refers to appreciation, admiration, respect or love and sense of security; (2) affirmation, which includes reinforcement, feedback and influence over a person's way of making decisions and (3) concrete aid, such as objects, money or time spent on helping someone (Kahn 1979). An internet resource was selected as the project's main intervention tool. The data from the cohort I parents were collected using a cross-sectional study to establish information to develop the intervention and collect the data before the intervention was implemented. The cohort II data were collected using a longitudinal study design to evaluate the effectiveness of the intervention.

Based on the Parent–Child Interaction Model (Barnard 1994), parent–child interaction is conceptualized as a process of mutual adaptation and it is influenced by several parent and infant attributes. In our study, parent–infant interaction is measured from the parents' perspectives on their parenting experiences: parenting satisfaction and parenting self-efficacy. Previous research (Mercer 1986, Tarkka *et al.* 2000, Pridham *et al.* 2001, Tarkka 2003) has shown that parenting experience is influenced by parent attributes: age, education, parity, self-concept, depressive symptoms, time and state of mind at discharge. Infant characteristics also influence parenting experience (Pridham *et al.* 1999, Hudson *et al.* 2001, Elek *et al.* 2003, Tarkka 2003). This parent–infant interaction can be influenced and facilitated by the environment, which consists of resources (Barnard 1994). Family is here understood as a resource and as a whole composed of different family members (Friedman 1998). Barnard (1994) emphasizes the importance of support during the first postpartum year.

Therefore, our intervention offers online information and support for parenting, breastfeeding and infant care, and was designed to strengthen parenting satisfaction and self-efficacy. Parenting satisfaction is defined as perceptions of pleasure and gratification regarding parenting role. This includes satisfaction in carrying out infant care tasks, how well the parent knows the infant, and the extent to which self-expectation as a parent is being met (Pridham & Chang 1989). The first hypothesis in the larger study is that parents exposed to the intervention will score higher than control parents in parenting satisfaction during the first year of parenthood. In addition, given the key importance of parenting self-efficacy to parental practices, we chose to base the intervention also on Bandura's (1997) self-efficacy theory. Parenting self-efficacy is defined as 'beliefs or judgements a

parent holds of their capabilities to organize and execute a set of tasks related to parenting a child' (de Montigny & Lacharite 2005, pp. 387). Therefore, the second hypothesis is that intervention parents will score higher than their controls in parenting self-efficacy during the first year of parenthood.

Our internet-based intervention consists of separate components: the content of the resource (information database), the selected communication methods (online peer discussion forum and questions/answers service) and the training of nurses and midwives for the online answering service. The content offers information about the tasks related to parent–child interaction in everyday situations; how to be sensitive to infants' cues and needs; and how to respond to them in a growth-fostering way (Barnard 1994). The production of the content was begun based on previous research, tacit knowledge and the nationwide infant care recommendations issued by the Finnish Ministry of Social Affairs and Health (Finnish Ministry of Social Affairs and Health 2004, Hasunen *et al*. 2004), but was completed as the cohort I data were collected. The intervention is designed to provide additional support and does not substitute for any other existing service.

Parents receiving the intervention are given individual user names and passwords that allow them to register for the internet resource midway through the pregnancy and access the information database and peer discussion forum while expecting their child. They can use these services based on their individual needs. These services complement the care and guidance given at the hospital after childbirth and through to 1-year postpartum. Furthermore, parents can contact a registered nurse or midwife for 2-week postpartum and ask anonymous questions online. The nurses or midwives answering their questions have taken part in a training programme based on social constructionism, open dialogue and a reflective process. The study was guided by the constructive perspective on learning, which takes account of social and contextual dimensions (Prawat 1996).

Intervention validation

The study was launched in August, and the project team submitted its first preliminary plan to the nursing directors of the participating hospitals in January 2006. In addition to the project team and project management group, six more teams were formed: a team of students working to produce the intervention content; a team of professionals working on content production; a technical team; a multi-professional content evaluation team; an editorial team and a team charged with developing the online answering service.

Bachelor's degree students in nursing and midwifery (n = 28) produced the content of the resource in collaboration with their teachers and the project team. In addition, professionals (n = 21) including neonatologists, a nutrition therapist, physiotherapist, sexual therapist and registered nurses and midwives from several specialties contributed to producing the content. Work to develop the content was started in collaboration with the technical team during 2006 while cohort I data collection was ongoing. The multi-professional content evaluation team, including pedagogy specialists, neonatologists (incl. A-LJ), a technical specialist, gynecologist, midwife, pediatric nurse and a researcher (AHS), met several times to discuss, assess and make suggestions to improve the content. This team also included members from two voluntary organizations representing mothers and fathers.

The name of the service (http://www.vauvankaa.fi) was created by the editorial team, and its final structure was organized around six themes: (1) for mothers; (2) for fathers; (3) your baby; (4) life as a couple and family; (5) what to do when you're in trouble and (6) support for the family. The texts were edited by a specialist in online communications. Feedback from the cohort I study was forwarded to the writers while the process was ongoing, and the content of the service was modified and completed on the basis this feedback. The final modifications were also made on the basis of comments and suggestions from the multi-professional content evaluation team and a pilot test. All steps described above were essential parts of developing the intervention and forming its theoretical base.

The study

Aim

The aim of the study was to describe the development of an internet-based intervention for parents with infants and to compare the participants and hospitals at baseline. The hypothesis was that parent, infant and environmental attributes are equivalent in the intervention and control hospitals at baseline.

Design

Two public university hospitals were chosen to represent families in a variety of life situations in urban and suburban areas in southern Finland. The sample size for each cohort (N = 1300 families) was calculated using power analysis (Cohen 1988). The sample in the control hospital was smaller (600 vs. 700) because a smaller number of patients was

treated there. The cohort I data were collected using a convenience sample and a cross-sectional study in 2006.

Participants

The sample for cohort I consisted of mothers and fathers in maternity hospitals; both primiparas and multiparas were included. 'Mother' was defined as a woman giving birth and 'father' as the infant's father or mother's spouse. The inclusion criteria were: ability to speak Finnish, infant treated at the maternity or neonatal unit and at least one parent in the family willing to participate. The exclusion criteria were: multiple birth (twins, triplets) and early discharge parents receiving support at home from the maternity hospital (home visit, nurse or midwife telephone call).

Data collection

Parents were informed about the study 1 day before discharge. Each parent was asked to complete a questionnaire at the hospital or no later than 1 week after discharge. The whole questionnaire including all instruments was pretested with doctoral level maternity care professionals ($N = 7$) and families of infants ($N = 70$). After this a total of 2600 questionnaires were handed out to parents in the target hospitals (Table 1). Refusal rates were similar in the two hospitals; a total of 98 mothers and 151 fathers refused to participate. The reason for refusal (busy, tired, business trip or perceived unnecessary) was documented only if it was communicated spontaneously. A total of 961 mothers and 580 fathers agreed to participate; finally, 1388 questionnaires from 863 mothers (66%) and 525 fathers (40%) were returned. The response rate for mothers was identical in the target hospitals, but the response rate for fathers was higher in the intervention hospital.

Independent variables included parent, infant and environmental attributes (Table 2). Parent attributes included self-concept, which was measured using an instrument developed by Saari and Majander (1985). This instrument has proven to be valid with childbearing mothers in Finland (Tarkka *et al.* 1998, 2000). Depressive symptoms were measured with the Edinburgh Postnatal Depression Scale (EPDS) (Cox *et al.* 1987, 1993). Parent's state of mind on discharge was measured with an instrument measuring whether the parent was fearful, strained, tired and saddened (Tarkka *et al.* 2000). Parent attributes also included age, education, marital status and parity (Table 3).

Parental perception of the infant was measured with an instrument developed for this study (Table 2). Perceptions measured included those of eating, sleeping, contentment, activity level, clarity of cues, adaptability, soothability and general perception about the child's health and how demanding the infant is. Other infant attributes were: current age, gender, birth weight and gestational weeks (Table 3).

Environmental attributes measured family functioning and health (Åstedt-Kurki *et al.* 2002) (Table 2). This instrument was tested for the first time among parents of infants. Access to social support from personnel on the maternity ward was measured using an instrument developed by Tarkka *et al.* (2000). Advice received from personnel was measured with a variable in which the respondents were asked to evaluate whether the advice was adequate, accurate, encouraging, understandable, individual, consistent with previous knowledge, consistent among ward personnel and whether both parents were acknowledged (Tarkka *et al.* 2000). In addition, environmental attributes included hospital experiences, such as type of delivery, rooming-in, fathers' presence on the maternity ward, feeding practices and mother's coping with breastfeeding (Table 4).

In addition, the dependent variables included parenting satisfaction and parenting self-efficacy (Table 2). Parenting satisfaction was assessed with the evaluation subscale of the What Being the Parent of a New Baby is Like-Revised (Pridham & Chang 1989). Parenting self-efficacy was measured with an instrument developed for this study, which consisted of cognitive, affective and behavioural skills related to infant care tasks (Table 5). The scales, scoring technique, interpretation of scores and internal consistency reliability of all instruments are described in details in Table 2. The

Table 1 Participants in the target hospitals during the data collection

	Mother		Father	
Subsets	Intervention	Control	Intervention	Control
Parents treated in the target units	2703	1572	Not known	Not known
Sets of forms handed to the parents	700	600	700	600
Eligible to participate	532	429	352	228
Questionnaire loss	231	206	393	382
Questionnaires returned (*n*)	469	394	307	218
Response rate (%)	67	66	44	36

Table 2 Scales, scoring technique and internal consistency reliability of the instruments measuring independent variables and dependent variables

Instruments	Items	Scale and scoring technique	Total score	Cronbach's α in this study: Mothers (*N* = 863)	Cronbach's α in this study: Fathers (*N* = 525)
Independent variables					
Self-concept	10	Likert scale 1–5*	10–50‡	0·81	0·76
Depressive symptoms	10	0–3 according to severity of the symptoms*	0–30§	0·84	0·78
State of mind on discharge	4	5-point scale with verbal end anchors†	1–5‡	0·69	0·66
Perception of infant	9	5-point scale with verbal end anchors†	1–5‡	0·85	0·83
Family functioning	21	1 = 'strongly disagree' to 6 = 'strongly agree'†	1–6‡	0·91	0·89
Family health	21	1 = 'strongly disagree' to 6 = 'strongly agree'†	1–6‡	0·77	0·78
Social support from personnel	21	1 = 'no support at all' to 6 = 'a great deal of support', 0 = 'no need for support'†	0–6‡	0·92	0·96
Affirmation	6			0·81	0·91
Affect	7			0·81	0·86
Aid	8			0·86	0·91
Advice	8	Likert scale 1–5†	1–5‡	0·86	0·87
Dependent variables					
Parenting satisfaction	25	9-point scale with verbal end anchors†	1–9‡	0·73	0·77
Evaluation	11			0·88	0·85
Centrality	8			0·67	0·68
Life change	6			0·69	0·69
Parenting self-efficacy	27	1 = 'strongly disagree' to 6 = 'strongly agree'†	1–6‡	0·96	0·95
Cognitive skills	11			0·91	0·88
Affective skills	7			0·92	0·90
Behavioural skills	9			0·93	0·90

*Sum score of all items calculated by adding together the scores for each of the items.
†Mean score of all items.
‡The higher the total score is the better.
§Lower total score is better.

instruments proved to have high internal consistency reliability (Cronbach's α = 0·66–0·96).

Ethical considerations

The research protocol was approved by the Research Ethics Committees of the hospitals involved. All instruments were used with the permission of the copyright holders. The parents received written and oral information about the study and signed consent forms. The ethical principles as set out in the World Medical Association's (1964) Declaration of Helsinki were followed. The data were treated as confidential. The Health on the Net Foundation Code of Conduct (HONcode 1997) and eEurope (2002) quality criteria were observed to increase the reliability and credibility of the content of the resource, and to ensure good ethical practice.

Data analysis

The data were analysed using SPSS 15.0 software (SPSS, Inc., Chicago, IL, USA) and descriptive statistics (frequencies, percentages, means, SD). The total scores for state of mind on discharge, perceptions of the infant, family functioning, family health, social support and advice were calculated by adding the scores of all items of each instrument divided by the number of items. The total scores for depressive symptoms and self-concept were measured by adding together the scores of all items of each instrument. An EPDS score of 13 or more was used as a cut-off point for depressive symptoms, as recommended by Cox *et al.* (1993), because this has been shown to predict postnatal depression among Finnish mothers (Tamminen 1990, Tammentie *et al.* 2004). Comparisons were made between mothers and between fathers in the target hospitals. In addition, individual statements measuring parenting self-efficacy among intervention parents were analysed using descriptive statistics (percentages, means, SD). Statistical significance was determined by chi-squared or Fisher's exact test for percentages and one-way ANOVA test for means. Questionnaires with minor response omissions were included in these analyses. Missing EPDS and self-concept items were replaced with series means. The internal consistency of the scales was analysed using Cronbach's alpha coefficients.

Table 3 Comparisons between parent and infant attributes at baseline

Variables from questionnaire	Mother			Father		
	Intervention (n = 469)	Control (n = 394)	P value	Intervention (n = 307)	Control (n = 218)	P value
Parent age						
Mean, years (SD)	30·7 (5·0)	29·8 (5·2)	0·006	32·0 (5·8)	31·8 (5·3)	0·616
Parent education (%)						
≤Comprehensive school	5·6	5·1	0·007**	7·5	6·5	0·022*
High school/vocational	27·4	36·3		33·6	34·7	
College	31·4	32·7		23·5	33·8	
Academic	35·7	25·9		35·5	25·0	
Marital status (%)						
Married/registered	63·5	56·9	0·133	66·4	58·3	0·152
Cohabitation	32·6	38·8		32·6	40·8	
Other	3·8	4·3		1·0	0·9	
Self-concept						
Mean score (SD)	42·5 (5·1)	41·9 (5·2)	0·112	43·9 (4·6)	43·2 (4·8)	0·090
Depressive symptoms						
Mean score (SD)	6·6 (4·2)	6·9 (4·5)	0·236	3·3 (2·9)	3·3 (3·4)	0·873
≥13 score (%)	9·0	12·2	0·146	1·3	2·8	0·332
State of mind on discharge						
Mean (SD)	4·1 (0·6)	4·1 (0·7)	0·796	4·3 (0·5)	4·4 (0·5)	0·020*
Parity						
First-timers (%)	55·4	53·6	0·584	64·7	65·0	0·949
Mean (SD)	1·7 (0·9)	1·7 (0·9)	0·795	1·5 (0·8)	1·5 (0·8)	0·795
Infant current age						
Mean (SD), days	3·5 (3·9)	4·5 (4·9)	0·002**	3·4 (3·4)	5·2 (5·5)	0·000***
Infant gender						
Boys (%)	50·3	53·7	0·338	49·8	56·9	0·131
Birth weight						
Mean, g (SD)	3559·0 (505·9)	3484·8 (556·0)	0·041*	3537·6 (483·5)	3521·8 (479·2)	0·712
Gestational weeks						
Mean (SD)	39·9 (1·6)	39·5 (2·0)	0·001**	39·9 (1·5)	39·7 (1·8)	0·151
< 37 weeks (%)	3·0	5·9	0·043*	2·6	4·2	0·331
Perception of infant						
Mean (SD)	4·2 (0·5)	4·2 (0·6)	0·022*	4·3 (0·5)	4·2 (0·5)	0·539

SD, standard deviation.
Intervention is a quasi-experimental comparison for the control, significance (P) is determined by chi-squared or Fisher's exact test for percentages and one-way ANOVA for means, $*P < 0{\cdot}05$; $**P < 0{\cdot}01$; $***P < 0{\cdot}001$.

Findings

Findings used to develop the content of the intervention

The results indicated that mothers experienced the lowest self-efficacy related to infant's day-rhythm and sleep, and affective skills related to sensitivity to infant's cues and behaviour (Table 5). The results also indicated that fathers experienced the lowest self-efficacy related to infant's nutritional recommendations, day-rhythm and sleep, normal development and infant's cues and behaviour. In addition, fathers experienced low self-efficacy-related behavioural skills, for example, how to comfort the infant to sleep, how to take account of the infant's states of consciousness and how to console a crying infant.

Comparison of participant hospitals at baseline

There were only minor differences in the mean age of mothers and fathers between the target hospitals (Table 3). There were no major differences in marital status, self-concept or depressive symptoms between the hospitals. Postnatal depressive symptoms occurred in 9·0–12·2% of mothers and 1·3–2·8% of fathers. Almost all parents (95·7–99·1%) were either married or cohabiting. However, some statistically significant differences were observed between the hospitals in

Table 4 Comparisons between participants' perception of environmental attributes at baseline

	Mother			Father		
Variables from questionnaire	Intervention (n = 469)	Control (n = 394)	P value	Intervention (n = 307)	Control (n = 218)	P value
Family functioning						
Mean (SD)	4·9 (0·6)	4·9 (0·6)	0·257	4·9 (0·5)	4·9 (0·5)	0·336
Family health						
Mean (SD)	5·0 (0·4)	4·9 (0·4)	0·068	4·9 (0·4)	4·8 (0·4)	0·047*
Type of delivery (%)						
Vaginal	74·4	75·6	0·777	71·1	74·2	0·359
Instrumental	9·4	9·9		11·5	12·9	
Caesarean section	16·2	14·5		17·4	12·9	
Rooming-in (%)						
Full-time	78·7	77·4	0·002**	78·9	78·5	0·985
Part-time	20·0	17·2		19·3	19·5	
Not at all	1·3	5·4		1·8	2·0	
Father present (%)						
24 hours a day	49·9	0·3	0·000***	66·1	2·3	0·000***
During the daytime	44·3	94·6		33·2	97·7	
Not at all	5·8	5·1		0·7	0·0	
Feeding practices (%)						
Exclusive breastfeeding	51·0	27·4	0·000***	54·2	31·6	0·000***
Partially breastfeeding	46·9	72·1		45·2	67·0	
Complementary feeding	1·7	0·5		0·7	0·5	
Don't know	0·4	0·0		0·0	0·9	
Mother coping with breastfeeding (%)						
Very poor/poorly	4·7	2·8	0·327	2·3	1·9	0·647
Satisfactorily	19·4	21·0		7·3	7·9	
Very well/well	74·4	73·7		89·4	88·0	
Not breastfeeding	1·5	2·6		1·0	2·3	
Social support from personnel, mean (SD)	3·6 (1·0)	3·6 (0·9)	0·999	3·7 (1·2)	3·2 (1·3)	0·000***
Affirmation	3·9 (1·2)	3·8 (1·0)	0·160	3·8 (1·5)	3·1 (1·5)	0·000***
Affect	4·2 (1·1)	4·0 (1·0)	0·006**	4·2 (1·2)	3·7 (1·3)	0·000***
Aid	3·0 (1·3)	3·2 (1·0)	0·002**	3·2 (1·4)	2·7 (1·4)	0·000***
Advice						
Mean (SD)	4·1 (0·6)	4·0 (0·6)	0·002**	4·1 (0·6)	4·0 (0·6)	0·181

SD, standard deviation.
Intervention is a quasi-experimental comparison for the control, significance (P) is determined by chi-squared or Fisher's exact test for percentages and one-way ANOVA for means: *$P < 0·05$; **$P < 0·01$; ***$P < 0·001$.

parental education and fathers' state of mind on discharge. Mothers' and fathers' total fertility rates did not differ between the hospitals. More than half of the mothers were primiparas, and the majority of fathers were also first-timers. Control parents participated in the study when their infant was statistically significantly older.

Infant gender did not differ between the two hospitals. A comparison of fathers' responses from the two hospitals revealed no statistically significant differences in infant birth weight, gestational weeks or fathers' perceptions of their infants. However, differences were seen between mothers' perceptions of their infant, mean birth weight and gestational weeks. The number of children born before 37 weeks was statistically significantly higher among control mothers.

Family functioning and health did not differ between the two hospitals (Table 4). There were no major differences in type of delivery, but some differences were observed between the hospitals in mothers' rate of rooming-in. There was a noticeable difference in fathers' overnight presence during hospitalization: fathers in the control hospital were able to stay in hospital 24 hours a day only on rare occasions, while this was common practice in the intervention hospital. A statistically significant difference was also seen in feeding practices between the hospitals: mothers in the intervention hospital were exclusively breastfeeding

Table 5 Individual statements measuring self-efficacy of mothers (n = 469) and fathers (n = 307) in the intervention hospital at the baseline

	Mean (SD)		Strongly disagree/disagree (%)		Slightly disagree/agree (%)		Agree/ strongly agree (%)	
Statements	M	F	M	F	M	F	M	F
Cognitive skills								
Nutritional recommendations	5·1 (1·0)	4·4 (1·1)	3·2	7·7	14·2	36·1	82·5	56·2
Hygiene	5·5 (0·6)	5·1 (0·7)	0·2	0·3	4·3	14·4	95·5	85·3
Clothing	5·2 (0·8)	4·8 (0·8)	0·6	2·0	13·5	27·9	85·9	70·0
Day-rhythm/sleep	4·3 (1·2)	3·9 (1·1)	9·0	13·7	42·6	53·2	48·4	33·1
Normal development	4·9 (0·9)	4·6 (0·9)	0·9	1·7	25·7	38·1	73·4	60·2
Stimulation	5·0 (0·9)	4·8 (0·8)	1·9	1·7	19·5	27·4	78·6	70·9
Safe environment	5·3 (0·7)	5·1 (0·7)	0·2	0·3	11·8	14·4	88·0	85·3
Infant cues	4·9 (0·9)	4·7 (0·9)	0·6	1·7	25·3	34·6	74·1	63·8
Ways to console	5·0 (0·8)	4·8 (0·8)	0·9	1·7	21·2	27·8	78·0	70·6
Enough facts for decision-making	5·2 (0·8)	4·9 (0·8)	0·4	0·7	16·7	26·5	82·9	72·8
Where to get more help/support	5·4 (0·7)	5·0 (0·9)	0·6	1·3	7·7	21·4	91·7	77·3
Affective skills								
Recognizing hunger	5·0 (0·8)	4·9 (0·8)	0·9	1·3	23·1	26·8	76·0	71·9
Sensitivity to cry	4·1 (1·1)	3·9 (1·1)	8·5	10·8	55·8	63·3	35·7	25·9
Sensitivity to states	4·8 (1·0)	4·6 (0·9)	2·1	1·3	32·0	38·9	65·9	59·7
Sensitivity to other cues and behaviour	4·5 (1·0)	4·3 (0·9)	3·2	3·7	42·5	55·5	54·3	40·8
Sensitivity to individual personality	4·3 (1·1)	4·0 (1·1)	6·5	9·7	48·6	55·4	44·9	34·9
Sensitivity to response to stimulation	4·7 (1·0)	4·3 (1·1)	3·0	6·4	34·6	47·3	62·4	46·3
Sensitivity to sources of pleasure/cherishment	4·6 (1·0)	4·4 (1·0)	2·8	3·4	39·7	49·0	57·5	47·7
Behavioural skills								
To nourish	5·4 (0·8)	4·7 (1·1)	0·4	5·7	11·2	23·6	88·4	70·6
To conduct basic care	5·5 (0·6)	5·2 (0·7)	0·0	0·3	6·9	13·7	93·1	86·0
To comfort to sleep	5·1 (0·8)	4·7 (0·9)	0·4	1·7	18·8	31·8	80·7	66·6
To take account states of consciousness	5·0 (0·8)	4·6 (0·8)	0·4	1·0	24·1	37·9	75·4	61·1
To handle/care safely	5·2 (0·8)	5·0 (0·7)	0·6	1·0	12·7	19·5	86·7	79·5
To console	5·0 (0·8)	4·7 (0·8)	0·0	1·7	24·1	35·1	75·9	63·2
To cherish	5·3 (0·7)	4·8 (0·7)	0·2	0·7	11·0	28·4	88·8	70·9
To stimulate/support development	5·1 (0·8)	4·8 (0·8)	0·9	0·7	17·9	29·4	81·3	69·9
Caring skills in general	5·0 (0·9)	4·9 (0·8)	0·9	1·0	23·4	26·0	75·8	73·0

SD, standard deviation; M, mothers; F, fathers.

more often compared to mothers in the control hospital. No differences were seen in mothers' coping with breastfeeding. Despite the differences between caring practices, mothers' general opinions about access to social support from personnel did not differ between the two hospitals, although differences were seen in the subcategories of affect and aid. Fathers' views on access to social support differed statistically significantly in all subcategories and in the fathers' general opinion about social support in favour of the intervention fathers. However, fathers were equally satisfied with the advice they received from personnel, but intervention mothers were somewhat more satisfied than control mothers. The lowest scores for both mothers and fathers were recorded for mother-centered, routine and inconsistent advice provided by ward personnel.

Discussion

The optimal design for this study would have been an RCT (Randolph *et al.* 1999, Altman *et al.* 2001, Moher *et al.* 2001, van Meijel *et al.* 2004). However, as randomization was not possible, we chose to use a quasi-experimental design. There were two reasons for this. First, personnel at the intervention hospital participated in the development process and were exposed to the intervention. Secondly, in the follow-up study participants for the intervention group will be recruited during pregnancy, and it will be impossible to know in advance on which wards they will be treated after childbirth. A quasi-experimental intervention study involves several methodological challenges that have to do with the intervention design and development, comparability and

representativeness of the participants, and influence of confounding variables.

Intervention design and development

The intervention developed and described in this paper is complex, involving the information database, online peer discussion forum and questions/answers service and the training of nurses and midwives for the online answering service. The aims of this study, its hypotheses and the whole development process were grounded in conceptual models, previous research and tacit professional knowledge. In addition, the development process was informed by the model introduced by van Meijel *et al.* (2004). The content for the internet resource was produced by the students as part of their final project for bachelor's degree, while the contribution of hospital professionals was partly in addition to their regular duties. During the development process, the quality and feasibility of the intervention was assessed by the multiprofessional content evaluation team and the parents in a pilot test.

Comparability and representativeness

For reasons of ensuring comparability it was important that the intervention and control hospitals were as similar as possible with respect to the independent variables. Our decision not to randomize might give rise to bias and change the composition of the sample (Randolph *et al.* 1999, Moher *et al.* 2001). Therefore, a special effort was made to evaluate the comparability of independent variables in the target hospitals and to make comparisons with national statistics. The study hypothesis was that parent, infant and environmental attributes would be equivalent in the intervention and control hospitals at baseline. The cohort I results did not support the hypothesis completely, because the target hospitals were not entirely comparable. There were some statistically significant differences between the environmental attributes. However, the large sample size meant it was possible to detect statistically significant differences ($P < 0{\cdot}05$), although not all of these differences are necessarily clinically significant. In this study, P values $< 0{\cdot}001$ were interpreted as clinically significant.

Mothers in the intervention and control hospitals were equally appreciative of the social support they received from personnel on the maternity wards, but the views of fathers differed statistically significantly. This difference could be clinically significant and could be explained by fathers staying overnight more often on the intervention wards. There were also differences between the hospitals in infant's current age. These differences could also be explained by fathers' less frequent overnight stays on the control hospital's maternity wards. The difference in the number of exclusively breastfed infants was also clinically significant. However, there were no differences in mothers' coping with breastfeeding. It is possible that the larger number of prematurely born children in the control hospital decreased the breastfeeding rates.

The use of quota sampling, questionnaire loss and the low response rate also raise questions about selection bias. A comparison between the study sample and national statistics compiled by STAKES (2007) shows that the participants are highly representative of Finnish birthing women with respect to mothers' age, parity, marital status and infant sex. However, although the target hospitals are big university hospitals that care for the sickest and smallest children in country, the number of parents with premature babies was lower than the national average. Also mothers' postnatal depression was slightly lower than anticipated. However, the EPDS has proved to be most sensitive at 6–8 weeks postpartum (Cox *et al.* 1993), and we used it only at 3·5–4·5 days postpartum. More attention needs to be paid to systematic quota sampling while collecting the cohort II data.

Independent variables and confounding variables

The cohort I data collection allowed us to test the instruments among the target group in a Finnish setting. These instruments will be used in the cohort II study while evaluating the effectiveness of the intervention. For purposes of evaluating the effectiveness of the intervention it is essential to control both influencing and confounding factors. The confounding factors are numerous in a complex healthcare intervention, and these factors need to be identified and their effects need to be estimated as well as possible.

Several co-interventions are currently underway at the hospitals concerned and they may influence the dependent variables of this study and contaminate its design (Randolph *et al.* 1999). Therefore, possible co-interventions need to be identified during data collection in the cohort II. The cohort I data collection also enables comparisons within hospitals before (cohort I) and after (cohort II) the intervention was implemented (Randolph *et al.* 1999). In addition, Statistics Finland (2007) sources indicate that internet use in Finland is at a very high level. Even though the control group does not have access to the intervention, they may be influenced by internet use in general. Therefore, internet use and skills in internet use need to be evaluated during cohort II data collection so that their impact on the dependent variables can be assessed.

What is already known about this topic

- There is a need for interventions to support parenting and for further research on internet-based interventions.
- The evaluation of complex healthcare interventions involves several methodological challenges.
- The development of interventions is rarely discussed in research reports.

What this paper adds

- A description of the systematic development of an internet-based intervention to support parents of infants and presents proposals for developing support for both parents.
- Discussion of the methodological challenges involved in evaluating the effectiveness of a quasi-experimental intervention study design.
- There were differences between hospital experiences and social support, but for further research is needed to provide a more reliable assessment of the effectiveness of the intervention.

Finally, although we evaluated several factors predicting study dependent variables in the target hospitals, we still need to clarify their effect size. Clarification of the effect size could be useful and enhance the reliability of evaluating the effectiveness of the intervention. In addition, a need for more research into factors influencing parents' well-being is emphasized by de Montigny and Lacharite (2005) and Magill-Evans *et al.* (2006). The cohort I data collection was an important part of developing an evidence-based intervention, and an important part of finding the necessary building blocks for a reliable evaluation of the effectiveness of the intervention. Our results indicated that mothers were more satisfied than fathers with social support from hospital personnel. However, both mothers and fathers might benefit from more support and advice about infant's cues and behaviour, and day-rhythm and sleep. Above all, this cohort I data collection offered valuable clues for the further development of the intervention and for the cohort II study, and confirmed that the preliminary decisions about the intervention design were correct.

Conclusion

Based on the cohort I study, another objective was added to the whole project: to evaluate the effect size of factors contributing parenting experience. Therefore, we will also gain a clearer understanding of the factors influencing parents' perspectives. Further research is recommended to evaluate how hospital experiences, especially infant feeding practices, fathers' overnight stays and social support from personnel on the hospital's maternity wards, contribute to parenting experiences to provide a more reliable assessments of the effectiveness of the proposed intervention.

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Author contributions

AHS, MK, PAK, ALJ & MTT were responsible for the study conception and design. AHS performed the data collection. AHS, MK & MTT performed the data analysis. AHS was responsible for the drafting of the manuscript. AHS, MK, PAK, ALJ & MTT made critical revisions to the paper for important intellectual content. AHS, PAK & MTT obtained funding. PAK & MTT provided administrative, technical or material support. MK, PAK, ALJ & MTT supervised the study.

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ORIGINAL RESEARCH

Parenting self-efficacy after childbirth

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Abstract

Title. Parenting self-efficacy after childbirth.

Aim. This paper is a report of study of parent, infant and environmental correlates of mothers' and fathers' perceptions of their parenting self-efficacy.

Background. Many parents are not confident in their ability to be good parents. Parenting self-efficacy is important for parents' sense of well-being, is a possible predictor of parenting practices and might be an indicator of risk. However, very little evidence exists on factors that influence fathers' perceptions of parenting, or comparisons between the parents.

Methods. The data were collected by questionnaire in 2006–2007 in two hospitals with a convenience sample of Finnish-speaking parents (N = 1300 families) during the first postpartum week. Multiple-birth and early-discharge parents were excluded. The response rate for mothers was 66% (n = 863) and for fathers 40% (n = 525). Comparisons were made by percentages and means. Statistical significance was determined by Generalized Estimating Equations models and one-way ANOVA. Pearson's and Spearman's correlation coefficients were used to determine correlations, and multiple regression analysis to clarify the effect size.

Results. Mothers scored higher than fathers on parenting self-efficacy. Parity, self-concept, depressive symptoms and state of mind on discharge contributed to parenting self-efficacy. Experiences of childbirth and life change correlated with mothers', but not with fathers', parenting self-efficacy. Perceptions of infant, family functioning, health and advice from personnel were major contributory factors.

Conclusion. Assessments of parenting self-efficacy are recommended to identify at-risk groups and at-risk parents. More research is recommended to look into the effect of rooming-in, feeding practices, fathers' presence and social support from personnel and parenting self-efficacy and to evaluate risk scales for at-risk parents. Parent attributes had a greater effect on mothers' parenting self-efficacy, while environmental attributes had a greater effect on fathers' parenting self-efficacy. At-risk parents can be supported by conducting face-to-face discussions about significant topics.

Keywords: childbirth, fathers, midwifery, mothers, nursing, parenting, postpartum, self-efficacy

Introduction

Parents in many western countries often feel overwhelmed during the first year of infancy (Nyström & Öhrling 2004). The process of becoming a parent involves developing a relationship with the infant and developing competence in caregiving tasks (Mercer 2004). According to Barnard's (1994) Model, parent-child interaction is a process of mutual adaptation. In the study reported in this paper, parent-infant interaction is examined from the parents' perspective on their parenting self-efficacy (PSE). Bandura (1997) concluded that for parents to employ parenting behaviour successfully, they must both believe that it will produce the desired outcome and have confidence in performing the specific behaviour. High PSE is important for sense of well-being and parenting satisfaction (Coleman & Karraker 1997, Elek *et al.* 2003, Drake *et al.* 2007, Ngai *et al.* 2007). PSE is also a possible predictor of adequate parenting practices and might be an indicator of risk (Bandura 1997, Reece & Harkless 1998, Jones & Prinz 2005). Parenting practices provide a key foundation for infant growth and development (de Montigny & Lacharite 2004, Ramchandani *et al.* 2005). Bandura's self-efficacy theory has been used in social sciences since the late 1970s. The potential of his theory has been noticed also in nursing, since it has been the framework for a number of nursing studies (e.g. Coleman & Karraker 1997, Creedy *et al.* 2003, Jones & Prinz 2005). Drake *et al.* (2007) point out that predictors of the parenting experience remain unexplored and that more research is needed, especially with mothers. Very little evidence exists on factors that influence fathers' perceptions of parenting, and comparisons between mothers and fathers are also scarce (de Montigny & Lacharite 2005, Magill-Evans *et al.* 2006, Garfield *et al.* 2006). In addition, parenting research has focused primarily on mothers and on parenting children with different kinds of disabilities (Gage *et al.* 2006).

Background

Parenting self-efficacy

Parenting self-efficacy is defined as 'beliefs or judgements a parent holds of their capabilities to organize and execute a set of tasks related to parenting a child' (de Montigny and Lacharite 2005, p. 387. PSE refers to (1) parents' personal beliefs, (2) what a parent can do under a set of conditions with their capabilities, (3) a set of organized actions to produce a set of tasks under difficult circumstances, and (4) a situation-specific tasks (Bandura 1997). In our study, these tasks were related to parent–child interaction in everyday situations; to how to be sensitive to infants' cues and needs; and to how to respond to them in a growth-fostering way (Barnard 1994). PSE has been studied from the nursing perspective using a variety of different terms bearing some similarities to PSE. These include 'competence', 'confidence', 'efficacy', 'sense of infant care skills', 'perceived role attainment' and 'self-esteem' (Jones & Prinz 2005, de Montigny and Lacharite 2005). Enactive mastery experiences, vicarious experiences, verbal persuation, and physiological and affective state are the main sources of self-efficacy beliefs (Bandura 1997). According to Barnard (1994), parent–child interaction is influenced by parent attributes, infant characteristics and the environmental context.

Parent attributes

Parent–child interaction is influenced by education, health, life change, expectations and coping (Barnard 1994). Based on Bandura's (1997), success or failure in previous parenting experiences have proved to be strong predictors of PSE. Several studies indicate that first-time parents (Froman & Owen 1990, Ferketich & Mercer 1995, Mercer & Ferketich 1995, Tarkka *et al.* 2000, Drake *et al.* 2007, Ngai *et al.* 2007) score statistically significantly lower in PSE than experienced parents during the early postpartum period. The impact of age, education and marital status is not clear. In Sweden, older mothers appeared to be less satisfied, whereas in Norway and the United States of America they were more satisfied (Froman & Owen 1990, Kiehl & White 2003). It has been reported that highly educated parents score lower in PSE (Ferketich & Mercer 1995, Mercer & Ferketich 1995). Furthermore, there is evidence that mothers score higher than fathers in PSE throughout the postpartum year (Hudson *et al.* 2001, Elek *et al.* 2003).

According to Bandura (1997), PSE is influenced by physiological state and mood. Pregnancy is the anticipatory stage of the parenting role, and pregnancy variables were found to have an impact on experienced mothers' PSE, but not that of inexperienced mothers' (Mercer & Ferketich 1995). Attitudes towards parenthood during pregnancy have been found to predict primiparas' PSE (Tarkka *et al.* 2000). Primiparous mothers reporting greater adaptation during pregnancy reported greater adaptation postpartum as well (Kiehl & White 2003). It has also been shown that experience of childbirth has an impact on PSE (Ferketich & Mercer 1995, Mercer & Ferketich 1995, Vehviläinen-Julkunen & Liukkonen 1998, Tarkka *et al.* 2000).

Self-concept or self-esteem (Ferketich & Mercer 1995, Mercer & Ferketich 1995, Tarkka *et al.* 2000, Drake *et al.* 2007, Ngai *et al.* 2007) has been found to correlate with PSE.

In addition, during early parenthood mothers have an increased risk for postnatal depression (Tammentie *et al.* 2004a, 2004b, Munk-Olsen *et al.* 2006); however, parenting can affect the mental health of men, too (Ramchandani *et al.* 2005, Garfield *et al.* 2006). Depressive mood (Teti & Gelfand 1991, Ferketich & Mercer 1995, Porter & Hsu 2003, Ngai *et al.* 2007), life change (Pridham *et al.* 1994) and infant centrality (Pridham *et al.* 1994) have been shown to affect parents' sense of efficacy. Recently, Premberg *et al.* (2008) reported that fathers' experiences were described by the following major constituents: 'to master the new situation', 'to get a new completeness of life' and 'to be overwhelmed' (Premberg *et al.* 2008). Therefore, state of mind on hospital discharge may also predict fathers' PSE, as it has done among mothers (Tarkka *et al.* 2000).

Infant attributes

Bandura (1997) says that perceived task difficulty is associated with PSE. Challenges related to infant maturity, health status, sex, age and infant characteristics in general might reflect perceived task difficulty. Conflicting evidence has been published about the impact of infant age: parents' perceptions may (Pridham *et al.* 1999, Elek *et al.* 2003, Porter & Hsu 2003) or may not (Rogers & Matthews 2004) change as the child gets older. Both first-time and experienced fathers scored lower on PSE when their infants were 1-month-old comparing their evaluations at hospital discharge. This trend was also seen among first-time mothers, but experienced mothers did not show any change in PSE levels during eight postpartum months (Mercer & Ferketich 1995). Conflicting evidence has also been published about the impact of infant sex on PSE during the first year of life (Froman & Owen 1990, Hudson *et al.* 2001, Elek *et al.* 2003, Rogers & Matthews 2004). However, researchers agree that challenges experienced with the infant indicate lower PSE (Teti & Gelfand 1991, Porter & Hsu 2003, Tarkka 2003).

Environmental attributes

Among environmental attributes identified by Bandura (1997) are vicarious experiences and social and verbal persuasion. Parents are expected to provide an environment that is optimal to their child's development. Family is the primary social institution in which parenting takes place (Gage *et al.* 2006). Family well-being is therefore a potential predictor of PSE (Ferketich & Mercer 1995). There is also evidence that social support from staff and different kinds of hospital practices have a positive impact on parenting (Reece 1993, Tarkka *et al.* 2000, Hudson *et al.* 2001, Elek *et al.* 2003, Svensson *et al.* 2005, Hildingsson 2007).

Summary

In summary, there is evidence that several parent attributes (age, education, marital status, parity, attitude towards parenthood, life change, infant centrality, state of mind on discharge), infant attributes (sex, infant maturity, health, current age, characteristics) and environmental attributes (family variables, different hospital practices, social support from personnel) may contribute to PSE.

The study

Aim

The aim of the study was to investigate the parent, infant and environmental correlates of mothers' and fathers' perceptions of their PSE.

Design

A correlational and cross-sectional study design was used.

Participants

The data were collected with a convenience sample of parents giving birth in two public university hospitals (hospital A and B) in southern Finland. The sample consisted of mothers and fathers or mothers' partners. Both primiparas and multiparas were included. Participating parents had to have the ability to understand and write Finnish, at least one parent in the family had to be willing to participate, and the infant had to be treated at the maternity or neonatal unit. Multiple birth and early discharge parents receiving home visits or nurse/midwife phone calls from the maternity hospital after discharge were excluded.

This study is a part of a project called 'Urban parenthood' that offers additional support for parents with an internet-based intervention (Salonen *et al.* 2008). After the implementation phase, hospital A parents will be the targets of the intervention and hospital B parents are their controls. Our data are considered as a description of the situation before the implementation.

A total of 4275 mothers gave birth in the target hospitals. Eligible parents were informed about the study on the day before hospital discharge. Information sheets, consent forms and questionnaires were handed out to mothers and fathers in 1300 families, and 961 mothers and

580 fathers agreed to participate. Parents were advised to complete the self-evaluation questionnaire at the hospital or 1 week after discharge at the latest. Questionnaires were returned by 469 mothers (67%) and 307 fathers (44%) from hospital A, and 394 mothers (66%) and 218 fathers (36%) from hospital B.

The sample size (N = 1300 families) was determined using power analysis. Analyses were split by Hospital (A/B) and Parent (mothers/fathers), yielding four groups with sample sizes 218, 307, 394 and 469 respectively. Power analysis showed that a sample size of 300 would achieve 81% power to detect a R^2 of 0·05 attributed to eight independent variables using an F-test with a statistical significance level of 0·05.

Data collection

The data were collected between October 2006 and April 2007. The questionnaire was based on multiple variables, which were measured with several instruments developed by different investigators (Table 1). All instruments were pilot-tested with doctoral-level maternity care professionals (N = 7) and infants' parents (N = 70 families). Based on the pilot study, it took on average of 32 minutes to complete the questionnaire, which had a total of 167 items.

Parenting self-efficacy was treated as a dependent variable and measured using a newly-developed instrument (Table 2). The instrument was developed on the basis of Bandura's (1997) self-efficacy theory, previous research (e.g. Brazelton &

Table 1 Dependent and independent variables including the reference for the instrument, number of the items, the scales and scoring technique

Variables	Reference for the instrument	Items	Scale	Total score
Dependent variable				
Parenting self-efficacy, the PSE	Salonen *et al.* (2008)	27	From 1 = 'strongly disagree' to 6 = 'strongly agree'	1–6$^{\dagger\uparrow}$
Independent variables				
Parent attributes				
Age, parity	–	2	Scale (parity used also as ordinal)	–
Education, marital status, parenting attitude during pregnancy	–	3	Ordinal/Nominal	–
Self-concept	Saari and Majander (1985)	10	Likert scale from 1 to 5	10–50*$^{\uparrow}$
Depressive symptoms, the EPDS	Cox *et al.* (1987, 1993)	10	From 0 to 3 according to severity of symptoms	0–30*$^{\downarrow}$
Centrality subscale of the WBPL-R	Pridham and Chang (1989)	8	9-point scale with verbal end anchors	1–9$^{\dagger\uparrow}$
Life change subscale of the WBPL-R	Pridham and Chang (1989)	6	9-point scale with verbal end anchors	1–9†
Experience of childbirth	Tarkka *et al.* (2000)	8	5-point scale with verbal end anchors	1–5$^{\dagger\uparrow}$
State of mind on discharge	Tarkka *et al.* (2000)	4	5-point scale with verbal end anchors	1–5$^{\dagger\uparrow}$
Infant attributes				
Gestational weeks, birth weight, current age	–	3	Scale	–
Gender, health	–	2	Nominal	–
Perception of infant	Salonen *et al.* (2008)	9	5-point scale with verbal end anchors	1–5$^{\dagger\uparrow}$
Environment attributes				
Rooming-in, father present, feeding practices, delivery type	–	4	Nominal	–
Family functioning, the FAFHES	Åstedt-Kurki *et al.* (2002)	21	From 1 = 'strongly disagree' to 6 = 'strongly agree'	1–6$^{\dagger\uparrow}$
Family health, the FAFHES	Åstedt-Kurki *et al.* (2002)	21	From 1 = 'strongly disagree' to 6 = 'strongly agree'	1–6$^{\dagger\uparrow}$
Social support from personnel, the FAFHES	Tarkka *et al.* (2000), Åstedt-Kurki *et al.* (2002)	21	From 1 = 'no support at all' to 6 = 'a great deal of support', 0 = 'no need for support'	0–6$^{\dagger\uparrow}$
Advice from personnel	Tarkka *et al.* (2000)	8	Likert scale from 1 to 5	1–5$^{\dagger\uparrow}$
Items total	–	167	–	–

EPDS, Edinburgh Postnatal Depression Scale; WBPL-R, What Being the Parent of a New Baby is Like-Revised; FAFHES, Family Functioning, Health and Social Support; $^{\uparrow}$, the higher the total score the better; $^{\downarrow}$, the lower the total score the better.
*Sum score of all items calculated by adding together the scores for each of the items.
†Mean score of all items.

Table 2 Factor analysis of an instrument measuring parenting self-efficacy in hospital A and B

	Affective		Cognitive		Behavioural	
Rotated factor matrix	A	B	A	B	A	B
Recognizing hunger	0·536	0·556				
Sensitivity to cry	0·710	0·694				
Sensitivity to states	0·633	0·643				
Sensitivity to other cues and behaviour	0·720	0·773				
Sensitivity to individual personality	0·772	0·747				
Sensitivity to response to stimulation	0·695	0·745				
Sensitivity to sources of pleasure/cherishment	0·669	0·647				
Nutritional recommendations			0·477	0·506		
Hygiene			0·450	0·520	(0·482)	-
Clothing			0·589	0·691		
Day rhythm/sleep			0·559	0·577		
Normal development			0·741	0·702		
Stimulation			0·702	0·673		
Safe environment			0·632	0·600		
Infant cues			0·512	0·582		
Ways to console	(0·446)	–	0·416	0·433		
Enough facts for decision-making			0·453	0·510	(0·511)	–
Where to get more help/support			0·365	0·404	(0·406)	–
To nourish					0·504	0·505
To conduct basic care					0·658	0·637
To comfort to sleep					0·609	0·735
To take account of states of consciousness					0·576	0·606
To handle/care safely					0·676	0·621
To console					0·632	0·685
To cherish					0·605	0·616
To stimulate/support development					0·506	0·533
Caring skills in general					0·630	0·619
Rotation sums of squared loadings						
% of variance	19·391	19·363	16·870	18·901	19·360	18·883
Cumulative % of variance	19·391	19·363	36·261	38·264	55·622	57·147
Initial eigenvalues						
% of variance	49·131	50·029	4·773	6·481	6·515	5·228
Cumulative % of variance	49·131	50·029	53·904	56·510	60·419	61·738

Extraction method: Maximum likelihood; Rotation method: Varimax with Kaiser normalization.
A, hospital A; B, hospital B.

Cramer 1990, Brazelton & Sparrow 2006), national infant care recommendations (Finnish Ministry of Social Affairs and Health 2004) and tacit knowledge. Bandura (1997) identifies three dimensions in PSE: level, generality and strength. In our study, level refers to task difficulty, generality to the modalities in which different tasks are expressed (cognitive, affective, behavioural) and strength to the person's degree of confidence (scale from 1 to 6). All items are worded positively as recommended by Bandura. The items reflect not only day-to-day infant care tasks, but also interactive behaviours (Barnard 1989). Factor analysis was performed using maximum likelihood as an extraction method to test the structure of the factors of the PSE instrument. Factors were rotated using Varimax with Kaiser normalization. This analysis supported the use of three modalities: affective, cognitive and behavioural skills related to PSE (Table 2). The PSE instrument reached alpha values of 0·91 or higher (Hospital A: Cognitive 0·91, Affective 0·91 and Behavioral 0·93, Total 0·96; Hospital B: Cognitive 0·91, Affective 0·92 and Behavioral 0·92, Total 0·96).

The independent variables consisted of several parent, infant and environmental attributes. Parent attributes were age, parity, education, marital status, self-concept, depressive symptoms (Edinburgh Postnatal Depression Scale, EPDS), life change and centrality (What Being the Parent of a New Baby is Like-Revised, WBPL-R), experience of childbirth, parent's state of mind on discharge and attitude towards parenthood during pregnancy (Table 1). Infant attributes were gender, gestational weeks, birth weight, current age and parents' perception of the infant. Responses to an open-ended

question concerning the infant's health problems were divided into two categories: no problems or any kind of health problem. Environmental attributes were type of delivery, rooming-in, feeding practices, advice and father's presence on the maternity ward, and family functioning, family health and social support from personnel (Family Functioning, Health and Social Support, FAFHES). The instruments measuring independent variables had Cronbach alpha values of 0·66–0·96 (Salonen *et al.* 2008).

Ethical considerations

The research protocol was approved by the appropriate research ethics and management committees. The ethical principles set out in the World Medical Association's (1964) Helsinki Declaration were followed. Permission to use the instruments was obtained from the copyright holders.

Data analysis

The data were analysed using SPSS 16·0 software (SPSS, Inc., Chicago, IL, USA). Total score for the PSE instrument was calculated by summing up the scores of all items in the instrument and dividing the sum by the number of items. Individual scores for self-concept and depressive symptoms (EPDS) were calculated by summing the scores for all items in the instrument. Total scores for other independent variables were calculated by summing up the scores for all items in the subscale or instrument and dividing the sum by the number of items. In the EPDS scale lower scores indicated better health, in all other instruments higher scores indicated better outcomes.

Comparisons were made between the scores for mothers and fathers in the two hospitals. Statistical significance in comparing mothers and fathers was determined by GEE models (Generalized Estimating Equations), and statistical significance levels for means of PSE by one-way ANOVA. Correlations were determined by Pearson's or Spearman's correlation coefficients. Finally, multiple regression analysis was used to determine the effect (R^2) of the most ($P \leq 0{\cdot}05$ among all groups of parents) and the least statistically significant infant, parent and environmental attributes, as well as their combined effect. In regression analyses, categorical variables were treated as fixed factors. In all regression models, multicollinearity was weak.

Results

The mean age of mothers in hospital A was 30·7 years and in hospital B 29·8 years. Fathers were statistically significantly older than mothers (Table 3). The participating parents were mainly well-educated: in each group one-quarter or more had an academic education. Mothers and fathers did not differ statistically significantly in terms of education. Almost all parents lived with a partner. The majority of mothers were first-timers, and fathers were first-timers statistically significantly more often than mothers. Most parents described their attitude towards parenting during pregnancy as relaxed or confident (Hospital A mothers 89·8% and fathers 92·8%; Hospital B mothers 86·0% and fathers 92·6%. The attitude difference of mothers and fathers in Hospital B was statistically significant ($P = 0{\cdot}019$). Only a small proportion of parents felt afraid, concerned or insecure (Hospital A mothers 10·2% and fathers 7·2%; Hospital B mothers 14·0% and fathers 7·4%). More than half of the parents had a male infant. Gestational weeks, infant birth weight and infant current age did not differ between mothers and fathers. Only very few infants were born prematurely, i.e. prior to 37 weeks gestation (Hospital A mothers 3·0% and fathers 2·6%; Hospital B mothers 5·9% and fathers 4·2%), but infant health problems occurred commonly. There was a slight difference ($P = 0{\cdot}046$) in infant health between hospital A mothers (25·2%) and fathers (20·2%), but hospital B mothers (38·3%) had infants with health problems clearly ($P \leq 0{\cdot}0001$) more often than hospital B fathers (26·6%). These health problems varied from minor skin complaints to severe illness requiring intensive care.

Perceptions of parenting self-efficacy and contributing factors

On average, mothers' and fathers' PSE scores were high. In hospital A, mothers' mean score for PSE was 5·0 (SD 0·6, range 3·0–6·0) and 4·7 (SD 0·6, range 2·1–6·0) for fathers. Mothers' mean scores for cognitive skills related to PSE were 5·1 (SD 0·6), affective skills 4·6 (0·8) and behavioural skills 5·2 (0·6). Fathers' mean scores were 4·7 (SD 0·6), 4·3 (0·7) and 4·8 (0·6) respectively. The differences between mothers and fathers were statistically significant ($P \leq 0{\cdot}001$) in all categories. The corresponding PSE figures in hospital B mothers were 4·9 (SD 0·6, range 1·8–6·0) and fathers 4·6 (SD 0·6, range 2·3–6·0). Mothers' mean score for cognitive skills related to PSE were 5·0 (SD 0·6), affective skills 4·6 (0·8) and behavioural skills 5·1 (0·6); and fathers' 4·6 (SD 0·6), 4·3 (0·8) and 4·7 (0·7) respectively. Again, these differences were statistically significant in all categories ($P \leq 0{\cdot}001$).

Academic parents had the lowest PSE scores. However, statistically significant differences were seen only among hospital A mothers and fathers (Table 4). Marital status did not statistically significantly affect PSE. A relaxed or

Table 3 Parent, infant and environmental attributes for participating parents in the target hospitals

	Hospital A			Hospital B		
Attributes	Mothers (n = 469)	Fathers (n = 307)	P	Mothers (n = 394)	Fathers (n = 218)	P
Parent age, mean (SD)	30·7 (5·0)	32·0 (5·8)	≤0·001	29·8 (5·2)	31·8 (5·3)	≤0·001
Range	17–47	18–62		18–42	20–45	
Parent education (%)						
≤Comprehensive school	5·6	7·5	0·087	5·1	6·5	0·798
High school/vocational	27·4	33·6		36·3	34·7	
College	31·4	23·5		32·7	33·8	
Academic	35·7	35·5		25·9	25·0	
Marital status (%)						
Married/registered	63·5	66·4	0·060	56·9	58·3	0·259
Cohabitation	32·6	32·6		38·8	40·8	
Other	3·8	1·0		4·3	0·9	
Parity, Mean (SD)	1·7 (0·9)	1·5 (0·8)	≤0·001	1·7 (0·9)	1·5 (0·8)	≤0·001
First-timers (%)	55·4	64·7	≤0·001	53·6	65·0	≤0·001
Infant gender						
Boys (%)	50·3	49·8	0·805	53·7	56·9	0·193
Gestational weeks						
Mean (SD)	39·9 (1·6)	39·9 (1·5)	0·815	39·5 (2·0)	39·7 (1·8)	0·029
Birth weight						
Mean (SD), g	3559·0 (505·9)	3537·6 (483·5)	0·281	3484·8 (556·0)	3521·8 (479·2)	0·175
Infant current age						
Mean (SD), days	3·5 (3·9)	3·4 (3·4)	0·457	4·5 (4·9)	5·2 (5·5)	0·018

SD, standard deviation.
Statistical significance (P) determined by GEE-models.

confident parenting attitude during pregnancy predicted statistically significantly higher PSE in all groups of parents except hospital B fathers. First-time parents scored statistically significantly lower in PSE than parents who had two or more children. Infant gender did not have a statistically significant influence. Infant health problems were accociated with lower PSE scores in all groups of parents except hospital B fathers. Type of delivery, different practices of rooming-in and father's presence at the maternity unit did not have a statistically significant influence, with the exceptions of rooming-in among hospital B fathers and father's presence among hospital A mothers. Mothers who exclusively breast-fed scored statistically significantly highest in PSE. Feeding practices did not have a significant influence on fathers' PSE.

Combined effect of separate groups of attributes

Parent's age did not correlate statistically significantly with PSE in any group of parents, but education did show a statistically significant correlation in some groups. Infant centrality did not have a clear effect. Life change and experience of childbirth correlated with PSE only among mothers. Together, parent's age, education, infant centrality, life change and experience of childbirth explained 11·7% of the variation in PSE among hospital A and 10·2% among hospital B mothers. The combined effect of corresponding variables was somewhat lower among fathers, explaining 6·2% of the variation in PSE in hospital A and 9·1% in hospital B fathers. However, the most statistically significant parent attributes in all groups of parents were parity, self-concept, depressive symptoms and parent's state of mind on discharge. Their combined effect explained 42·5% of the variation in hospital A mothers' PSE and 33·6% of the variation in hospital B mothers' PSE. The combined effect of parent's age, education, infant centrality, life change and experience of childbirth explained 29·1% of the variation in hospital A fathers' PSE and 23·8% of the variation in hospital B fathers' PSE.

Among infant attributes, gestational weeks, birth weight, health and current age did not show a strong correlation with PSE. The combined effect of these four attributes explained only 2·5% of the variation in PSE among hospital A mothers and 3·0% among hospital B mothers. The combined effect of these corresponding variables explained 2·5% of the variation in hospital A fathers' and 4·9% of the variation in hospital B fathers' PSE. However, parents' perceptions of the infant correlated statistically significantly with PSE, explaining 16·1% of the

Table 4 Statistical significance of factors influencing parenting self-efficacy

	Parenting self-efficacy							
	Hospital A				Hospital B			
	Mothers (n = 469)		Fathers (n = 307)		Mothers (n = 394)		Fathers (n = 218)	
Attributes	Mean (SD)	P	Mean (SD)	P	Mean (SD)	P	Mean (SD)	P
Parent education								
≤Comprehensive	5·0 (0·6)	0·022	4·8 (0·5)	0·029	5·1 (0·6)	0·224	4·7 (0·8)	0·422
High school/vocational	5·0 (0·6)		4·7 (0·6)		5·0 (0·6)		4·6 (0·6)	
College	5·0 (0·6)		4·7 (0·6)		5·0 (0·6)		4·6 (0·6)	
Academic	4·9 (0·6)		4·5 (0·6)		4·9 (0·5)		4·5 (0·6)	
Marital status								
Married/registered	5·0 (0·6)	0·223	4·7 (0·6)	0·753	5·0 (0·6)	0·592	4·6 (0·6)	0·196
Cohabitation	4·9 (0·6)		4·7 (0·6)		4·9 (0·6)		4·6 (0·7)	
Other	4·8 (0·7)		4·4 (0·2)		5·0 (0·7)		3·8 (0·5)	
Parenting attitude during pregnancy								
Afraid/concerned/insecure	4·5 (0·6)	≤0·001	4·2 (0·6)	≤0·001	4·6 (0·6)	≤0·001	4·6 (0·6)	0·975
Relaxed/confident	5·0 (0·6)		4·7 (0·6)		5·0 (0·6)		4·6 (0·6)	
Parity								
First-timers	4·7 (0·6)	≤0·001	4·6 (0·6)	≤0·001	4·7 (0·6)	≤0·001	4·5 (0·6)	≤0·001
Two or more	5·2 (0·5)		4·8 (0·6)		5·3 (0·6)		4·8 (0·6)	
Infant gender								
Girl	5·0 (0·6)	0·867	4·7 (0·6)	0·071	4·9 (0·6)	0·348	4·5 (0·6)	0·231
Boy	5·0 (0·6)		4·6 (0·6)		5·0 (0·6)		4·6 (0·6)	
Infant health problem								
Yes, any kind	4·8 (0·6)	0·005	4·5 (0·6)	0·011	4·8 (0·6)	0·002	4·5 (0·6)	0·198
None	5·0 (0·5)		4·7 (0·6)		5·0 (0·6)		4·6 (0·6)	
Rooming-in								
Full-time	5·0 (0·6)	0·085	4·7 (0·6)	0·092	5·0 (0·6)	0·024	4·6 (0·6)	0·650
Part-time	5·0 (0·6)		4·5 (0·5)		4·9 (0·6)		4·5 (0·6)	
Not at all	4·5 (0·9)		4·3 (0·4)		4·7 (0·9)		4·4 (1·0)	
Father present								
24 hours a day	4·9 (0·6)	0·012	4·7 (0·6)	0·748	–	0·061	4·2 (1·5)	0·210
Daytime	5·1 (0·6)		4·6 (0·6)		4·9 (0·6)		4·6 (0·6)	
Not at all	5·0 (0·6)		4·9 (0·2)		5·2 (0·6)		–	
Feeding practices								
Exclusive breastfeeding	5·0 (0·6)	0·028	4·7 (0·6)	0·225	5·1 (0·5)	≤0·001	4·7 (0·6)	0·100
Partly breastfeeding	4·9 (0·6)		4·6 (0·5)		4·9 (0·6)		4·5 (0·6)	
Complementary feeding	4·7 (0·7)		4·4 (0·8)		4·9 (0·2)		5·0 (0·5)	

Statistical significance (P) determined by one-way ANOVA.

variation seen in hospital A mothers' PSE and 19·5% of the variation in hospital B mothers' PSE. Among fathers, parents' perceptions of the infant explained 17·5% of the variation in hospital A and 15·7% in hospital B.

Rooming-in, feeding practices, father's presence and social support from personnel on the maternity ward did not show a strongly statistically significant correlation with PSE. The combined effect of these four environmental attributes explained only 5·7% of the variation among hospital A mothers' and PSE 7·1% of hospital B mothers' PSE. The corresponding figures for the variation in PSE among hospital A fathers were 3·9% and for hospital B fathers 4·2%. Family functioning, family health and advice from ward staff were perceived as the most statistically significant environmental attributes. Their combined effect explained 17·4% of hospital A mothers', 25·2% of hospital B mothers', 26·0% of hospital A fathers' and 21·4% of hospital B fathers' PSE.

Cumulative effect of parent, infant and environmental attributes

We also examined the cumulative effect of the least and the most statistically significant parent, infant and environmental

attributes on PSE. The cumulative effect of the least statistically significant parent attributes (parent age, education, infant centrality, life change, experience of childbirth), infant attributes (gestational weeks, birth weight, health, current age) and environmental attributes (rooming-in, feeding practices, father's presence, social support from personnel) explained 25·4% of hospital A mothers' PSE and 24·5% of hospital B mothers' PSE. The cumulative effect of these least statistically significant parent, infant and environmental attributes explained 30·4% of the variation in hospital A fathers' PSE and 37·3% of the variation in hospital B fathers' PSE.

The cumulative effect of the most statistically significant parent attributes (parity, self-concept, depressive symptoms, state of mind on discharge), infant attributes (perception of infant) and environmental attributes (family functioning, family health, advice) explained 46·3% of the variation in hospital A mothers' PSE and 48·0% of the variation in hospital B mothers' satisfaction. The cumulative effect of the most statistically significant parent, infant and environmental attributes was 44·8% among hospital A and 37·5% among hospital B fathers. These figures did not show a statistically significant increase when one or more less statistically significant attributes were added.

Discussion

There are some limitations regarding the validity and reliability of our study. First, the instrument used to measure the dependent variable of PSE was used in this research project for the first time. However, to enhance the instrument's content validity, it was developed with the assistance of experts in a university hospital setting and piloted. In addition, the factor analysis performed in this study supported the theory (Bandura 1997), on the basis of which the instrument was developed. Internal consistency reliability among the different categories appeared to be good. Second, the statistical methods used in this study were restricted to linear correlations and shed no light on causality. Third, our data were collected with Finnish-speaking parents in two separate hospitals in urban areas. The results for these two datasets support each other, but they cannot be generalized to different cultural or environmental contexts. Fourth, the sample for this study included both experienced and inexperienced parents.

The level of perceived PSE was high among both mothers and fathers. However, most parents who participated in this study were still at the maternity hospital and had not yet cared for their infant independently. Therefore, as Ferketich and Mercer (1995) have suggested, it is possible that in this protective hospital setting they overestimated their abilities. Bandura (1997), on the other hand, has argued that parents' beliefs in their efficacy motivate and guide their actions, and high PSE beliefs make parents try more. In addition, high PSE is important for parents' sense of well-being and parenting satisfaction (Coleman & Karraker 1997, Hudson *et al.* 2001, Elek *et al.* 2003). Indeed high PSE beliefs, even if they are slightly too optimistic, are generally a good thing. However, when parents' evaluations of their PSE indicate a risk for infant growth, development or health, it is important that supportive interventions are available. Task-specific PSE instruments give valuable clues to healthcare professionals about the content of advice and support in order to develop interventions to enhance mothers' and fathers' PSE. While evaluating the effectiveness of these interventions it is important to identify statistically significant factors influencing PSE and their effect sizes in order to quarantee reliable study designs (Salonen *et al.* 2008).

Our results showed that mothers' PSE scores were statistically significantly higher than fathers', which is consistent with the findings of several previous studies (e.g. Reece & Harkless 1998, Hudson *et al.* 2001, Elek *et al.* 2003). In addition, several researchers (Ferketich & Mercer 1995, Mercer & Ferketich 1995, Bandura 1997, Tarkka *et al.* 2000) have found that first-time parents score statistically significantly lower on PSE than experienced parents during the early postpartum period. Based on her meta-synthesis, Nelson (2003) concluded that professionals must remain sensitive to the insecurity of primiparas. Bandura (1997) too has emphasized that parents' experiences and physiological state are strong predictors of PSE. Our results lend strong support to these views in that parity, self-concept, depressive symptoms and state of mind on hospital discharge were found to correlate statistically significantly with both mothers' and fathers' PSE. These correlations were stronger among mothers than fathers. Positive parenting attitude during pregnancy correlated with high PSE among hospital A and B mothers and hospital A fathers. In addition, minor life change and a positive experience of childbirth indicated higher PSE among mothers, but not among fathers. Most Finnish fathers are present during labour and their experiences of childbirth are more optimistic than mothers'.

In this study we found that parents' age, education and marital status did not correlate closely with mothers' or fathers' PSE. This is in conflict with the results of Mercer and Ferketich (1995). However, Kiehl and White (2003) discovered that different countries have contrasting family values, laws and policies, which may affect parenting. Parents in Finland are highly educated and all families have access to comprehensive social security benefits, including universal

What is already known about this topic

- The fact that parents can feel overwhelmed during the first year of infancy is a problem in many western countries.
- Parenting self-efficacy is important for parents' sense of well-being, is a possible predictor of parenting practices and might be an indicator of risk.
- Parenting self-efficacy has been studied from a nursing perspective using conflicting concepts, but the factors influencing parenting self-efficacy still continue to remain poorly explored.

What this paper adds

- Parity, self-concept, depressive symptoms and state of mind on discharge correlated with both parents' self-efficacy, while childbirth experiences and life change correlated with mothers' self-efficacy.
- Perception of infant and family functioning, health and advice from personnel contributed statistically significantly to both parents' parenting self-efficacy, while environmental attributes had a greater effect on fathers' parenting self-efficacy.
- Rooming-in, feeding practices, fathers' presence and social support from personnel had a statistically significant effect only when combined with other attributes.

Implications for practice and/or policy

- Assessments of parenting self-efficacy are recommended to identify at-risk groups and at-risk parents.
- Healthcare professionals should discuss with parents their depressive symptoms, state of mind on discharge, perception of the infant, and family well-being, and mothers' attitudes towards parenthood, childbirth experiences and life change.
- More research is recommended to look into the effect of rooming-in, feeding practices, fathers' presence and social support from personnel and parenting self-efficacy and to evaluate risk scores for at-risk parents.

health care, parental leave and child benefits. According to the National Research and Development Centre for Welfare and Health (2007), most Finnish parturients in 2006 were married (59·9%) or cohabiting (30·3%). Cohabiting couples enjoy the same social recognition and benefits as married couples in Finland.

According to Bandura (1997), challenges related to different infant attributes may reflect perceived task difficulty. In this study, parents' general perceptions of the infant showed the most statistically significant correlation with mothers' and fathers' PSE. Parents with infants who had health problems had lower PSE scores than parents with healthy infants, but the statistical significance of these differences varied in different groups of parents. However, these health problems included a wide range of problems, from minor skin complaints to severe illness requiring intensive care. Infant maturity did not correlate with either mothers' or fathers' PSE. In future, it could be helpful to study the effects of health problems or infant maturity in more closely defined groups of infants, since this could help to shed more light on perceived task difficulty. Infant sex did not correlate with PSE in any of the groups of parents, which is consistent with the findings of Elek *et al.* (2003) and Rogers and Matthews (2004). Previous research (Pridham *et al.* 1999, Elek *et al.* 2003, Porter & Hsu 2003) has also indicated that infant current age may have an impact on PSE. In our study, however, neither mothers' nor fathers' PSE was affected by infant current age. This is possibly explained by the short timespan: our participants filled in the questionnaire mainly during the first postpartum week and only at one time point.

Parents are expected to provide an environment that is optimal to their child's development. Our findings showed that better family functioning and family health correlate with higher PSE. In fact in the case of fathers, family functioning was one of the top three factors predicting PSE, and these correlations were even stronger than among mothers. Bandura (1997) has observed that verbal persuasion influences feelings of efficacy. Professionals too are expected to provide a supportive environment for parenting. Our results indicate that the more satisfied the parents were with the advice they received from hospital personnel, the higher their perceived efficacy. Earlier studies (e.g. Tarkka *et al.* 2000, Hudson *et al.* 2001, Svensson *et al.* 2005, Hildingsson 2007) have found that social support from personnel and different kinds of hospital practices have a positive impact on parenting. In this study, where different practices of rooming-in, fathers' presence at the maternity ward and social support from personnel were analysed separately, we found no statistically significant correlation with PSE. Mothers who exclusively breastfed had the highest scores in both groups of mothers, even though the statistical significance of this correlation varied from weak to strong. Hannula *et al.* (2008) observed in their systematic review of professional support interventions for breastfeeding that complex interventions using various methods were more effective than

single method interventions. In our study, the combined effect size of these hospital practices (rooming-in, fathers' presence at the maternity ward, feeding practices, social support) was less than 5%. The long-term effects of these hospital practices and social support from staff and the impact of time could be studied more reliably in a follow-up setting.

Conclusion

Identifying parents at risk is important for enhancing the well-being of each the parent, the infant and the whole family. The routine measurement of PSE during hospitalization might help to identify at-risk parents and provide an important diagnostic tool for individualizing interventions. However, more research is needed to evaluate risk scores among both mothers and fathers while using our PSE instrument. At this point, it can be used in defining scores, identifying possible risk groups and developing interventions.

Parents at risk can also be supported by identifying the most statistically significant parent, infant and environmental attributes, which will help professionals strengthen parents' resources and remove possible obstacles limiting their well-being. Therefore, at-risk parents can also be identified by using instruments that measure depressive symptoms, or by conducting face-to-face discussions with them about statistically significant topics. Mothers may also benefit from discussions about their attitudes towards parenthood during pregnancy, experiences of childbirth and life change, and more intensive breastfeeding support.

Rooming-in, infants' feeding practices, fathers' over night presence at the maternity hospital, and social support from personnel have been used to develop nursing care during the past 20 years. In this study these attributes did not show a clear correlation with either mothers' or fathers' PSE. However, these attributes had a statistically significant effect size while combined with other attributes. More research is recommended to look into these four environment attributes.

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Conflict of interest

No conflict of interest has been declared by the authors.

Author contributions

AHS, MK, PAK, ALJ and MTT were responsible for the study conception and design. AHS performed the data collection. AHS, MK, HI and MTT performed the data analysis. AHS was responsible for the drafting of the manuscript. AHS, MK, PAK, ALJ, HI and MTT made critical revisions to the paper for important intellectual content. HI provided statistical expertise. AHS, PAK and MTT obtained funding. MK, PAK, ALJ and MTT supervised the study.

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Parenting satisfaction during the immediate postpartum period: factors contributing to mothers' and fathers' perceptions

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Aims. To compare mothers' and fathers' parenting satisfaction; to identify factors contributing to their parenting satisfaction; and to evaluate the effect of these factors.

Background. Parenting satisfaction is important for parents' motivation to care, nurture and interact with their child. Parenting is influenced by attributes of parent, infant and the environment. However, more research is needed to understand the contributing factors.

Design. Parenting satisfaction and several parent, infant and environment attributes were measured at hospital or in one week of discharge. A total of 2600 questionnaires were handed out to a convenience sample of Finnish speaking parents in two hospitals during the winter of 2006. Multiple-birth and early-discharge parents receiving support at home were excluded. Responses were received from 863 mothers (66%) and 525 fathers (40%).

Methods. Comparisons were made by percentages and means. Significances were determined by GEE models and One Way ANOVA tests. Pearson's and Spearman's correlations were used to determine correlations and multiple regression analysis to clarify the effect size.

Results. Mothers were more satisfied than fathers with their parenting. Self-concept, depressive symptoms, infant centrality, state of mind on discharge and perception of infant contributed most to parenting satisfaction. Family functioning, health and advice from personnel were major contributory factors as well.

Conclusion. Hospital practices and social support from personnel did not correlate with parenting satisfaction. More research is recommended to evaluate them, since they had an effect when combined with other attributes.

Relevance to clinical practice. Our results will help professionals understand the experiences, resources and challenges faced by parents. Family-oriented care and sound advice have the potential to offer the most supportive environment for both parents. If professionals can identify mothers who are afraid, concerned or insecure during pregnancy, they can also offer them extra support before the child is born.

Key words: comparative studies, family nursing, infants, parenting, parents, personal satisfaction

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Introduction

Mercer (1986) defines parenting satisfaction as the sense of pleasure and gratification that comes with the parenting role. Parenting is a major source of satisfaction for most parents, and it is essential for their motivation to care, nurture and interact with their infant (Coleman & Karraker 1997, Elek *et al.* 2003, Drake *et al.* 2007, Ngai *et al.* 2007). Becoming a parent also adds to the overall stressfulness of life and brings changes that can affect the parent's well-being (Pridham & Chang 1989). Many parents today feel unprepared for parenthood and feel overwhelmed (Cronin & McCarthy 2003, Condon *et al.* 2004, Nyström & Öhrling 2004, George 2005). A major task for health care professionals is to recognise factors that might affect parents' ability to provide a safe, supportive and loving environment to their children (Elek *et al.* 2003). There is very little evidence on fathers' parenting evaluations, factors influencing fathers' perceptions and comparisons between mothers and fathers (Hudson *et al.* 2001, Elek *et al.* 2003, de Montigny & Lacharite 2005, Garfield *et al.* 2006, Magill-Evans *et al.* 2006).

Background

Parent attributes

Parent-child interaction is a process of mutual adaptation that is influenced by parent attributes. These attributes include level of education, health, life change, expectations and coping (Barnard 1994). Mothers tend to score higher than fathers in parenting satisfaction during early parenthood (Reece & Harkless 1998, Hudson *et al.* 2001, Elek *et al.* 2003, Pelchat *et al.* 2004). However, there are also several other contributing factors. Mothers' higher age contributes negatively to parenting satisfaction, since older mothers appear to have unrealistically high expectations (Mercer 1986, Reece & Harkless 1996, Tarkka *et al.* 2000). It has also been reported that mother's age has no significant correlation with parenting satisfaction (Pridham & Chang 1992). Mercer (1986) and Pridham *et al.* (1991) found that highly educated mothers scored lower in parenting satisfaction. Tarkka *et al.* (2000), however, found no correlation between education or marital status and coping with child care. Primiparous women tend to be more critical than multiparas in their evaluations of parenting satisfaction (Pridham & Chang 1989, Tarkka *et al.* 2000). Age, education and parity showed a significant (R^2 = 11%) combined contribution (Pridham *et al.* 1991).

There are both positive and negative sides to the life change associated with becoming a parent. The positive sides are related to the development of a new self, a sense of mastery, growth as an individual and a new position in society (Reece & Harkless 1996). Tarkka *et al.* (2000) found close correlation between mothers' self-concept and coping with child care. The infant's central role brings intense feelings of love and attachment into life, but also concern about separation, other caregivers and the infant's health. Parents may also see unwanted changes in their freedom, flexibility and relationships (Reece & Harkless 1996). The infant has a more central role in the life of primiparous women, who have more difficulty coping with life change than multiparas (Pridham & Chang 1989, Cronin & McCarthy 2003). Infant centrality has also been shown to correlate significantly with parenting satisfaction (Pridham *et al.* 1994). Fathers identified knowing the infant, taking care of and feeding the infant as the critical incidents during early fatherhood (de Montigny & Lacharite 2004).

Discrepancy between expectations and reality has been found to correlate with postnatal depression (Tammentie *et al.* 2004a). Becoming a parent increases mothers' risk of depression (Tammentie *et al.* 2004b, Munk-Olsen *et al.* 2006), but parenting can also affect the mental health of fathers (Ramchandani *et al.* 2005, Garfield *et al.* 2006). The more the mother has postnatal depressive symptoms, the less positive her assessment of parenting satisfaction (Pridham *et al.* 2001). Parents' experience of childbirth is also important to the parenting experience (Vehviläinen-Julkunen & Liukkonen 1998, Tarkka *et al.* 2000). Finally, it has been reported that attitudes towards parenthood during pregnancy and parents' state of mind on discharge from hospitals are associated with coping with child care (Tarkka *et al.* 2000).

Infant attributes

Parent-child interaction is also influenced by infant characteristics (Barnard 1994). The sex of the infant is an important concern for some parents, for personal and cultural reasons. Hudson *et al.* (2001) reported that infant sex was not associated with parenting evaluations during the first two months. However, there is evidence that fathers of boys score higher than fathers of girls in parenting satisfaction at 3–12 months postpartum (Hudson *et al.* 2001, Elek *et al.* 2003). On the other hand, de Tychey *et al.* (2008) claimed that the birth of a boy reduces young mothers' quality of life. Therefore, further research is needed to gain stronger evidence (Hudson *et al.* 2001).

Pridham *et al.* (1999) studied mothers of premature (mean weight 1114 g, SD 269) and full-term (mean weight 3553 g, SD 560) infants. They found no significant correlation between infant maturity and parenting satisfaction. On the other hand, there is evidence that infant characteristics (Pridham *et al.* 1994, Tarkka 2003) and health affect parenting satisfaction. Pelchat *et al.* (2004) found significant differences in parenting satisfaction between parents with newborns who had specific health problems (cleft and/or lip palate vs. Down syndrome) in favour of cleft/lip palate.

Environment attributes

Parent-child interaction can be intervened and facilitated by the environment, which includes the resources (Barnard 1994). Becoming a parent affects family life (Pridham & Chang 1989, Hakulinen *et al.* 1998, 1999). Loving family relationships may emerge as an important source of satisfaction (Horowitz & Damato 1999), but family situation can also be a source of stress. For fathers, communicating and sharing emotions and solving problems are important family-related critical incidents (de Montigny & Lacharite 2004). Elek *et al.* (2003) found that marital satisfaction correlated positively with parenting satisfaction. On this basis we can assume that family functioning and health are potential predictors of parenting satisfaction.

Hospital practices differ internationally, but often nationally as well. Differences are found in practices of rooming-in, fathers' overnight stays in maternity hospital, feeding practices and social support from personnel. Mercer (1986) suggested that early experiences contribute to maternal self-evaluation. However, Pridham *et al.* (1991) found no significant correlation between parenting satisfaction and delivery, hospital conditions or postpartum learning resources. In addition, Svensson *et al.* (2005) noticed that mothers who left their infants in the nursery overnight scored closeness to their infants as less important. The active participation of first-time fathers during the early postpartum period contributes positively to parenting satisfaction (Hudson *et al.* 2001, Elek *et al.* 2003). Hildingsson (2007) found that fathers who did not spend the night on the maternity ward were more dissatisfied with their caregiving role than fathers who did spend the night.

There is evidence that social support from personnel has a positive impact on the parenting experience (Pridham & Chang 1992, Reece 1993). However, parenting education has received much criticism for its tendency to focus on mothers (Hudson *et al.* 2001, Elek *et al.* 2003). Fathers' critical experiences related to nurses and the hospital include obtaining responses, giving/receiving advice and being praised by the nurses, as well as coming to terms with loss of control and knowing and coping with hospital routines (de Montigny & Lacharite 2004). In particular, fathers often complain about the lack of informational support (Hudson *et al.* 2001, Elek *et al.* 2003).

To conclude, there is evidence that several parent attributes (age, education, marital status, parity, attitude towards parenthood, life change, infant centrality, state of mind on discharge), infant attributes (sex, infant maturity, health, characteristics) and environment attributes (family functioning, family health, different hospital practices, social support from personnel) might contribute to parenting satisfaction. However, the earlier research has worked with relatively small sample sizes and selected groups of parents and focused on limited cultural contexts. There is only very little evidence on fathers' parenting evaluations and comparisons between mothers and fathers. Therefore, more research is needed to study parenting satisfaction in both mothers and fathers during the early postpartum period.

Aims

The aim is to compare mothers' and fathers' parenting satisfaction; to identify factors contributing to their parenting satisfaction; and to evaluate the effect of these factors during the early postpartum period.

Our research questions are:

- How do mothers and fathers evaluate their parenting satisfaction?
- What are the factors contributing to mothers' and fathers' parenting satisfaction?
- What is the effect size of the factors contributing to mothers' and fathers' parenting satisfaction?

Methods

Design and participants

The sample consisted of mothers and fathers giving birth in two public university hospitals in southern Finland. The data for this cross-sectional study were collected in the context of a collaborative project called Urban parenthood, which is an intervention study aimed at enhancing the well-being of infants' families (Salonen *et al.* 2008). After the implementation of the intervention, hospital A parents will be the targets of the intervention and hospital B parents are their controls. Our data is considered as a description of the situation before the intervention was implemented. Mother refers here to a woman giving birth, and father to the infant's

father or mother's partner. The inclusion criteria for primiparas and multiparas were: (1) ability to understand and write Finnish, (2) at least one parent in the family willing to participate and (3) infant treated at the maternity or neonatal unit. Multiple-birth and early-discharge parents receiving support at home from the maternity hospital (home visit, nurse/midwife phone call) were excluded.

A power analysis was performed on pilot data to determine the sample size needed for comparisons between mothers and fathers. The test variable was the Evaluation subscale of What Being the Parent of a New Baby is Like- Revised, with means 7·9 (mothers) and 7·8 (fathers). Thus the desired difference was 0·1. Equal group sizes and equal variances (SD 0·64) were assumed. The alpha level was set at 0·05, and power was set at 0·80. In addition, the response rate was assumed to be 60%. With these assumptions, the required sample size was estimated at 1300.

Data collection

Data were collected using a convenience sample of parents. The participants were informed about the study the day before discharge and asked to complete a structured questionnaire at the hospital or no later than one week after discharge. A total of 4275 mothers gave birth in the target units during the periods of data collection, the exact number of fathers is not known. A total of 2600 information sheets and questionnaires were handed out to mothers and fathers. In all, 961 mothers and 580 fathers agreed to participate. Eventually a total of 1388 questionnaires were returned by 863 mothers (66%) and 525 fathers (40%): 469 mothers and 307 fathers in hospital A and 394 mothers and 218 fathers in hospital B. The number of couples in hospital A and B was 487 and 38 fathers and 376 mothers participated without their partners. Both hospitals recommend the practice of rooming-in, offer continuity of care and family-centred care. However, fathers' overnight stays on the maternity unit is common in hospital A, whereas in hospital B fathers can only stay the night in exceptional circumstances (e.g. if the infant was critically ill).

Parenting satisfaction was used as a dependent variable. It was assessed with the Evaluation subscale of What Being the Parent of a New Baby is Like- Revised (WPBL-R, Pridham & Chang 1989), which has three subscales: Evaluation (11 items), Centrality (eight items) and Life change (six items). Subjects respond to the questions on a nine-point scale with verbal end anchors. The WPBL-R instrument has been validated (Pridham & Chang 1989) and used in several studies with both parents. Alpha values of 0·77 or higher have been reported (e.g. Reece & Harkless 1998, Hudson *et al.* 2001, Elek *et al.* 2003). In this study, the WPBL-R instrument yielded alpha values of 0·67 or higher (Mothers: Evaluation 0·88, Centrality 0·67, Life change 0·69; Fathers: Evaluation 0·85, Centrality 0·68, Life change 0·69). The WPBL-R was translated into Finnish and back-translated into English by professional translators.

Several parent, infant and environment attributes were considered as independent variables. Parent attributes included age, education, marital status, parity and attitude towards parenthood during pregnancy (Table 1). In addition, an instrument developed by Saari and Majander (1985) was used to measure self-concept (10 items). Depressive symptoms were measured with the Edinburgh Postnatal Depression Scale (EPDS, Cox *et al.* 1987, 1993). Although the EPDS (10 items) was originally developed to screen depression in postnatal women, it has also been used in men (Ramchandani *et al.* 2005). Life change and infant centrality were evaluated with subscales of the WBPL-R (Pridham & Chang 1989). Experience of childbirth (eight items) and parent's state of mind on discharge (four items) were measured using five-point scales with verbal end anchors (Tarkka *et al.* 2000).

The infant attributes considered were gender, gestational weeks, birth weight and current age (Table 2). The presence of health problems in the infant was evaluated with an open-ended question, and the answers were divided into two categories: no problems or presence of any kind of health problem. Parents' perception of the infant was measured (nine items) using a five-point scale with verbal end anchors. Perceptions measured included those of eating, sleeping, contentment, activity level, clarity of cues, adaptability, soothability and general perception of the infant's health and how demanding the infant is.

Environment attributes included family functioning (21 items) and health (21 items), which were evaluated on a scale from 1 = 'strongly disagree' to 6 = 'strongly agree' (Åstedt-Kurki *et al.* 2002). In addition, environment attributes included type of delivery, rooming-in, feeding practices and fathers' presence on the maternity ward (Table 2). Social support (21 items) and advice (eight items) from personnel were measured with instruments developed by Tarkka *et al.* (1998, 2000).

To maximise the content validity of the whole questionnaire and all instruments, it was pilot tested by a team of doctoral level maternity care professionals (n = 7) and families (n = 70) in a university hospital setting. Internal consistency reliability was analysed by using Cronbach's

Table 1 Participating parents' attributes

Attributes	Hospital A			Hospital B		
	Mothers (n = 469)	Fathers (n = 307)	p	Mothers (n = 394)	Fathers (n = 218)	p
Parent age, mean (SD), years	30·7 (5·0)	32·0 (5·8)	0·000***	29·8 (5·2)	31·8 (5·3)	0·000***
Parent education (%)			0·087			0·798
≤ Comprehensive school	5·6	7·5		5·1	6·5	
High school/vocational	27·4	33·6		36·3	34·7	
College	31·4	23·5		32·7	33·8	
Academic	35·7	35·5		25·9	25·0	
Marital status (%)			0·060			0·259
Married/registered couple	63·5	66·4		56·9	58·3	
Cohabitation	32·6	32·6		38·8	40·8	
Other	3·8	1·0		4·3	0·9	
Parity						
First-timers (%)	55·4	64·7	0·000***	53·6	65·0	0·000***
Mean (SD)	1·7 (0·9)	1·5 (0·8)	0·000***	1·7 (0·9)	1·5 (0·8)	0·000***
Self-concept, mean (SD), total score 0–50	42·5 (5·1)	43·9 (4·6)	0·000***	41·9 (5·2)	43·2 (4·8)	0·002**
Depressive symptoms						
Mean (SD), total score 0–30	6·6 (4·2)	3·3 (2·9)	0·000***	6·9 (4·5)	3·3 (3·4)	0·000***
≥ 13 score (%)	9·0	1·3	0·000***	12·2	2·8	0·000***
Life change			0·000***			0·000***
Mean (SD), total score 1–9	6·3 (1·2)	5·9 (1·2)		6·3 (1·1)	5·8 (1·2)	
Infant centrality			0·000***			0·000***
Mean (SD), total score 1–9	7·1 (0·8)	6·7 (0·8)		7·1 (0·8)	6·6 (0·8)	
Parenting attitude during pregnancy (%)			0·174			0·019*
Afraid/concerned/insecure	10·2	7·2		14·0	7·4	
Relaxed/confident	89·8	92·8		86·0	92·6	
Experience of birth			0·000***			0·000***
Mean (SD), total score 1–5	3·3 (0·8)	3·6 (0·7)		3·3 (0·7)	3·6 (0·7)	
State of mind on discharge			0·000***			0·000***
Mean (SD), total score 1–5	4·1 (0·6)	4·3 (0·5)		4·1 (0·7)	4·4 (0·5)	

SD, standard deviation.
Significance (p) is determined by GEE Models, *$p \leq 0{\cdot}05$, **$p \leq 0{\cdot}01$, ***$p \leq 0{\cdot}001$.

alpha coefficients. The alpha coefficients of the independent variables varied from 0·66–0·96. More detailed information about the content and scorings of various parts of the questionnaries are described by Salonen *et al.* (2008).

Ethical considerations

The research protocol was approved by the Research Ethics Committees of the hospitals involved. Following approval from the hospital admistration, the data were collected between October 2006–April 2007. The parents received written and verbal information about the study and signed written consent forms. To ensure anonymity and confidentiality, an envelope addressed to the principal investigator (AS) was enclosed. The questionnaires were coded for statistical purposes. The ethical principles as set out in the The World Medical Association's (1964) Declaration of Helsinki were followed. The instruments were used with the permission of the copyright holders.

Data analysis

Data were analysed using SPSS 16.0 software and descriptive statistics (ranges, means, SD, frequencies, percentages). Total scores for the WBPL-R subscales and for each independent variable, with the exception of self-concept and depressive symptoms, were calculated by summing the scores for all items in each subscale and dividing the sum by the number of items. Individual scores for self-concept and depressive symptoms were calculated by summing the scores for all items in the subscale. With the exception of the EPDS where lower scores indicated better health, higher scores represented better outcome. Comparisons were made between mothers and fathers in two different hospitals.

Table 2 Infant and environment attributes in the target hospitals

Attributes	Hospital A			Hospital B		
	Mothers (n = 469)	Fathers (n = 307)	p	Mothers (n = 394)	Fathers (n = 218)	p
Infant sex, boys (%)	50·3	49·8	0·805	53·7	56·9	0·193
Gestational weeks, mean (SD)	39·9 (1·6)	39·9 (1·5)	0·815	39·5 (2·0)	39·7 (1·8)	0·029*
< 37 weeks (%)	3·0	2·6	0·718	5·9	4·2	0·208
Birth weight, mean (SD), g	3559·0 (505·9)	3537·6 (483·5)	0·281	3484·8 (556·0)	3521·8 (479·2)	0·175
Infant current age in days, mean (SD)	3·5 (3·9)	3·4 (3·4)	0·457	4·5 (4·9)	5·2 (5·5)	0·018*
Infant health problem, any kind (%)	25·2	20·2	0·046*	38·3	26·6	0·000***
Perception of infant			0·304			0·024*
Mean (SD), total score 1–5	4·3 (0·5)	4·3 (0·5)		4·2 (0·6)	4·3 (0·5)	
Family functioning			0·783			0·882
Mean (SD), total score 1–6	4·9 (0·6)	4·9 (0·5)		4·9 (0·6)	4·9 (0·5)	
Family health			0·001***			0·001***
Mean (SD), total score 1–6	5·0 (0·4)	4·9 (0·4)		4·9 (0·4)	4·8 (0·4)	
Type of delivery (%)			0·071			0·714
Vaginal	74·4	71·1		75·6	74·2	
Instrumental	9·4	11·5		9·9	12·9	
Caesarean section	16·2	17·4		14·5	12·9	
Rooming-in (%)			0·936			0·507
Full-time	78·7	78·9		77·4	78·5	
Part-time	20·0	19·3		17·4	19·5	
Not at all	1·3	1·8		5·4	2·0	
Father present (%)			0·000***			0·001***
24 hours a day	49·9	66·1		0·3	2·3	
During the daytime	44·3	33·2		94·6	97·7	
Not at all	5·8	0·7		5·1	0·0	
Feeding practices (%)			0·240			0·111
Exclusive breastfeeding	51·0	54·2		27·4	31·6	
Partially breastfeeding	46·9	45·2		72·1	67·0	
Complementary feeding	2·1	0·7		0·5	1·4	
Social support from personnel, mean (SD), total score 0–6	3·6 (1·0)	3·7 (1·2)	0·281	3·6 (0·9)	3·2 (1·3)	0·000***
Advice						
Mean (SD), total score 1–5	4·1 (0·6)	4·1 (0·6)	0·608	4·0 (0·6)	4·0 (0·6)	0·458

SD, standard deviation.
Significance (p) is determined by GEE Models, *$p \leq 0{\cdot}05$, ***$p \leq 0{\cdot}001$.

Significances in comparing mothers and fathers were determined by GEE models (Generalized Estimating Equations), and significances for means of parenting satisfaction by One Way ANOVA. The exact significance (p) values are presented in the results to detect statistically significant differences ($p \leq 0{\cdot}05$). Due to the large sample size used in this study, p-values ≤0·001 were interpreted as clinically significant. Correlations were determined by Pearson's or Spearman's correlation coefficients. Multiple regression analysis was used to assess the effect (R square) of the least and the most significant infant, parent and environment attributes and to determine their combined effect. In regression analysis categorical variables were treated as fixed factors. The most significant attributes had p-values of 0·001 or below in all groups of parents.

Results

The mean age of hospital A mothers was 30·7 years (range 17–47) and of hospital B mothers 29·8 years (range 18–42). Fathers were significantly older: in hospital A fathers' mean age was 32·0 years (range 18–62) and in hospital B 31·8 years (range 20–45). The participants were highly educated: no significant difference was seen in this respect between mothers and fathers (Table 1). Almost all parents lived with a partner. The majority of mothers were first-timers, and fathers were first-timers significantly more often than mothers. Mothers scored high on self-concept, and fathers scored even higher. Depressive symptoms were relatively common among mothers, fathers suffered from depressive symptoms significantly less often than mothers.

Most parents described their attitude towards parenting during pregnancy as relaxed or confident, and only a small proportion said they felt afraid, concerned or insecure. Mothers experienced a bigger life change and infant centrality than fathers. Mothers' experiences of birth and state of mind on discharge were significantly more negative than fathers' (Table 1).

More than half of the parents had a male infant. Gestational weeks and infant birth weight did not differ between the parents in the two hospitals. Only very few infants were born prematurely. However, various health problems were quite common. The severity of these problems ranged from minor skin complaints to severe diseases requiring intensive care. No difference was recorded between mothers and fathers in hospital A in infant health, but mothers in hospital B had infants with health problems more often than fathers in hospital. On the whole, parents had positive perceptions of their infants, and these perceptions did not differ between the different groups. Current infant age did not differ between mothers and fathers.

Parents' perceptions of family functioning did not differ between the different groups, but mothers had significantly more optimistic opinions about family health (Table 2). The most common type of delivery was vaginal or instrument delivery. No significant differences were seen between mothers and fathers in rooming-in and feeding practices. However, a significant difference was seen in fathers' presence during hospitalisation. Perceptions of social support from personnel did not differ between mothers and fathers in hospital A. In hospital B, however, mothers had significantly more positive assessments of social support from personnel than fathers. Parents' perceptions of advice received from personnel did not differ between the groups.

Parenting satisfaction and contributing factors

On average, mothers' and fathers' parenting satisfaction scores were high. In hospital A, mothers' mean score for parenting satisfaction was 7·9 (SD 0·7, range 5·1–9·0), among fathers 7·8 (SD 0·7, range 5·4–9·0). This difference was statistically significant ($p = 0·004$). The corresponding figures for hospital B were 7·9 (SD 0·7, range 5·0–9·0) and 7·6 (SD 0·8, range 5·4–9·0), respectively, again showing a statistically significant difference ($p \leq 0·001$).

The most significant parent attributes among all groups of parents were self-concept, depressive symptoms, infant centrality and parent's state of mind on discharge (Table 5). Parental age did not correlate significantly with parenting satisfaction in any of the groups of parents, but parity and life change did show a significant correlation in some groups (Table 4). Higher parental education did not negatively affect parenting satisfaction (Table 3). However, statistically significant differences were only seen among hospital A fathers and hospital B mothers. Marital status did not significantly contribute to parenting satisfaction. A relaxed or confident parenting attitude during pregnancy predicted statistically significantly higher parenting satisfaction among mothers. Parenting attitudes during pregnancy did not have a significant impact on fathers' satisfaction.

Among infant attributes, gestational weeks, birth weight, health and current age did not show a strong correlation with parenting satisfaction (Table 4). Infant gender did not have a significant influence, either, but infant health problems were accociated with lower satisfaction scores (Table 3). However, statistically significant differences only occurred among hospital A fathers and hospital B mothers. Parents' perceptions of the infant correlated significantly with parenting satisfaction (Table 5).

Type of delivery, different practices of rooming-in and father's presence at the maternity unit did not have a significant influence, except for rooming-in among hospital A mothers (Table 3). Mothers breastfeeding exclusively were the most satisfied, but statistically significant differences were only seen among mothers in hospital B. Feeding practices did not have a significant influence on fathers' satisfaction. Social support from maternity unit personnel did not show a strongly significant correlation with parenting satisfaction (Table 4). Family functioning, family health and advice from personnel were perceived as the most significant environment attributes (Table 5).

The combined effect of separate groups of attributes

The combined effect of parental age, education, parity, life change and experience of childbirth explained 12·3% of the variation in parenting satisfaction among hospital A and 7·0% among hospital B mothers. The combined effect of parental age, education, parity, life change and experience of childbirth was somewhat lower among fathers, explaining 7·8% of the variation in parenting satisfaction among hospital A fathers and 5·6% among hospital B fathers. The combined effect of self-concept, depressive symptoms, infant centrality and parent's state of mind on discharge explained 33·7% of the variation in hospital A mothers' and 44·6% of the variation in hospital B mothers' parenting satisfaction. The combined effect of self-concept, depressive symptoms, infant centrality and parent's state of mind on discharge explained 36·1% of the variation in hospital A fathers' and 33·6% of the variation in hospital B fathers' satisfaction.

Table 3 Significance of factors influencing parenting satisfaction

	Parenting satisfaction							
	Hospital A				Hospital B			
	Mothers (n = 469)		Fathers (n = 307)		Mothers (n = 394)		Fathers (n = 218)	
Attributes	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p
Parent education		0·060		0·002**		0·001***		0·248
≤ Comprehensive	7·9 (0·7)		8·1 (0·4)		8·2 (0·6)		7·8 (0·7)	
High school/vocational	8·0 (0·7)		7·9 (0·6)		8·0 (0·6)		7·6 (0·8)	
College	8·0 (0·7)		7·8 (0·7)		7·9 (0·7)		7·7 (0·7)	
Academic	7·8 (0·7)		7·6 (0·8)		7·7 (0·7)		7·5 (0·8)	
Marital status		0·387		0·980		0·282		0·210
Married/registered	8·0 (0·7)		7·8 (0·7)		7·9 (0·7)		7·6 (0·8)	
Cohabitation	7·9 (0·7)		7·8 (0·7)		7·9 (0·7)		7·7 (0·8)	
Other	7·8 (0·7)		7·8 (0·5)		8·2 (0·6)		6·7 (0·6)	
Parenting attitude during pregnancy		0·000***		0·022*		0·000***		0·948
Afraid/concerned/insecure	7·5 (0·8)		7·4 (0·9)		7·5 (0·8)		7·7 (0·6)	
Relaxed/confident	8·0 (0·7)		7·8 (0·7)		8·0 (0·6)		7·6 (0·8)	
Infant sex		0·191		0·357		0·575		0·082
Girl	7·9 (0·8)		7·8 (0·7)		7·9 (0·6)		7·5 (0·8)	
Boy	8·0 (0·6)		7·7 (0·7)		7·9 (0·7)		7·7 (0·7)	
Infant health problem		0·102		0·005**		0·001***		0·141
Yes, any kind	7·8 (0·6)		7·6 (0·7)		7·8 (0·6)		7·5 (0·8)	
None	8·0 (0·7)		7·8 (0·7)		8·0 (0·8)		7·7 (0·8)	
Type of delivery		0·420		0·748		0·765		0·335
Vaginal	7·9 (0·7)		7·8 (0·7)		7·9 (0·7)		7·7 (0·8)	
Instrumental	7·8 (0·8)		7·8 (0·5)		7·9 (0·6)		7·4 (0·7)	
Caesarean section	7·9 (0·7)		7·8 (0·8)		7·9 (0·8)		7·6 (0·6)	
Rooming-in		0·313		0·962		0·022*		0·317
Full-time	7·9 (0·7)		7·8 (0·7)		8·0 (0·6)		7·6 (0·8)	
Part-time	7·9 (0·6)		7·8 (0·6)		7·9 (0·7)		7·7 (0·7)	
Not at all	7·6 (0·7)		7·9 (0·6)		7·5 (1·1)		7·1 (1·4)	
Father present		0·250		0·642		0·222		0·263
24 hours a day	7·9 (0·7)		7·8 (0·7)		–		7·2 (1·5)	
During the daytime	8·0 (0·6)		7·8 (0·8)		7·9 (0·7)		7·6 (0·8)	
Not at all	7·9 (0·8)		–		8·2 (0·6)		–	
Feeding practices		0·058		0·294		0·002**		0·962
Exclusive breast feeding	8·0 (0·6)		7·8 (0·7)		8·0 (0·6)		7·6 (0·8)	
Partially breast feeding	7·8 (0·7)		7·7 (0·7)		7·9 (0·7)		7·6 (0·8)	
Complementary feeding	7·9 (1·4)		8·1 (0·5)		6·5 (1·4)		7·6 (1·1)	

SD, standard deviation.
Significance (p) is determined by One Way ANOVA, *$p \leq 0{\cdot}05$, **$p \leq 0{\cdot}01$, ***$p \leq 0{\cdot}001$.

The combined effect of gestational weeks, birth weight, health and current age explained only 2·9% of the variation in parenting satisfaction among hospital A mothers and 4·1% among hospital B mothers. The combined effect of these variables explained 2·8% of the variation in hospital A fathers' and 3·3% of the variation in hospital B fathers' parenting satisfaction. Parents' perceptions of the infant explained 20·2% of the variation seen in hospital A mothers' parenting satisfaction and 27·8% of the variation in hospital B mothers. Among fathers, the combined effect of these two variables was 21·0% in hospital A and 12·9% in hospital B.

The combined effect of rooming-in, feeding practices, father's presence and social support from maternity unit personnel explained only 4·9% of the variation in mothers' and 3·4% of the variation in fathers' satisfaction in hospital A, and 6·1% of the variation in hospital B mothers and 4·0% of the variation in fathers' satisfaction. The combined effect of family functioning, family health and advice from personnel explained 23·4% of hospital A mothers', 18·9% of

Table 4 The least significant infant, parent and environment attributes and their cumulative effect (*R* square) on parenting satisfaction

	Parenting satisfaction							
	Hospital A				Hospital B			
	Mothers (n = 469)		Fathers (n = 307)		Mothers (n = 394)		Fathers (n = 218)	
Attributes	R (p)	Cum R^2	R (p)	Cum R^2	R (p)	Cum R^2	R (p)	Cum R^2
Parent								
Parent age	0·052	0·003	−0·012	0·000	−0·061	0·004	0·028	0·001
	0·263		0·835		0·232		0·686	
Education	−0·075	0·022	−0·190	0·054	−0·214	0·044	−0·099	0·019
	0·106		0·001***		0·000***		0·150	
Parity	0·272	0·104	0·044	0·052	0·113	0·054	0·127	0·031
	0·000***		0·450		0·026*		0·064	
Life change	−0·087	0·117	−0·050	0·053	−0·178	0·060	0·007	0·032
	0·086		0·468		0·000***		0·909	
Experience of birth	0·130	0·123	0·152	0·078	0·120	0·070	0·180	0·056
	0·005**		0·009**		0·018*		0·009**	
Infant								
Gestational weeks	0·111	0·139	−0·036	0·079	0·103	0·080	−0·018	0·056
	0·017*		0·542		0·042*		0·797	
Infant birth weight	0·112	0·142	0·008	0·080	0·063	0·081	0·030	0·060
	0·016*		0·888		0·215		0·658	
Infant health	0·112	0·150	0·152	0·103	0·154	0·108	0·094	0·073
	0·016*		0·008**		0·002**		0·171	
Infant current age	−0·105	0·155	0·000	0·105	−0·108	0·108	−0·139	0·096
	0·024*		0·993		0·033*		0·042*	
Environment								
Rooming-in	−0·090	0·185	−0·017	0·136	−0·074	0·176	0·003	0·164
	0·054		0·776		0·147		0·966	
Feeding practices	−0·133	0·216	−0·083	0·170	−0·113	0·218	−0·018	0·188
	0·004**		0·154		0·026*		0·798	
Father present	0·051	0·292	0·032	0·291	0·060	0·259	0·019	0·226
	0·239		0·581		0·239		0·780	
Social support from personnel	−0·138	0·291	0·080	0·306	0·063	0·240	0·129	0·252
	0·003**		0·178		0·223		0·067	

Correlation coefficient R and significance (p) are determined by Pearson's or Spearman's (two-tailed) correlation tests, $*p \leq 0{\cdot}05$, $**p \leq 0{\cdot}01$, $***p \leq 0{\cdot}001$. Cumulative R^2 is determined by Multiple Regression Analysis, categorical variables treated as fixed factors.

hospital B mothers', 24·7% of hospital A fathers' and 36·4% of hospital B fathers' parenting satisfaction.

The combined effect of parent, infant and environment attributes

We also examined the cumulative effect of the least and the most significant parent, infant and environment attributes. The combined effect of the least significant parent attributes (parental age, education, parity, life change, experience of birth), infant attributes (gestational weeks, birth weight, health, current age) and environment attributes (rooming-in, feeding practices, father present, social support from personnel) explained 29·1% of hospital A mothers' and 24·0% of hospital B mothers' parenting satisfaction (Table 4). The combined effect of these least significant parent, infant and environment attributes explained 30·6% of the variation in hospital A fathers' and 25·2% of the variation in hospital B fathers' parenting satisfaction.

The combined effect of the most significant parent attributes (self-concept, depressive symptoms, infant centrality, state of mind on discharge), infant attributes (perception of infant) and environment attributes (family functioning, family health, advice) explained 41·8% of the variation in hospital A mothers' parenting satisfaction and 51·9% of the variation in hospital B mothers' satisfaction (Table 5). The cumulative effect of the most significant parent, infant and environment attributes was 48·0% among hospital A and 47·3% among hospital B fathers. The addition of one or more less significant attributes did not significantly increase these figures.

Table 5 The most significant infant, parent and environment attributes and their cumulative effect (*R* square) on parenting satisfaction

	Parenting satisfaction							
	Hospital A				Hospital B			
	Mothers (n = 469)		Fathers (n = 307)		Mothers (n = 394)		Fathers (n = 218)	
Attributes	Pearson significance	Cum R^2	Pearson significance	Cum R^2	Pearson significance	Cum R^2	Pearson significance	Cum R^2
Parent								
Self-concept	0·364	0·132	0·252	0·064	0·393	0·155	0·294	0·087
	0·000***		0·000***		0·000***		0·000***	
Depressive symptoms								
	−0·339	0·170	−0·208	0·076	−0·308	0·169	−0·334	0·133
	0·000***		0·000***		0·000***		0·000***	
Infant centrality	0·279	0·203	0·257	0·233	0·161	0·247	0·384	0·197
	0·000***		0·000***		0·000***		0·000***	
State of mind on discharge								
	0·485	0·337	0·426	0·361	0·582	0·446	0·497	0·336
	0·000***		0·000***		0·000***		0·000***	
Infant								
Perception of infant	0·449	0·383	0·459	0·438	0·527	0·505	0·359	0·357
	0·000***		0·000***		0·000***		0·000***	
Environment								
Family functioning	0·389	0·410	0·451	0·475	0·408	0·530	0·518	0·424
	0·000***		0·000***		0·000***		0·000***	
Family health	0·394	0·417	0·283	0·479	0·345	0·530	0·375	0·426
	0·000***		0·000***		0·000***		0·000***	
Advice from hospital personnel	0·352	0·418	0·345	0·480	0·275	0·519	0·483	0·473
	0·000***		0·000***		0·000***		0·000***	

Significance (p) is determined by Pearson's correlation (two-tailed) $^{*}p \leq 0{\cdot}05$, $^{***}p \leq 0{\cdot}001$. Cumulative R^2 is determined by Multiple Regression Analysis, all variables are numerical.

Discussion

Findings

The aims were to compare mothers' and fathers' parenting satisfaction; to identify factors contributing to their parenting satisfaction; and to evaluate the effect of these factors. Our study identified several factors that had a more or less significant impact on parenting satisfaction. Overall, the level of parenting satisfaction during the immediate postpartum period was high. Mothers were more satisfied than fathers, as reported in several previous studies (Reece & Harkless 1998, Hudson *et al.* 2001, Elek *et al.* 2003, Pelchat *et al.* 2004). The mothers and fathers who took part in our study differed in many other ways, too. Mothers were younger, they scored lower on self-concept, had more depressive symptoms and more negative perceptions of childbirth than fathers. Mothers also experienced bigger life change and infant centrality.

Self-concept, depressive symptoms, infant centrality and parent's state of mind on discharge emerged as the most significant parent attributes affecting mothers' and fathers' parenting satisfaction. These results are in line with those reported earlier by Pridham *et al.* (1991) and Tarkka *et al.* (2000). Previous research (e.g. Mercer 1986, Pridham *et al.* 1991, Reece & Harkless 1996, Tarkka *et al.* 2000) has also indicated that parenting satisfaction is influenced by parental age, education and parity. However, when analysed separately, these three parent attributes did not show a clear and significant correlation with parenting satisfaction. Furthermore, the combined effect of age, education and parity was less significant than in the study by Pridham *et al.* (1991). Parents' attitude towards parenthood during pregnancy was mainly positive. Mothers' attitude towards parenthood during pregnancy proved to predict parenting satisfaction in the immediate postpartum period. No such association was found for fathers' attitudes.

Parent's perceptions of the infant was the most significant infant attribute affecting parenting satisfaction. Barnard (1994), Pridham *et al.* (1994) and Tarkka (2003) also identified infant characteristics that correlated significantly with parenting experience. Previous research suggests that

infant sex (Elek *et al.* 2003) and health (Pelchat *et al.* 2004) contribute to parenting satisfaction. However, we were unable to find a significant correlation between infant sex and parenting satisfaction. This result is supported by Hudson *et al.* (2001), who concluded that infant sex has no effect during the first two months after childbirth. Our results are also consistent with the findings of Pridham *et al.* (1999) in that we found no statistically significant correlation between infant maturity and parenting satisfaction. In our study, more than 20% of infants had health problems. However, infant health problems were defined as including a wide range of problems, which may explain the non-detection of a significant correlation.

The environment attributes with the most significant impact on mothers' and fathers' parenting satisfaction were family functioning, family health and advice from hospital personnel. Family well-being is widely recognised as an important resource, but it can also be a source of stress (Pridham & Chang 1989, Barnard 1994, Åstedt-Kurki *et al.* 2002). Previous research has confirmed the importance of informational support and advice (Hudson *et al.* 2001, Elek *et al.* 2003, de Montigny & Lacharite 2004). In the past few decades considerable effort has been invested in developing caring practices at maternity hospitals to support mothers' and fathers' well-being and to meet their needs. Examples include rooming-in, infant's feeding practices, father's presence on the maternity ward and social support from personnel. However, we were unable to find a significant correlation between these factors and parenting satisfaction. In the long term, however, it is possible that these environment attributes may have a significant impact on parenting satisfaction, bearing in mind that parent-child interaction is a process of adaptation. In addition, in our study rooming-in, infant's feeding practices, father's presence on the maternity ward and social support from personnel seemed to have an effect while combined with other attributes.

Parenting satisfaction can be used as a nursing outcome measure, since it is essential for parental motivation to care, nurture and interact with their child. Knowledge about factors that contribute to parenting satisfaction is crucial to enhancing the reliability and validity of evaluations of the effectiveness of clinical nursing interventions.

Study limitations

There are some limitations that affect the validity and reliability of this study. Firstly, a comparison of the study sample with national statistics compiled by STAKES (2006) shows that the participants are highly representative of Finnish parturients with respect to mothers' age, parity, marital status and infant sex. The hospitals involved are major university hospitals that care for the sickest and smallest children in the country, but the number of parents with prematurely born children was lower than the national average (5·9% in 2006). Mothers' postnatal depression was also slightly lower than anticipated. Secondly, cultural and environmental factors always limit the generalisations that can be made from empirical findings. Our data were collected from two separate hospitals and analysed separately. Although there were some differences between the parents in the two hospitals, the results for these two datasets support each other. Thirdly, this study is based strictly on parents' self-assessments, which may be liable to inaccuracies. On the other hand, the dependent variable in this study was parenting satisfaction, which is precisely a subjective assessment. Therefore, the best way of assessing parenting satisfaction is to rely on reliable and valid self-evaluation instruments. In addition, there are challenges of measuring satisfactions, since high satisfaction does not quarantee, that parents have not had poor experiences in maternity care situations.

Conclusion

Even though mothers scored lower than fathers in several parent attributes, our results confirm that mothers are significantly more satisfied than fathers with their parenting during the immediate postpartum period. Self-concept, depressive symptoms, infant centrality, state of mind on discharge and perception of infant had the strongest influence on both mothers' and fathers' parenting satisfaction. Family functioning, health and advice from personnel also contributed significantly. On the other hand, hospital practices and social support from personnel did not correlate significantly with parenting satisfaction, but they had an effect while combined with other attributes. Therefore, more research is recommended to look into these four environment attributes, and their mediated and long-term effects.

Relevance to clinical practice

Our results will help professionals better understand the experiences, resources and challenges faced by parents and provide better clinical practice and support for mothers and fathers. Any factors that impact parenting also affect the infant and have public health significance. Increased parenting satisfaction requires that the needs of infants, parents and the whole family are more closely taken into account. Our results indicated that the development of family-oriented care and good advice have the potential to offer a

supportive environment for both parents. In addition, mothers' attitude towards parenthood during pregnancy was found to predict parenting satisfaction during the immediate postpartum period. Therefore, if professionals can recognise at-risk mothers who are afraid, concerned or insecure, they can offer them extra support before the child is even born.

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Contributions

Study design: AHS, MK, M-TT; data collection: AHS; analysis and interpretation of the data: AHS, MK, PÅ-K, A-LJ, HI, M-TT; manuscript preparation: AHS, MK, PÅ-K, A-LJ, HI, M-TT.

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Effectiveness of an internet-based intervention enhancing Finnish parents' parenting satisfaction and parenting self-efficacy during the postpartum period

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ABSTRACT

Background: the postpartum period presents several challenges related to learning infant care tasks, getting to know the infant and fulfilling self-expectations as parents. There is a need to evaluate the effectiveness of IT-based interventions that support parenting during this period.
Objective: this study evaluates the effectiveness of an internet-based intervention to support mothers' and fathers' parenting satisfaction and parenting self-efficacy (PSE).
Design: a quasi-experimental design with non-equivalent control group and repeated measures.
Settings: the study was conducted in two public maternity hospitals (intervention/control) in southern Finland.
Participants: a convenience sample of mothers and/or fathers ($N=1300$ families) was recruited. The inclusion criteria were primipara or multipara, and at least one parent willing to participate. Multiple birth, non-Finnish speaking and early discharge parents receiving home visits were excluded. A total of 500 mothers and 242 fathers returned complete sets of questionnaires.
Intervention: the intervention offered online support for parenting, breast feeding and infant care beginning from the middle of pregnancy. It comprised an information database, a peer discussion forum and expert advice.
Measurements: outcomes were measured by the evaluation subscale of the What Being the Parent of a New Baby is Like-Revised (WBPL-R) and Parenting Self-efficacy instruments after childbirth and six-to-eight weeks post partum.
Findings: both intervention and control mothers' parenting satisfaction and PSE increased statistically significantly during the postpartum period. Fathers' parenting satisfaction and PSE also increased, but this change was statistically significant only in the case of PSE. Both parents felt their affective skills related to PSE were the weakest after childbirth. During the postpartum period affective skills improved more than cognitive and behavioural skills. Different groups of mothers and different groups of fathers showed an equally positive change in parenting satisfaction and PSE.
Conclusion: both intervention and control mothers' and fathers' parenting satisfaction and PSE became more positive during the postpartum period. However, no intervention effects were found. In the future, it would be interesting to study longer-term effects and more specific groups of parents. The results indicate that online support has the potential to reach parents from diverse backgrounds. More research is needed on gender differences and user preferences. More interactive methods are needed to support parents' affective skills related to PSE.

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Introduction

The postpartum period begins after childbirth and ends when the mother's body has recovered as closely as possible to its pre-pregnant state. This six-to-eight weeks period is not just one of feelings of joy and happiness, but it also presents challenges related to learning infant care tasks, getting to know the infant and fulfilling self-expectations as a parent. According to Barnard's model (1994), this parent–infant interaction is a process of mutual adaptation.

In this study, parent–infant interaction is measured from the point of view of the parenting experience, in terms of parenting satisfaction and parenting self-efficacy. Parenting satisfaction is defined as a sense of pleasure and gratification regarding the parenting role. This includes a sense of satisfaction from carrying out infant care tasks, how well the parent knows the infant, and the extent to which self-expectations of being a parent are met (Pridham and Chang, 1989). Parenting self-efficacy (PSE) is defined as 'beliefs or judgements a parent holds of their capabilities to organise and execute a set of tasks related to parenting a child' (de Montigny and Lacharite, 2005, p. 387). In this study, these tasks are related to everyday parent–child interactions. However, they do not only reflect day-to-day tasks, but also interactive behaviours: how to be sensitive to infants' cues and needs and how to respond to them in a growth-fostering way (Barnard, 1994). During the infant's first four months, parents' perceptions of parenting may or may not change (Mercer and Ferketich, 1995; Reece and Harkless, 1996). Conflicting evidence has been published about the direction of this change: parents' perceptions may change more positively (Pridham and Chang, 1989, 1992; Pridham et al., 1994, 1999; Hudson et al., 2001) or negatively (Ferketich and Mercer, 1995; Mercer and Ferketich, 1995; Ngai et al., 2009).

The parenting experience is also influenced by various parent, infant and environmental attributes (Barnard, 1994; Salonen et al., 2009, in press). Mothers' experiences are usually more positive than fathers' (Reece and Harkless, 1998; Hudson et al., 2001; Elek et al., 2003). In addition, parent's age (Reece and Harkless, 1998; Kiehl and White, 2003), education (Ferketich and Mercer, 1995; Mercer and Ferketich, 1995), parity (Pridham and Chang, 1989; Tarkka et al., 2000; Drake et al., 2007), experience of childbirth (Ferketich and Mercer, 1995; Mercer and Ferketich, 1995; Tarkka et al., 2000), and depressive symptoms (Ferketich and Mercer, 1995; Porter and Hsu, 2003) are potential predictors of mothers' and/or fathers' parenting experience. There is also evidence that infant characteristics (Porter and Hsu, 2003; Tarkka, 2003) and social support from midwifery and nursing professionals (Tarkka et al., 2000) may contribute to the parenting experience. Shorter hospital stays are challenging midwifery and nursing professionals to offer effective support to facilitate parents' self-care. Internet-based interventions have the potential to support parents in this new life situation (Nyström and Öhrling, 2004; Madge and O'Connor, 2006; Magill-Evans et al., 2006).

In this paper, an intervention is defined as a set of actions aimed at bringing about change or producing identifiable outcomes (Rychetnik et al., 2002). Internet-based interventions tend to include an information database, peer communication and/or expert advice (White and Dorman, 2001; Herman et al., 2005). However, the concepts used in describing these interventions are numerous; examples include internet-based social support (Hudson et al., 2008), social support websites (Herman et al., 2005), web-based intervention (Christakis et al., 2006), online support (White and Dorman, 2001; Hudson et al., 2009), computer-mediated support (Bragadóttir, 2008), computer network (Hudson et al., 1999; Campbell-Grossman et al., 2009), virtual social support (Madge and O'Connor, 2006) and telemedicine programmes (Gray et al., 2000).

Internet-based interventions have been studied among parents with healthy infants (Kouri et al., 2006a, b; Wallance et al., 2006; Christakis et al., 2008), teenage mothers (Hudson et al., 1999), vaginal birth after caesarean section mothers (Wang et al., 2006), single low-income African American mothers (Herman et al., 2005; Hudson et al., 2008, 2009; Campbell-Grossman et al., 2009), and alcohol or substance abusing mothers (Thornberry et al., 2002; Ondersma et al., 2005). Research has also been conducted among first-time fathers (Hudson et al., 2003), parents whose children were born prematurely (Gray et al., 2000) or who had cancer (Bragadóttir, 2008). Many of the intervention studies mentioned above involved all three components: an information database, a peer discussion forum and access to advice from health-care professionals (Hudson et al., 2003; Herman et al., 2005; Kouri et al., 2006a, b; Hudson et al., 2008, 2009; Campbell-Grossman et al., 2009).

Kouri et al. (2006a, b) and Hudson et al. (2009) described different themes emerging in peer discussion forums, and Hudson et al. (1999) and Campbell-Grossman et al. (2009) described the themes raised in e-mail messages to professionals. These studies also reported the benefits of peer support. An online parenting support group for parents of children with cancer decreased mothers' depression and fathers' anxiety and stress (Bragadottir, 2005). It has also been found that online support improves parents' knowledge, attitudes and/or motivation (Hudson et al., 2003; Ondersma et al., 2005; Wallace et al., 2006; Wang et al., 2006). Furthermore, there are reports that online support strengthened first-time fathers' self-efficacy and parenting satisfaction four-to-eight weeks post partum (Hudson et al., 2003) and improved family satisfaction among parents with premature infants (Gray et al., 2005). In addition, online support improved the overall quality of care (Gray et al., 2000), promoted preventive practices (Christakis et al., 2006; Thompson et al., 2007), and activated parents to discuss prevention topics with the child's care provider (Christakis et al., 2006; Thompson et al., 2007).

Earlier research on online parenting support has predominantly used qualitative methods, or small samples in quantitative setting. The target groups and selected outcome measures have varied widely. No studies have reported negative effects or non-beneficial internet-based interventions. Effectiveness has been assessed only in rare cases, using controlled study designs. Several researchers have suggested that internet-based interventions should be further developed and researched (Bragadottir, 2005; de Montigny and Lacharite, 2005; Gray et al., 2005; Ondersma et al., 2005).

Methods

The aim of this study is to evaluate the effectiveness of an internet-based intervention to support mothers' and fathers' parenting satisfaction and parenting self-efficacy. The hypothesis is that intervention mothers and fathers will score higher than controls in parenting satisfaction and parenting self-efficacy during the postpartum period.

Design

A quasi-experimental design with non-equivalent control group and repeated measures was used. The study was conducted as part of a larger project entitled 'Urban parenthood' that offers additional support for infants' parents via an internet-based intervention (Salonen et al., 2008). Randomisation was not possible because the intervention was developed through multi-professional collaboration in the intervention hospital; therefore, personnel and parents at the intervention hospital were exposed

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to the intervention. In addition, the participants for the intervention group were recruited during pregnancy and it was impossible to know in advance on which wards they were to be treated after childbirth.

Settings

In Finland, maternity care is provided by a network of public maternity clinics and public hospitals that specialise in obstetric care. In 2008 a total of 59,808 children were born in Finland. The country's total fertility rate (1.85 in 2008) is one of the highest in Europe, and the perinatal mortality rate (4.8) is among the lowest in the world. In 2008 the mean age of all parturients was 30.1 years and the average duration of hospital stays after childbirth 3.2 days. Generally, parents in Finland are highly educated and all families have access to comprehensive social security benefits, including universal health care, parental leave and child benefits. Most Finnish parturients are married (58.6%) or cohabiting (33.6%) (National Institute for Health and Welfare, 2008). Cohabiting couples enjoy the same benefits as married couples. The rate of mothers' postnatal depression is estimated at around 10–15%, the same as in several other western countries (Tammentie et al., 2004a, b).

The study was conducted in two public university hospitals in southern Finland. Both hospitals (intervention/control) recommend the practice of rooming-in, aim to offer continuity of care and family-centred care. In the intervention hospital, fathers' overnight stays on the maternity unit are common practice, whereas in the control hospital overnight stays are allowed only in exceptional circumstances. In addition, the intervention hospital has in recent years developed several interventions to support breast feeding. In the control hospital, the main focus of midwifery and nursing development has been on early discharge parents receiving support at home from the maternity hospital (nurse/midwife home visits and telephone call). Early discharge is also an option in the intervention hospital, but nurse/midwife home visits are not. The internet-based intervention was used in the intervention hospital only. Midwifery and nursing professionals in the control hospital were to continue their work normally.

Participants

The sample consisted of a convenience sample of mothers and/or fathers. The inclusion criteria were a primiparous or multiparous parent, and at least one parent in the family willing to participate. The exclusion criteria were multiple births, unable to understand Finnish and early discharge parents receiving support at home by midwifery and nursing professionals (in the control hospital). The data were gathered as part of the larger research project. For that project, power analysis was performed to determine the sample size needed for comparisons between mothers and fathers (Cohen, 1988). The test variable was Parenting satisfaction, with means of 7.9 (mothers) and 7.8 (fathers). The desired difference was thus 0.1. Equal group sizes and equal variances (SD 0.64) were assumed. The level of alpha was set at 0.05, and power was 0.80. In addition, the response rate was assumed to be 60%. The sample size of $N=1300$ families was calculated on the basis of these assumptions.

Intervention

The intervention was designed to strengthen parenting satisfaction and PSE by offering online support for parenting, breast feeding and infant care (Salonen et al., 2008). The content of the internet resource was developed on the basis of previous research (e.g. Salonen et al., 2008), tacit knowledge and the nationwide infant care recommendations issued by the Finnish Ministry of Social Affairs and Health (Finnish Ministry of Social Affairs and Health, 2004; Hasunen et al., 2004). Intervention parents could access the internet resource based on their individual needs beginning from the middle of pregnancy. During pregnancy intervention parents had access to the information database and peer discussion forum using individual user names and passwords. In addition, parents were able to contact a registered nurse or midwife to ask anonymous questions online for two weeks post partum. These services complemented the care and guidance given at the intervention hospital after childbirth.

Procedures

The data were collected during August 2007–April 2008 in the intervention hospital and during December 2007–April 2008 in the control hospital. A total of 8827 mothers were treated in the target units during those periods (Fig. 1). A registered midwife recruited intervention parents when they visited the maternity hospital for an ultrasound screening during 18–21 gestational weeks. Control parents were recruited by midwifery and nursing professionals during the post partum in-patient stay. A convenience sample of parents from 1300 families were asked to complete a structured baseline questionnaire at the maternity hospital or no later than one week after discharge. Reasons for refusal were not asked. Each participant was advised to answer the questionnaire independently.

A total of 1196 questionnaires were returned after childbirth by 760 mothers (58%) and 436 fathers (34%): 433 mothers and 202 fathers in the intervention hospital, and 327 mothers and 236 fathers in the control hospital. Follow-up questionnaires including pre-paid postage envelopes were sent six weeks post partum to those participants who completed the questionnaire after childbirth. Complete sets of questionnaires, including both after childbirth and six-to-eight weeks follow-ups, were returned by 500 mothers (66%) and 242 fathers (56%): 244 mothers and 104 fathers in the intervention hospital, and 216 mothers and 138 fathers in the control hospital.

Instruments

The primary outcome measure was parenting satisfaction, which was assessed with the Evaluation (11 items) subscale of the revised What Being the Parent of a New Baby is Like (WPBL-R, Pridham and Chang, 1989). Subjects respond to the questions on a 9-point scale (range 1–9) with verbal end anchors. Total scores for Parenting satisfaction were calculated by adding up the scores of all items and dividing the sum by the number of items. Higher scores indicated higher satisfaction. Pridham and Chang (1989) reported alpha values of 0.87 one week and 0.90 for the Evaluation subscale one month post partum. In this study, the subscale yielded values of 0.89 or higher after childbirth (Mothers: 0.89; Fathers: 0.89) and at six-to-eight weeks (Mothers: 0.91; Fathers: 0.91).

The secondary outcome measure, parenting self-efficacy (PSE), was assessed using an instrument developed by Salonen et al. (2008, 2009). The PSE instrument comprises 27 items measuring cognitive (11 items), affective (7 items) and behavioural (9 items) infant care tasks on a scale from 1='strongly disagree' to 6='strongly agree'. Total PSE scores were calculated by adding up the scores of all items and dividing the sum by the number of items. In addition, the score for each subcategory was calculated

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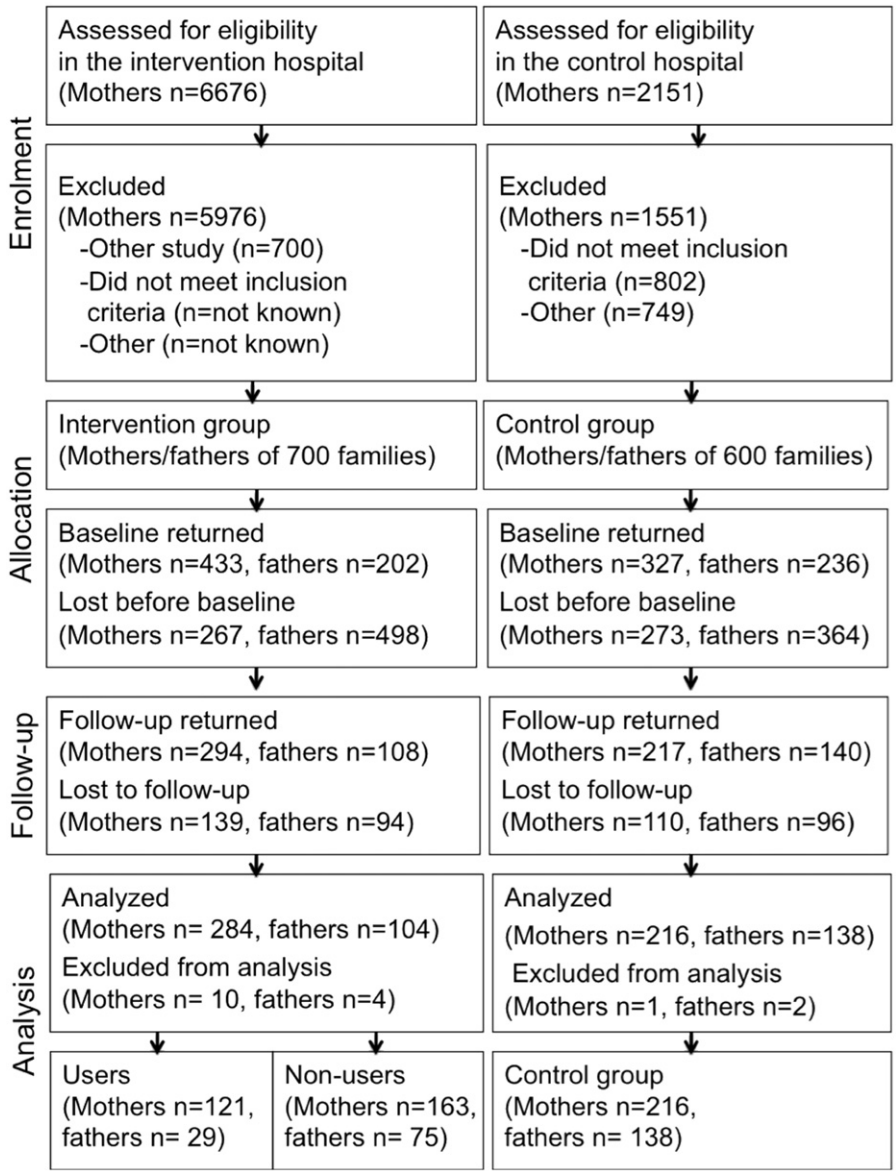

Fig. 1. Flow diagram of the progress of enrolment, allocation, follow-up and analysis of the participants in the intervention and control hospital.

by adding up the scores of all items in the subcategory and dividing the sum by the number of items. In this instrument higher scores indicated better outcomes. Salonen et al. (2008, 2009) reported alpha values of 0.91 or higher using the PSE instrument. In this study, the PSE instrument yielded alpha values of 0.87 or higher after childbirth (Mothers: Cognitive 0.91, Affective 0.91, Behavioural 0.92, Total 0.96; Fathers: Cognitive 0.90, Affective 0.91, Behavioural 0.90, Total 0.96), and at six-to-eight weeks (Mothers: Cognitive 0.87, Affective 0.89, Behavioural 0.89, Total 0.95; Fathers: Cognitive 0.88, Affective 0.89, Behavioural 0.86, Total 0.95).

The parent attributes considered were age, education, marital status, parity and type of childbirth (Table 1). Depressive symptoms were measured using the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987, 1993). Individual scores for depressive symptoms (EPDS) were calculated by summing the scores for all items in the instrument. An EPDS score of 13 or more was used as a cut-off point for depressive symptoms, as recommended by Cox et al. (1993). In this study, EPDS yielded alpha values of 0.83 for mothers and 0.76 for fathers after childbirth.

Previous computer use and computer skills in general were also evaluated. Infant attributes included gestational weeks and birth weight. Social support from midwifery and nursing professionals was evaluated using a subscale of the Family Functioning, Health and Social Support instrument (FAFHES, Åstedt-Kurki et al., 2002, 2009; Salonen et al., 2008). Total scores for Social Support were calculated by adding up the scores for all items in the instrument and dividing the sum by the number of items. Higher scores (scale 0–6) indicate better support from professionals. In this study, the Social support subscale yielded alpha values of 0.91 for mothers and 0.96 for fathers.

Data analysis

The data were analysed using SPSS 16.0 software (SPSS, Inc., Chicago, IL, USA). Descriptive statistics included frequencies, percentages, means and standads deviations. In the final analysis, comparisons were made between mothers and between fathers in the target hospitals (intervention/control). In addition, mothers and fathers in the intervention hospital were divided into two

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Table 1
Comparison of parent, infant and environmental attributes of mothers ($N=760$) and fathers ($N=436$) after childbirth.

Variables from questionnaire	Mothers					Fathers				
	Users (n=210)	Non-users (n=223)	p	Controls (n=327)	p	Users (n=53)	Non-users (n=149)	p	Controls (n=234)	p
Parent age, mean (SD)	30.4 (4.4)	31.4 (4.3)	0.012	30.1 (4.7)	0.516	32.0 (5.3)	31.6 (4.7)	0.616	31.7 (5.3)	0.658
Education (%)			0.161		0.014			0.514		0.636
≤ Comprehensive school	4.3	3.7		3.7		1.9	6.0		3.0	
High school/vocational	21.0	19.7		31.5		28.3	24.8		36.8	
College	34.8	31.1		36.4		32.1	26.2		27.4	
Academic	40.0	50.7		28.4		37.7	43.0		32.9	
Marital status (%)			0.141		0.625			0.641		0.858
Married/registered	68.1	69.8		64.2		69.8	73.2		67.5	
Cohabitation	29.0	29.7		33.0		30.2	26.8		32.1	
Other	2.9	0.5		2.8		0.0	0.0		0.4	
Parity, mean (SD)	1.4 (0.8)	1.5 (0.8)	0.112	1.7 (0.9)	0.002	1.2 (0.5)	1.4 (0.6)	0.143	1.6 (0.9)	0.005
First-timers (%)	69.1	57.2	0.012	54.2	0.001	78.8	70.3	0.281	57.8	0.005
Type of childbirth (%)			0.677		0.554			0.891		0.774
Vaginal	66.7	67.4		70.8		65.4	67.8		70.4	
Instrumental	13.3	15.4		10.8		13.5	14.1		11.2	
Caesarean section	20.0	17.2		18.5		21.2	18.1		18.5	
Depressive symptoms										
Mean (SD), scale 0–30	6.6 (4.4)	5.9 (4.0)	0.106	6.6 (4.2)	0.984	3.9 (3.5)	3.3 (2.9)	0.184	3.2 (2.9)	0.101
≥ 13 score (%)	9.5	6.3	0.217	7.0	0.330	3.8	1.3	0.282	0.4	0.089
Previous computer use (%)			0.432		0.000			0.786		0.064
Daily	90.9	88.3		76.3		92.5	90.6		81.5	
Weekly or less	9.1	11.3		23.7		7.5	9.4		18.5	
Computer skills (%)			0.169		0.001			0.251		0.030
Not at all/weak/moderate	5.2	7.7		12.2		3.8	8.1		17.9	
Good	52.9	52.4		59.3		37.7	45.6		35.5	
Excellent	41.9	38.0		28.4		58.5	46.3		46.6	
Birth weight, mean (SD)	3474.7 (550.0)	3510.4 (491.9)	0.476	3512.7 (515.2)	0.417	3502.9 (521.0)	3512.1 (476.7)	0.906	3470.8 (479.2)	0.666
Gestational age, mean (SD)	39.7 (1.7)	40.1 (1.8)	0.074	39.7 (1.7)	0.704	40.2 (1.6)	39.9 (1.7)	0.285	39.7 (1.6)	0.079
Social support										
Mean (SD), scale 0–6	3.7 (0.9)	3.7 (0.9)	0.891	3.6 (0.9)	0.351	3.8 (0.9)	3.8 (1.1)	0.604	2.8 (1.4)	0.000

SD, standard deviation; Intervention users is a quasi-experimental comparison between intervention non-users and the control group, significance (p) is determined by Chi-square or Fisher's exact test for percentages and one-way ANOVA for means.

groups based on intervention use: intervention users refer to parents with any kind of intervention use, and non-users to those parents who did not use the intervention at all. An analysis was also performed to evaluate intervention effectiveness among primiparous and multiparous parents. Statistical significance was determined by chi-square or Fisher's exact test for percentages and one-way ANOVA test for means when comparing parent, infant and environment attributes. *P*-values for change in outcome measures were determined by Paired Samples Test (within group) and Tukey HSD multiple correlation (between groups). While comparing parent, infant and environmental attributes (Table 1), intervention users were compared with both intervention non-users and controls. While comparing the outcome measures, parenting satisfaction (Table 2) and parenting self-efficacy (Tables 3 and 4), all groups were compared with each other. The internal consistency of the scales was evaluated by Cronbach's alpha coefficients.

Ethical considerations

The ethical principles set out in the World Medical Association's (1964) Declaration of Helsinki were honoured. The research protocol was approved by the Research Ethics Committees of the hospitals concerned. The mothers and fathers received written and oral information about the study and voluntary participation. All participants signed informed consent forms, and all data were treated confidentially. The instruments were used with the permission of the copyright holders.

Findings

Respondents

The mean age for all mothers was 30.6 (SD 4.6, range 18–44) and for all fathers 31.7 years (SD 5.1, range 20–55). Mothers using the intervention were statistically significantly younger than non-users, but the other groups of parents did not differ significantly from each other (Table 1). The respondents were highly educated as more than 60% had either a college or academic degree. Control mothers, however, had a significantly lower level of education than intervention mothers. Almost all parents lived in a couple relationship. The total number of children range from 1 to 8 among mothers and from 1 to 7 among fathers. The mean amount of children was 1.4 (SD 0.8) for mothers using the intervention, 1.5 (SD 0.8) for non-users and 1.7 (SD 0.9) for controls. The corresponding figures for fathers were 1.2 (SD 0.5) for users, 1.4 (SD 0.6) for non-users and 1.6 (SD 0.9) for controls. Parents using the intervention were first-timers statistically significantly more often than control parents. Mothers or fathers did not differ statistically significantly between the groups while comparing marital status, childbirth type or depressive symptoms. In general, the respondents were frequent and confident users of the internet. However, intervention parents were statistically

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Table 2
Comparison of parenting satisfaction in different groups of mothers ($N=500$) and fathers ($N=242$) during the postpartum period.

	Parenting satisfaction			*P*-value of change within group	*P*-values of changes between groups		
	After childbirth (*A*)	Six-to-eight weeks post partum (*B*)	Change of means (*B*−*A*)		Users	Non-users	Control
Mothers							
Intervention group: Users	7.79 (0.7)	7.93 (0.8)	0.14	0.006	1.000	–	–
Intervention group: Non-users	7.80 (0.7)	7.88 (0.8)	0.08	0.140	0.592	1.000	–
Control group	7.82 (0.7)	8.01 (0.7)	0.19	0.000	0.784	0.152	1.000
All mothers	7.80 (0.7)	7.94 (0.8)	0.14	0.000	–	–	–
Fathers							
Intervention group: Users	7.51 (0.8)	7.57 (0.6)	0.06	0.582	1.000	–	–
Intervention group: Non-users	7.58 (0.8)	7.65 (0.9)	0.07	0.401	0.998	1.000	–
Control group	7.58 (0.9)	7.65 (0.9)	0.07	0.313	1.000	0.996	1.000
All fathers	7.57 (0.8)	7.64 (0.9)	0.07	0.155	–	–	–

Scale 1–9, mean (SD), *p*-values paired samples test and Tukey HSD multiple comparisons.

Table 3
Cognitive, behavioural and affective skills related to mothers' ($N=500$) parenting self-efficacy among intervention users, intervention non-users and control group.

	Parenting self-efficacy			*P*-values of change within group	*P*-values of changes between groups		
	After childbirth (*A*)	Six-to-eight weeks post partum (*B*)	Change of means (*B*−*A*)		Users	Non-users	Control
Total score							
Intervention group: Users	4.90 (0.6)	5.20 (0.4)	0.30	0.000	1.000	–	–
Intervention group: Non-users	4.89 (0.6)	5.16 (0.5)	0.27	0.000	0.813	1.000	–
Control group	4.93 (0.6)	5.24 (0.5)	0.31	0.000	0.999	0.736	1.000
All mothers	4.91 (0.6)	5.20 (0.5)	0.29	0.000	–	–	–
Cognitive skills							
Intervention group: Users	5.02 (0.6)	5.21 (0.5)	0.19	0.000	1.000	–	–
Intervention group: Non-users	5.00 (0.6)	5.16 (0.5)	0.16	0.000	0.843	1.000	–
Control group	5.04 (0.6)	5.26 (0.5)	0.22	0.000	0.848	0.429	1.000
All mothers	5.02 (0.6)	5.21 (0.5)	0.19	0.000	–	–	–
Behavioural skills							
Intervention group: Users	5.09 (0.6)	5.38 (0.4)	0.29	0.000	1.000	–	–
Intervention group: Non-users	5.09 (0.6)	5.34 (0.5)	0.25	0.000	0.697	1.000	–
Control group	5.11 (0.6)	5.40 (0.5)	0.29	0.000	0.979	0.751	1.000
All mothers	5.10 (0.6)	5.4 (0.5)	0.27	0.000	–	–	–
Affective skills							
Intervention group: Users	4.47 (0.7)	4.95 (0.6)	0.48	0.000	1.000	–	–
Intervention group: Non-users	4.46 (0.8)	4.93 (0.6)	0.47	0.000	0.990	1.000	–
Control group	4.54 (0.7)	5.00 (0.7)	0.46	0.000	0.954	0.986	1.000
All mothers	4.50 (0.7)	4.97 (0.6)	0.47	0.000	–	–	–

Scale 1–6, mean (SD), *p*-values paired samples test and Tukey HSD multiple comparisons.

significantly more frequent internet users and they also rated their computer skills as significantly higher than the controls. The respondents did not differ from each other with respect to infant birth weight and gestational weeks. Infant birth weight ranged from 1135 to 5380 g and gestational weeks ranged from 27.4 to 43.0. Mothers' perceptions of social support from midwifery and nursing professionals during the postnatal in-patient stay did not differ between the two groups, but control fathers scored significantly lower than intervention fathers. Intervention use ranged from 0 to 6.0 hours per week among mothers and from 0 to 5.0 hours per week among fathers.

Parenting satisfaction

Mothers' mean scores for parenting satisfaction after childbirth were 7.79 (SD 0.7) among the intervention users, 7.80 (SD 0.7) among intervention group non-users and 7.82 (SD 0.7) among mothers in the control hospital (Table 2). Fathers' mean parenting satisfaction scores after childbirth were 7.51 (SD 0.8) among users, 7.58 (SD 0.8) among non-users and 7.58 (SD 0.9) among controls. At six-to-eight weeks post partum, mean parenting satisfaction scores for intervention user mothers were 7.93 (SD 0.8), for non-users 7.88 (SD 0.8) and for control mothers 8.01 (SD 0.7). The corresponding figures for fathers were 7.57 (SD 0.6) among users, 7.65 (SD 0.9) among non-users and 7.65 (SD 0.9) among controls. The mean parenting satisfaction scores at six-to-eight weeks post partum were therefore higher than after childbirth in all groups of mothers and fathers. However, these differences were statistically significant only among mothers (Table 2). The scores did not differ significantly between different groups of mothers, or between different groups fathers. In addition, there was no statistically significant difference between the three groups when first time and experienced mothers and fathers were analysed separately (data not shown). Intervention use in minutes or based on frequency (daily, weekly, monthly,

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Table 4
Cognitive, behavioural and affective skills related to fathers' ($N=242$) parenting self-efficacy among intervention users, intervention group non-users and control group.

	Parenting self-efficacy			*P*-values of change within group	*P*-values of changes between groups		
	After childbirth (*A*)	Six weeks post partum (*B*)	Change of means (*B*−*A*)		Users	Non-users	Control
Total score							
Intervention group: Users	4.51 (0.6)	4.72 (0.5)	0.21	0.026	1.000	–	–
Intervention group: Non-users	4.55 (0.6)	4.82 (0.5)	0.27	0.000	0.848	1.000	–
Control group	4.53 (0.6)	4.81 (0.6)	0.28	0.000	0.788	0.994	1.000
All fathers	4.53 (0.6)	4.80 (0.6)	0.27	0.000	–	–	–
Cognitive skills							
Intervention group: Users	4.50 (0.6)	4.74 (0.5)	0.24	0.035	1.000	–	–
Intervention group: Non-users	4.60 (0.7)	4.76 (0.5)	0.16	0.011	0.781	1.000	–
Control group	4.55 (0.7)	4.78 (0.7)	0.23	0.000	0.993	0.664	1.000
All fathers	4.56 (0.7)	4.77 (0.6)	0.21	0.000	–	–	–
Behavioural skills							
Intervention group: Users	4.78 (0.6)	4.89 (0.5)	0.11	0.240	1.000	–	–
Intervention group: Non-users	4.72 (0.6)	5.02 (0.6)	0.30	0.000	0.310	1.000	–
Control group	4.72 (0.7)	4.96 (0.6)	0.24	0.000	0.495	0.811	1.000
All fathers	4.73 (0.6)	4.97 (0.6)	0.24	0.000	–	–	–
Affective skills							
Intervention group: Users	4.17 (0.8)	4.45 (0.6)	0.28	0.037	1.000	–	–
Intervention group: Non-users	4.23 (0.8)	4.65 (0.7)	0.42	0.000	0.646	1.000	–
Control group	4.27 (0.8)	4.66 (0.7)	0.39	0.000	0.708	0.971	1.000
All fathers	4.25 (0.8)	4.63 (0.7)	0.38	0.000	–	–	–

Scale 1–6, mean (SD), *p*-values paired samples test and Tukey HSD multiple comparisons.

rarely than monthly, not at all) did not impact parenting satisfaction.

Parenting self-efficacy

Mothers' mean PSE scores after childbirth were 4.90 (SD 0.6) among users, 4.89 (SD 0.6) among non-users and 4.93 (SD 0.6) among controls (Table 3). Fathers' mean PSE scores after childbirth were 4.51 (SD 0.6) among users, 4.55 (SD 0.6) among non-users and 4.53 (SD 0.6) among controls (Table 4). At six-to-eight weeks post partum, mothers' mean PSE scores were 5.20 (SD 0.4) among users, 5.16 (SD 0.5) among non-users and 5.24 (SD 0.5) among the controls. The corresponding PSE figures for fathers were 4.72 (SD 0.5) among users, 4.82 (SD 0.5) among non-users and 4.81 (SD 0.6) among controls. The total PSE scores at six-to-eight weeks post partum did not differ statistically significantly between different groups of mothers or fathers. However, the mean PSE scores at six-to-eight weeks post partum were statistically significantly higher than after childbirth in all groups of mothers (Table 3) and fathers (Table 4). Both mothers' and fathers' mean PSE scores after childbirth were the highest for behavioural skills and the lowest for affective skills. These changes in mean scores during the postpartum period were statistically significant in all groups of mothers ($p \leq 0.0001$) and fathers ($p \leq 0.05$), except for behavioural skills among intervention user fathers. The change in mean scores within the groups was clearly the largest for affective skills and the smallest for cognitive skills among mothers. The corresponding figures for fathers are similar, but the differences vary more within different groups. Six-to-eight weeks post partum, the PSE scores for cognitive, behavioural or affective skills did not differ statistically significantly between different groups of mothers or fathers. In addition, no significant difference was seen between the three groups when first time and experienced mothers and fathers were analysed separately (data not shown). Finally, intervention use in minutes or based on frequency (daily, weekly, monthly, rarely than monthly, not at all) did not impact parenting self-efficacy.

Discussion

Study limitations

There are some limitations that affected the validity and reliability of this study. The first limitation is the lack of randomisation, which may have resulted in selection bias (Moher et al., 2001). Intervention parents were first-timers, and more confident and more active computer users than their controls. Second, intervention parents were advised to use the intervention based on their individual needs and therefore the intervention group was divided into two groups (users/non-users). The users and non-users were well comparable with respect to parent, infant and environment attributes.

A third limitation is the high attrition rate of mothers and fathers in particular. However, the response rate for fathers is a conservative estimate, as it assumes that fathers from all 1300 families were eligible. In reality, all fathers could not even be reached and informed about the study. The mothers in this study are representative of Finnish parturients quite well with respect to age, but intervention mothers were first-timers more often than the national average (National Institute for Health and Welfare, 2008). Furthermore, mothers' postnatal depression was lower than anticipated and the data did not include non-Finnish speaking parents.

Fourth, controlling performance bias means that there are no systematic differences in care provided for different groups a side the proposed intervention under evaluation (Borglin and Richards, 2010). In this study, postnatal hospital practices differed significantly in terms of fathers' opportunities to participate in infant care 24 hours a day. Mothers' evaluations of social support from professionals during their postnatal in-patient stay did not differ between the groups, but control fathers were significantly less satisfied. This difference was present even before the

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internet-based intervention (Salonen et al., 2008, 2009). The instruments used in this study have been previously validated in a Finnish population. In this study, the internal consistency of both instruments appeared to be good.

Discussion of findings

This study provides information about the effectiveness of an internet-based intervention, mothers' and fathers' parenting experience during the postpartum period, and parents as users of online parenting support. Mothers had systematically higher parenting satisfaction and parenting self-efficacy scores than fathers, which supports the results of previous studies (e.g. Reece and Harkless, 1998; Hudson et al., 2001; Elek et al., 2003; Salonen et al., 2009, in press). Conflicting evidence has been published about the direction of change in parents' perceptions of the parenting experience. The finding indicates that both mothers' and fathers' perceptions of parenting satisfaction and PSE changed in a more positive direction during the postpartum period, more clearly so for PSE than for parenting satisfaction. On the other hand the results showed an equally positive change among different groups of mothers' as well as different groups of fathers' parenting experience during the puerperal period, which is not consistent with the study hypothesis. The hypothesis was that during the postpartum period, intervention mothers and fathers will score higher than their controls in parenting satisfaction and PSE.

Previous studies indicate that internet-based interventions improve parents' knowledge, attitudes and/or motivation (Hudson et al., 2003; Ondersma et al., 2005; Wallace et al., 2006; Wang et al., 2006). The results from this study show that parents in all groups had the highest score for cognitive skills related to PSE and, therefore, were quite well informed. Overall, both mothers' and fathers' parenting satisfaction and PSE were at such a high level that there is only limited room for improvement.

The internet-based intervention used in this study was relatively complex, involving an information database, peer discussion forum and expert advice. The information database included a lot of information about parenting, breast feeding and infant care. In fact, the information database formed the largest part of the whole internet resource. In addition, intervention parents were able to use the intervention for more than 20 weeks while expecting their child. During that period, they may have received support from several other sources as well, including the maternity health clinic, childbirth education, social network and other parenting websites. Most importantly, it is possible that the questionnaire itself served as an intervention and activated parents, including control parents, to search for more support and information.

On the other hand, according to Bandura's (1997) self-efficacy theory, the main source for parents' sense of efficacy is their experience with parenting tasks. In this study, both mothers' and fathers' assessments of PSE after childbirth were the lowest for affective skills. The improvement in affective skills was clearly biggest during the postpartum period. Salonen et al. (2008) found that both mothers and fathers in the intervention hospital might benefit from extended support about the infant's cues and behaviour, and day-rhythm and sleep. Therefore, further information was added to the internet resource about these topics. Parents might benefit from more interactive interventions to support their affective skills after the child is born. In the future, it would be interesting to study the effects of the proposed intervention in a longer-term follow-up setting.

Several researchers have recommended developing preventively arranged and population-based parenting support online (Nyström and Öhrling, 2004; Magill-Evans et al., 2006). However, based on their systematic review of the literature on the effectiveness of post partum support, Shaw et al. (2006) concluded that there was no randomised controlled trial evidence to endorse universal provision of post partum support to improve parenting, mental health quality of life and physical health. According to Salonen et al. (2009, in press), rooming-in, fathers' presence at the maternity unit, infant feeding practices or social support from midwifery and nursing professionals do not correlate with mothers' and fathers' parenting experience after childbirth, but they do have an impact in combination with other factors. The meta-analysis by Yarcheski et al. (2009) also suggests that social support from professionals has only a moderate effect on maternal–fetal attachment. Furthermore, there is evidence to indicate that online support might not benefit all parents equally (e.g. Herman et al., 2005; Sarkadi and Bremberg, 2005; Madge and O'Connor, 2006). However, there is also evidence that some high-risk groups might benefit from post partum support (Gardner and Deatrick, 2006; Shaw et al., 2006). Therefore, further research is needed to establish whether the proposed intervention is effective in supporting more specific groups of mothers and fathers such as parents with premature infants, parents with a negative parenting attitude or depressive symptoms. Further research is also needed to study whether the proposed intervention is effective when using narrow-domain outcome measures such as breast feeding.

The intervention users in this study were quite representative of Finnish birthing women with respect to mothers' age, marital status, type of childbirth and infant birth weight. The results also indicate that mothers used online parenting support more actively than fathers. In other words the use of online parenting support did not appear to be socially biased, but there was a gender bias. This result is consistent with the findings of Sarkadi and Bremberg (2005). According to the literature review by White and Dorman (2001), men use computer-mediated support groups more often than face-to-face support groups. Most of all, there is evidence that fathers' use of online support differs from mothers' use (e.g. White and Dorman, 2001; Bragadóttir, 2008). All in all, it could be useful to conduct studies into gender differences and also preferences of internet use.

The aims of this study, its hypotheses and the whole development process were grounded in conceptual models, previous research and tacit professional knowledge (Salonen et al., 2008). The sample for this study consisted of a wide range of parents from diverse backgrounds, and therefore it was impossible to define an appropriate intervention 'dose' (see Forbes, 2009). Intervention use was therefore based on parents' individual needs. In the future, it could be useful to study the usability and parents' perceptions of internet-based social support. An assessment of effectiveness means comparing the outcomes with the objectives defined for the intervention. In other words, effectiveness is only concerned with one aspect of the intervention: its positive and expected effects. However, any intervention may also have positive and unexpected effects, or expected and unexpected negative effects. For example, even though we did not in this study use these measures, it is possible that the information in the internet resource promoted preventive caring practices or activated parents to discuss the topics covered with the child's care provider (see Christakis et al., 2006; Thompson et al., 2007). Most importantly, at the individual level there might be parents who found it useful and who benefited from this information.

Conclusions

Mothers' and fathers' parenting satisfaction and PSE changes in a positive direction during the postpartum period. However, no intervention effects were found. In the future, it could be

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interesting to study the longer-term effects of the proposed intervention. Further research is also needed to study the effects of the proposed intervention when supporting different risk groups and when using narrow-domain measures such as breast feeding. All in all, the results indicate that online support has the potential to reach parents from diverse backgrounds, but more research is still needed on gender differences and preferences of use. Both mothers and fathers rated their affective skills related to PSE the weakest after childbirth, but they improved more than cognitive and behavioural skills during the postnatal period. More interactive interventions need to be developed to support parents' affective skills related to self-efficacy.

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