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WOMEN'S HEALTH AFTER CHILDBIRTH

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To the memory of my father who did research on much colder issues than motherhood.

ABSTRACT

Women's health after childbirth. Erica Schytt, Department of Woman and Child Health

The overall aim of this thesis is to describe women's health after childbirth in a national Swedish sample by investigating the prevalence of a number of physical symptoms and self-rated health (SRH). The prevalence of stress incontinence at one year after delivery, and possible predictors, was investigated specifically. Risk factors for poor SRH at two months and one year after childbirth were identified. To further understand what the question of SRH captures in the context of childbirth and early parenthood, the reasoning of new mothers when answering the question 'How would you summarize your state of health at present' at one year after the birth, was explored.

For the purpose of Papers I-III, we used selected data from a national Swedish survey (the KUB project: Women's experiences of childbirth), investigating women's physical and psychological assessment of childbirth. This study was designed as a cohort study in which women were followed by means of three questionnaires from early pregnancy to one year after the birth. Swedish-speaking women were recruited at their first antenatal booking visit, from 593 (97%) antenatal clinics in Sweden. About 4600 women were eligible. Of the 3455 (75%) who consented to participate, 3061 answered the first questionnaire, 2762 the second and 2563 the third; 2450 (53%) filled in all three questionnaires. The representativity of the sample was assessed by comparison with all births taking place in Sweden in 1999, according to the Swedish Medical Birth Register. For the purpose of Paper IV, a qualitative design using the method of combined concurrent and retrospective thinkaloud interviews, followed by a semi-structured interview, was used. The 26 respondents, recruited from Child Health Clinics one year after delivery, were asked to say out loud everything that came into their minds, from the moment they first saw the question until they finally gave their answer. The analysis was guided by a theoretical framework describing four cognitive tasks, usually performed when a respondent answers a survey question: interpretation of the question, retrieval of information, forming a judgment and giving a response.

Tiredness, headache, neck, shoulder and low back pain were common problems at two months, as well as one year after childbirth. At two months, pain from cesarean section, dyspareunia, and hemorrhoids were frequent problems, whereas stress incontinence was often reported at one year. Nevertheless, SRH was reported to be 'very good' or 'good' by 91% of the women at two months after birth, and by 86% at one year (Paper I).

One year after the birth, 22% of the women had symptoms of stress incontinence but only 2% said it caused them major problems. The strongest predictor was urinary incontinence (overall leakage) 4-8 weeks after a vaginal delivery as well as after a cesarean section. Other predictors in women with a vaginal delivery were: multiparity, obesity and constipation 4-8 weeks postpartum (Paper II).

Physical problems, such as tiredness, musculoskeletal symptoms and abdominal pain, and emotional problems such as depressive symptoms, increased the risk of poor SRH in both primiparas and multiparas at one or both time points. Negative experience of breastfeeding (2 months) and infant sleeping problems (1 year) were infant-related risk factors in both groups, and prematurity was a risk factor in primiparas at two months. Insufficient social support increased the risk in multiparas. In primiparas, outcome of labor, such as negative birth experience after operative delivery was associated with poor SRH at one year, and perineal pain at two months (Paper III).

The qualitative study showed that the question on SRH was a measure of women's general health and wellbeing in their present life situation, but it did not seem to measure recovery after childbirth specifically. The question on SRH seemed to capture a woman's total life situation, such as family functioning and wellbeing, relationship with partner, the issue of combining motherhood and professional work, level of energy, physical symptoms and emotional problems affecting daily life, stressful life events, chronic disease with ongoing symptoms, body image, physical exercise, and feelings of happiness and joy. Neither childbirth-related events nor some childbirth-related symptoms (urogenital and anal symptoms) were included in women's reasoning (Paper IV).

In conclusion, this thesis shows that physical problems were common in early motherhood, but in spite of this, few women assessed their health as poor. Self-rated health mainly captures a woman's total life situation as well as ongoing physical and emotional health problems affecting daily life. The quantitative study suggests that mode of delivery and childbirth experience have long-term effects on SRH, but the qualitative study did not support this finding, showing that more research is needed on long-term effects of childbirth on mothers' experiences of their health.

Keywords: postpartum health, maternal health, physical symptoms, self-rated health

LIST OF PUBLICATIONS

This thesis is based on the following papers, which will be referred to in the text by their Roman numerals:

I. Schytt, E., Lindmark, G., Waldenström, U.
Physical symptoms after childbirth: prevalence and associations with self-rated health. *BJOG* 2005; 112 (2), 210-217

II. Schytt, E., Lindmark, G., & Waldenström, U.
Symptoms of stress incontinence 1 year after childbirth: prevalence and predictors in a national Swedish sample. *Acta Obstet Gynaecol Scand* 2004; 83, 923-936

III. Schytt, E., Waldenström, U.
Risk factors for poor self-rated health in women at 2 months and 1 year after childbirth. *Journal of Women's Health. In press*

IV. Schytt, E., Olsson, P., Waldenström, U.
Self-rated health in the context of early motherhood – what does it capture? Investigation of a survey question employing thinkaloud interviews.
Submitted

CONTENTS

ABBREVIATIONS AND DEFINITIONS

ABBREVIATIONS

SRH	Self-rated health
OR	Odds ratio
RR	Relative risk
CI	Confidence Interval
MBR	Swedish Medical Birth Register
BMI	Body mass index (kg/m^2)
PME	Pelvic muscle exercise
CHC	Child Health Clinic
SF-36	Short Form 36, instrument for measuring Quality of Life (1)

DEFINITIONS

Poor SRH	Less than ‘good’ on the five-point SRH scale (Paper III)
Fair/poor SRH	Less than ‘good’ on the five-point SRH scale (Paper I)
Puerperium	A period of six weeks after delivery
Symptoms of stress incontinence	Experience of involuntary leakage of urine during physical exertion (e.g. sneezing or jumping) during the last week

INTRODUCTION

Sweden is a country with a very low maternal mortality rate (2). Nevertheless, for a number of women, childbirth causes long-lasting health problems (3), which may be associated not only with physiological processes, but also with the mother's background and new life situation. The health of the mother is, of course, important for her own wellbeing (4, 5), but also for her baby and the rest of the family (6-8), and the risk factors to which a mother is exposed may also affect her children.

Psychological health postpartum, especially depressive symptoms, has received a great deal of attention in research during recent decades. Physical health has not attracted the same attention, and providers of maternity care have expressed that lack of knowledge about new mothers' physical recovery after childbirth makes appropriate postpartum treatment and counseling difficult (5). Even if a few studies describe the general picture of women's physical health problems postpartum, none of them include recent mothers' own assessments of their general health in terms of self-rated health, which is a strong predictor of future morbidity and mortality (9-13). The present thesis contributes to this field of knowledge, in that it aims to describe not only women's self-reported symptoms but also self-rated health at the end of the puerperium as well as at one year after the birth, a time point when parental leave for many Swedish women is coming to an end.

BACKGROUND

WOMEN'S HEALTH IN GENERAL

Women's health has been paid increasing attention during recent decades. Generally, most health indicators are less favorable in women than in men, and the difference seems to emerge already during adolescence (14). A higher proportion of women consider that their health is poor (15-17), even in the youngest age groups (16-24 years), and women in the socially less advantaged groups are most vulnerable. Even though Swedish women live longer than Swedish men, long-term illness and sickness absence is more common among women, who also utilize health care services to a larger extent than men. Some health indicators show positive trends in women, such as increasing length of life, decreased mortality caused by some diseases, and a decrease in the number of smokers. Other indicators show that women's health deteriorates, for example by an increase in BMI and more mental problems (18). In order to direct health promotion optimally, it is important to identify young women at risk of poor health, and since most women give birth to at least one baby, pregnancy and early motherhood provide an opportunity to reach them.

WOMEN'S HEALTH AFTER CHILDBIRTH

Pregnancy, delivery and the puerperium are associated with great changes in a woman's body and, even when these processes are normal, they may affect maternal health (5). Pregnancy and childbirth are regarded as normal processes as long as no complications emerge, and women are expected to recover physically during the six-week puerperium. However, many physical symptoms remain for a longer period (19-23) or even increase (23) during the first year of motherhood, and depressive symptoms are common (24). Further, an increasing number of births may not be defined as normal, due to the increasing cesarean section rate and use of epidural analgesia (25). Studies have shown that general health status, measured by a Quality of Life instrument (SF-36), is lower in women who have experienced a major obstetric complication (26), a cesarean section or instrumental vaginal delivery (27).

Physical symptoms

Many studies have focused on specific physical symptoms during the puerperium, but only a smaller number have described the general picture of physical health problems

during the first year of motherhood, and no such large population-based study has been conducted in Sweden. Brown and Lumley (21) showed that 94% of 1336 Australian women had one or more health problems six to seven months after childbirth, and Glazener and colleagues (22) reported a wide range of physical symptoms in Scottish women from the time of delivery up to 18 months later. In a large English study of long-term health problems after childbirth, MacArthur and colleagues (20) showed that a majority of symptoms that lasted for more than a year after the birth were still present one to eight years later. In a study of French and Spanish new mothers, Saurel-Cubizolles and colleagues (23) found that the already high prevalence of physical and emotional symptoms at 5 months postpartum had increased by the one-year measurement. In contrast, an Australian study by Thomson and colleagues (19) showed a decline in most physical symptoms during a period of 6 months after the birth.

The studies show that health problems are common, and the prevalence of symptoms is fairly similar between studies. The most common postpartum symptoms, independent of the time of measurement, are tiredness (19-23, 28), backache (19-23, 28), headache (19, 21, 23, 28) and hemorrhoids (20, 21, 23, 28), and these problems affect at least one out of four women. Other common symptoms are breast problems (22, 28), perineal pain (22, 28), pain from cesarean section wound (21), dyspareunia (19, 21, 23, 29), urinary incontinence (30-32), constipation (28) and sleep disorders (23). Less common problems such as fecal incontinence (33), and flatus incontinence (34), is embarrassing for some women and may cause major suffering.

The physical problems may differ between primiparous and multiparous women. Primiparous women are more bothered by dyspareunia (19, 21, 23), perineal pain (19, 21, 22), sexual problems (19, 21) and breast problems (22), and multiparous women by urinary incontinence (22). Differences have also been reported in relation to mode of delivery. Women who had an assisted vaginal delivery reported more problems with perineal pain (19, 22), constipation (22), hemorrhoids (21, 22) and sexual problems (21, 22) than those who experienced a vaginal birth. On the other hand, women who had a cesarean section reported more problems with tiredness, lack of sleep and bowel problems (19), but fewer problems with perineal pain (19, 21) and urinary incontinence (19, 21, 30, 32, 35).

The results of these studies are not easily compared, as physical health problems were investigated at different time points and during varying lengths of time. In some studies, the women were asked if physical symptoms had been present at the time of data collection, in others during a period of up to several months or years. Furthermore, none of these general studies included a comparison with women of a similar age in the general population, which makes interpretations difficult.

Women usually receive little information about long-lasting physical problems that may occur as a consequence of childbirth and early motherhood, and they may therefore be unnecessarily unprepared when faced with such problems (5). A majority of women who experience such problems do not consult a health professional, even if they feel that they need help or advice (5, 20-22, 29, 36, 37).

Stress incontinence

A symptom that is strongly associated with pregnancy and childbirth is stress incontinence. Prevalence rates before, during and after pregnancy of 3.6-11% (38-41), 22-62% (38, 39, 41-43), and 5-38% (32, 38, 39, 41, 43-46) respectively have been reported. The variation in findings may be due to different study designs, different methods of assessing incontinence or different definitions of urinary incontinence. For some women, stress incontinence is a significant health problem and restricts their daily activity, whereas other women describe it as a minor inconvenience and a natural consequence of childbirth (38, 47). Even if the symptoms can be difficult and embarrassing, few women seek professional help (36, 47-49).

Factors that have been consistently associated with stress incontinence are vaginal delivery (30-32, 35, 45, 50), multiparity (30, 32, 45, 48, 51) and age (30, 31, 45, 50, 52), especially at the first birth (41, 45, 52). Women aged 25 or younger at their first delivery have a lower risk of symptoms than older women (45, 52). The risk of long-lasting symptoms tends to be particularly high in women with stress incontinence at three months after their first delivery (31, 35). The additional risk of a vaginal delivery, compared with a cesarean section, remains mainly unexplained. There is ongoing controversy about other possible risk factors, such as perineal trauma (30, 31, 35, 53, 54), assisted vaginal delivery (31, 35, 53, 54), high infant birth weight (30, 31, 38, 53, 55), large infant head circumference (53), epidural anesthesia (31, 55-57) and smoking (30, 38, 58). Further, leaking urine is not only associated with childbirth but also with

other conditions involving pressure on the pelvic floor, such as constipation (48, 57) and obesity (30, 48, 58, 59). In summary, urinary incontinence is a common problem, especially in relation to childbirth. Different prevalence rates have been reported and the significance of a number of possible risk factors needs further investigation.

SELF-RATED HEALTH

Women's health after childbirth has mainly been described as the presence or absence of physical (19-22) or mental (22, 60, 61) symptoms and sexual problems (29, 62). Another measure of health is self-rated health (SRH). It is a subjective and holistic measure of health, and suggested as being close to the WHO's definition of health (*Health is a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity)*(63). SRH is measured by a single-item question, such as 'How would you summarize your state of health at present?' with three to five response alternatives, and the question is widely used in health surveys. It is simple, and has shown high test-retest reliability (64, 65). Even though there is sufficient evidence that SRH is a predictor of future health and mortality (9-13), there is an ongoing debate on what SRH really captures.

A review of studies using a quantitative design showed that the most important components of SRH in non-pregnant populations were physical and emotional symptoms and diseases, and their functional consequences (11, 66-69). Other determinants were socio-demographic factors such as education, unemployment, immigrant background, civil status, social contacts, support (15, 16, 67-69) and lifestyle factors (15, 67-69). SRH seems to be a sensitive measure of ongoing health-related problems, i.e. a spontaneous health assessment (70, 71). It may also involve a more stable core related to life-course factors from childhood and adolescence (72), self-image (73), such as defining oneself as a healthy or unhealthy person (70, 71), and the ability to adapt to changed health conditions (74).

A few studies have also used qualitative methods to investigate what individuals base their assessment on when answering the question on SRH. Respondents in non-childbearing populations seem to foremost include the presence or absence of health problems, physical functioning and condition (75-78), general subjective feelings (76, 78), fitness (77), coping and health behavior (75, 77). The respondents seem to weigh their health problems against everyday experiences, limitations and freedom of action;

and disease and good health do not seem to be mutually exclusive (79). Manderbacka (77) concluded that SRH is a "weighted sum of different aspects of health that the respondent considers important, depending on her state of health, life situation, lifestyle and the context".

In the SRH literature, the study populations have differed and included such varying groups as elderly people, immigrants and adolescents, but not specifically new mothers. During a dynamic period such as the first year of motherhood, risk factors for SRH may differ from those in more stable periods of life, and also between novice and experienced mothers. The self-rating of health by a new mother is most likely influenced by her experience of pregnancy and delivery, and the adaptation to motherhood. Besides the physical recovery after pregnancy and birth, the process of becoming a mother involves achieving maternal competence, adapting to changed relationships and professional goals, and a reconstruction of personal identity (80-82). A continuous evaluation of self-image and body image against the ideal image of a mother occurs (83), which may affect confidence and self-concept (84). Previous experiences, social support, and the baby's behavior and condition may mediate the process (82). The reasoning of new mothers and their decision to tick a specific response alternative when answering the question on SRH may therefore differ from their reasoning and decision during other periods in life.

CONTEXT

Antenatal care reaches nearly all pregnant women in Sweden, and during a normal pregnancy most visits are with a midwife. Nearly 100% of women give birth in hospital and most deliveries are attended by midwives, in complicated cases in collaboration with doctors. In 2000, the cesarean section rate in Sweden was 15% and the epidural rate during a vaginal delivery 44% in primiparas and 15% in multiparas (85). The length of postnatal stay was approximately 2 days after a normal delivery. The postnatal check-up, which takes place approximately two months postpartum, is attended by 80% of new mothers (86). It includes a visit with a midwife or, after a complicated pregnancy or birth, with a doctor. The postnatal check-up is based on individual needs and may include contraceptive advice, a vaginal examination and an opportunity to discuss breastfeeding, the experience of childbirth- and health-related issues. During the infant's first year the parents regularly attend a child health clinic (CHC), which is part of the Swedish health care services with the responsibility for

health promotion and health surveillance of infants from birth up to school age. The Swedish model of parental leave includes the opportunity of 13 months with financial compensation amounting to 80% of one's salary up to a certain limit (SEK 24 000 /month), and another 3 months with SEK 60 /day (87).

HEALTH PROMOTION

The opportunity for health promotion during pregnancy and early motherhood is unique, since childbirth occurs early in women's lives, and most women, in Sweden 86% (88), may be reached during this period. Previous studies have shown that women are prone to changes of their health behavior during pregnancy (89). They are young and usually open to advice given by the midwife or doctor during the regular antenatal visits, and by the nurse at the CHC. However, little is known about whether this window of opportunity is used in an optimal way. Most women in Sweden are satisfied with the care and attention they receive at the antenatal clinic during pregnancy (90), but fewer of them are satisfied with postpartum care (91). Some women (20%) do not attend the postnatal check-ups in Sweden (86), and the content of care during the puerperium and beyond is under discussion in many high-income societies (92-98). In an Australian population-based survey, half of the women said they would have liked more help or advice about their own health and recovery after the birth (21). Greater awareness of the risk of long-lasting problems could lead to earlier reporting of symptoms and adequate treatment (99), and possibly even to a reduction of sick leave (100).

IN SUMMARY

Women's health after childbirth is an area that is under-investigated. Knowledge about women's physical health problems after childbirth in Sweden is limited, and SRH is unexplored in this population. Considering the predictive value of a person's subjective assessment of their health, and the importance of studying this outcome in the context of childbearing and early parenthood where both mother and baby are involved, we wanted to identify risk factors for poor SRH and also understand what lies behind the ratings.

AIMS

The overall aim of this thesis is to describe women's health after childbirth in a national Swedish sample, by investigating the prevalence of a number of physical symptoms and self-rated health, two months and one year after delivery.

Specific aims of the studies were:

- to describe the prevalence of a number of physical symptoms, as reported by women themselves, two months and one year after childbirth, and to investigate the associations between specific symptoms and women's self-rated health (Paper I).

- to describe the prevalence of stress incontinence, as reported by women themselves, one year after childbirth and to identify possible predictors (Paper II).

- to investigate risk factors for poor self-rated health in primiparous and multiparous women, at two months and one year after childbirth (Paper III).

- to investigate women's reasoning when answering the question 'How would you summarize your state of health at present', at one year after childbirth (Paper IV).

METHODS

GENERAL DESIGN OF THE STUDIES

For the purpose of Papers I-III, we used selected data from a national Swedish survey (Women's experience of childbirth) of women's physical and psychological assessment of childbirth. This study was designed as a cohort study in which women were followed by means of questionnaires from early pregnancy to one year after the birth. For the purpose of Paper IV, a qualitative design was used, using the method of combined concurrent and retrospective thinkaloud interviews (101-103), followed by a semi-structured interview.

RECRUITMENT

Papers I-III

The aim was to recruit a representative sample of pregnant women from the entire country. However, non-Swedish speaking women had to be excluded due to lack of resources to translate questionnaires into different languages. All antenatal clinics in Sweden were invited to participate in the study by recruiting women at their first booking visit in early pregnancy. Since the number of deliveries in Sweden varies over the year, and this may impact on the workload of midwives, nurses and doctors, women were recruited during three one-week periods, evenly spread over one year (in May and September 1999, and January 2000). The midwives who invited women to the study were informed by letter and an advertisement in the Swedish Journal of Midwifery (Jordemodern). After each recruitment week, the midwives at each clinic forwarded the list of women who had given informed consent, together with each woman's civic registration number and contact details, to the research team. To avoid any concerns that participation would influence the care they received, all further contacts with the women concerning the study were then with the research team.

Paper IV

Women were recruited from two child health clinics in a small town in Sweden, during a period of eight weeks (April to June 2005). Mothers who attended the routine visit to the clinic at approximately one year after the birth were invited to participate in the study. A nurse, who had received verbal and written information about the purpose of

exploring a certain but unidentified survey question, was responsible for the recruitment at the respective clinic. After informed consent was obtained, the woman's contact details were forwarded to me, who then contacted her. If the woman was still willing to participate in the study, an appointment was made for an interview. A combined consecutive and purposeful sampling strategy was used (104) and the aim was to reach saturation of information, as well as representativity concerning less than 'good' SRH (105).

SAMPLES

Papers I-III

Of all the 608 antenatal clinics in Sweden, 593 (97%) chose to participate in the study. An estimate based on the Swedish Medical Birth Register showed that approximately 5500 women were booked for antenatal care during the recruitment period, and 4600 were eligible after exclusion of miscarriages (275), non-Swedish speaking women or women who were not approached for unknown reasons (550) and women from 15 non-participating clinics (75) (Figure 1). Of those eligible for the study, 3455 (75%) consented to participate, and 3061 completed the first questionnaire, 2762 the second questionnaire and 2563 the third questionnaire. For the purpose of studies I-III, women who responded to all three questionnaires were included, in total 2450 women. From this sample, the following groups of women were excluded from the respective study:

- Paper I: not responding to any of the questions on physical symptoms in either questionnaire (n=37)
- Paper II: giving birth to twins (n=30) or not filling in the question on stress incontinence (n=30)
- Paper III: not responding to the SRH question at the one-year measurement (n=26)

The final samples comprised 2413, 2390 and 2424 women respectively, i.e. 69-70% of the women who consented to participate and 52-53% of all women eligible for the study.

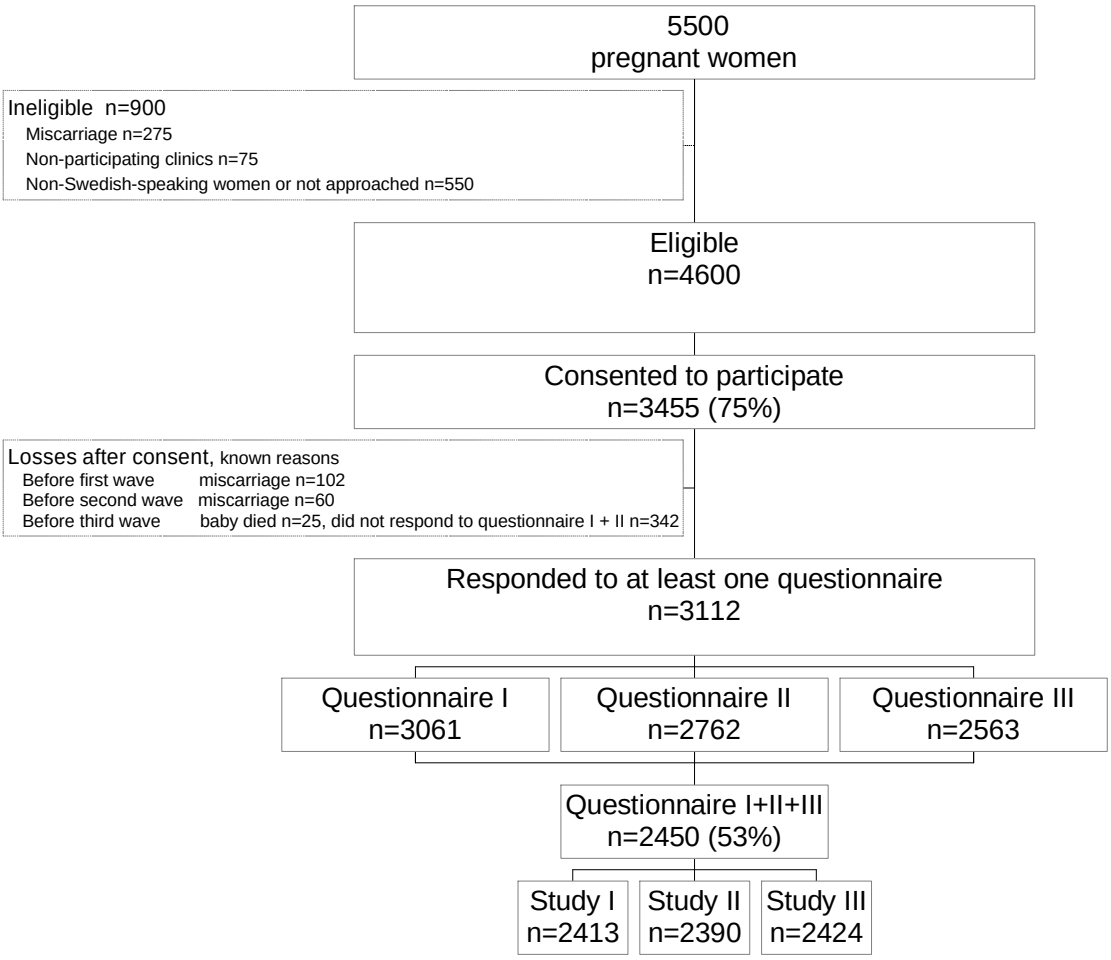

Figure 1. Recruitment and samples. Numbers in first three boxes are approximations.

Table 1 shows the characteristics of the sample basis of study I-III (n=2450). To estimate the representativity of the sample, the background characteristics and labor data of the 2450 women were compared with those of a cohort of all women who gave birth in Sweden in 1999 (n=84 729) according to the Swedish Medical Birth Register (25, 106) (Table 1). Women in the sample did not differ from the national birth cohort regarding marital status, BMI or mode of delivery. However, fewer women in the study group were younger than 25 years (14% vs.16%, p<0.001), older than 35 years (10% vs. 12%, p=0.02), multiparas (56% vs. 58%, p=0.03), smokers (9% vs. 12%, p<0.0001), and of non-Swedish-speaking background (8% vs. 17%, p<0.0001), compared with the total birth cohort.

Table 1. Sociodemographic and labor data of women in the study group (n=2450) and of a birth cohort of all women who gave birth in Sweden in 1999 (n=84 729)

	Study group %	National birth cohort 1999 %
Age, years		
<25	13.9	16.4
25-35	76.0	71.8
>35	10.1	11.7
Civil status		
Single	4.5	5.0
Other native language than Swedish	8.0	17.4
Smoking		
Early pregnancy	8.9	12.0
BMI, kg/m^2, mean	24.5	24.3
Parity		
Primiparas	44.1	41.9
Multiparas	55.9	58.2
Mode of delivery		
Vaginal	79.0	78.8
Vacuum extraction or forceps	7.2	7.4
Cesarean section	13.7	14.2
Perineal tear		
First or second degree	53.8	
Third or fourth degree	2.7	
Episiotomy	12.0	
Infant birth weight, grams, mean	3597	3534
Breastfeeding, exclusively or partially		
2 months	89.4	
1 year	17.9	

Paper IV

A total of 54 women were eligible for the study and 30 consented to participate. Of these, three changed their minds and withdrew from the study and one did not speak Swedish well enough to complete the thinkaloud part of the interview. The final sample consisted of 26 women. Characteristics of the 26 participants are presented in Table 2. The women's ages ranged from 20 to 42 years and the number of primiparas and multiparas was the same. A majority of the women (n=21) were still on parental leave, either part-time or full-time. Five women had had a cesarean section and seven had a negative experience of the birth. Six women rated less than good health on the SRH scale.

Table 2. Characteristics of sample, study IV (n=26).

	n		n
Sociodemographics		**Physical health**	
Age, mean (years)	30.6	Chronic disease	4
Not cohabitant with the father	1	BMI, kg/m^2	
Other native language than Swedish	2	Normal (18.5-24.9)	19
Parental leave		Overweight (25.0-29.9)	5
Full-time	15	Obesity (≥30.0)	2
Part-time	6	Visit to the doctor first year after birth	11
Working full-time	4	Smoking or using Swedish *snus*	4
Unemployed*	4	**Self-rated health**	
Obstetric background		Very good	5
Number of children		Good	15
1	13	Neither good nor bad	6
2	12	Bad	0
3	1	Very bad	0
Mode of delivery			
Normal vaginal	20		
Vacuum extraction	1		
Elective cesarean section	3		
Emergancy cesarean section	2		
Experience of childbirth			
Positive	15		
Positive and negative	4		
Negative	7		

*A combination with parental leave is possible

DATA COLLECTION

Papers I-III

Data were collected by means of three questionnaires: in early pregnancy, two months and one year after the birth. The first questionnaire was posted to the participants when the research team had received the women's consent and contact details. If the questionnaire was not returned within two weeks, a letter of reminder was sent and after another two weeks without response, a copy of the questionnaire was included. The second questionnaire was posted approximately two months after the expected date of delivery (calculated on the basis of the rule of Naegele) to all women who had consented to participate, except to those who had reported a miscarriage or some other cause for withdrawal. The third questionnaire, one year after the birth, was not sent to women who had not responded to the two previous ones, to women who had not been registered for a delivery in the Swedish Medical Birth Register (MBR), or to women who were known to have had an infant who had died. The same procedure concerning reminders was also used for the second and third questionnaires.

The average length of gestation at the time of answering the first questionnaire was 16 weeks (mean) (SD 3.4, median 15). The second questionnaire was completed at 10

weeks postpartum (SD 3.2, median 9) and the third questionnaire at one year and two weeks (SD 3.0, median one year and one week) after delivery.

To detect errors concerning registration of data into the database, 10% of the first and third questionnaires were randomly chosen by the statistical program SPSS, and 0.15% and 0.19% of the data were found incorrect, respectively. Data from the second questionnaire was continuously double checked for errors during registration.

Questionnaires

The questionnaires, designed as small booklets, included questions that would cover the purpose of a number of different studies. For the present studies, variables on socio-demographic background and obstetric history were used from the first questionnaire, and from the second, questions about the delivery, infant outcome and health, breastfeeding, emotional problems and physical symptoms, support, self-rated health and the use of alcohol and tobacco. From the third questionnaire, data from an extended list of physical symptoms, emotional problems, support, self-rated health, the use of alcohol and tobacco, and questions on infant health, were used.

Dependent variables

Self-rated health (Papers I, III)

SRH was measured at two months and one year after the delivery by the question 'How would you summarize your state of health at present?' using a five-point scale with the response alternatives: 'very good', 'good', 'neither good nor bad', 'bad', and 'very bad'. For the analysis, SRH was dichotomized into 'good' (very good + good) and 'fair/poor' (Paper I) or 'poor' (neither good nor bad + bad + very bad) (Paper III). This choice was based on our finding that the distribution of responses was very skewed. Few women rated their health as less than 'good' at two months and one year after delivery: 7% and 12% responded 'neither good nor bad', and < 2% and 3% respectively responded 'bad' or 'very bad'. Consequently, 'neither good nor bad' was interpreted as a deviation from a normal state of good health, and as such, closer to poor than good health. Further, a number of studies have used this way of dichotomizing the response scale, making results comparable over populations (107-110).

Stress incontinence (Paper II)

Women with symptoms of stress incontinence were identified by the question 'Have you experienced involuntary loss of urine during physical exertion (for example sneezing or jumping) during the last week?', which is in accordance with the International Continence Society's definition (111). Severity of stress incontinence symptoms one year after delivery was measured on a scale ranging from 0 to 3 (0 = no problems, 1 = minor problems, 2 = severe problems and 3 = very severe problems). In the analysis, 1 was defined as minor problems, and 2-3 as major problems. To determine the prevalence of symptoms, the scale was dichotomized into symptoms (1-3 on the scale) and no symptoms (0 on the scale)

Independent variables

All independent variables are shown in Appendix 1, and are presented with the respective response alternatives and categorizations. This table also includes data source, namely questionnaire 1-3 or the MBR.

A list of 18 maternal physical symptoms (tiredness, headache, sleeping problems, neck and shoulder pain, low back pain, sore nipples, engorgement, mastitis, dyspareunia, pain from cesarean section, perineal pain, urinary incontinence, dysuria, hemorrhoids, constipation, stomachache, nausea and anal incontinence) was included in the two-month assessment, and the women were asked if the specific symptom had occurred during the last four weeks, and to what degree it had bothered them (Papers I, II, III). The list of symptoms was developed for the one-year assessment and the following were added: colds, allergic symptoms, urge incontinence, stress incontinence, flatus and feces incontinence. The presence of symptoms during the last week was asked for (Papers I, II, III, IV).

Depressive symptoms were measured by the Edinburgh Postnatal Depression Scale (112, 113), a 10-item self-report scale widely used in research and screening for postnatal depressive symptoms (Paper III). Each item is scored on a 4-point scale (0-3) with a total sum ranging from 0-30. A cut-off score for postpartum symptoms at >11 was used, as suggested by Wickberg and colleagues (113), who validated the instrument in a Swedish sample. In cases of a maximum of two missing items on this scale, imputation of an individual's mean value on the remaining items was made.

The Stressful Life Events scale (SLE) (114), includes 10 items describing events that may have occurred a) the year prior to the measurement or b) previously: serious illness in family member, serious concerns about family member, death of family member, divorce or separation, forced to move house, forced to change jobs, been made redundant, feelings of insecurity at work, serious financial problems or been legally prosecuted. One item was added to the original instrument: own serious illness or accident. The scale was used at item level, as well as a summation of all the events that had occurred during the year prior to the measurement (Paper III).

The Cambridge Worry Scale (CWS) (115, 116), which primarily measures women's worries during pregnancy, and has been validated in Sweden (117), was used (Paper III). Here, we modified the scale by including only 14 of the original 16 items, excluding questions relevant for pregnant women only, which has been done previously (118). The scale was used at item level only, as recommended by the constructer (personal communication with Professor Josephine M Green).

Swedish Medical Birth Register

Obstetric variables (single/multiple birth, gestational age, fetal presentation, perineal trauma, pharmacological pain relief), maternal weight and height prior to pregnancy, chronic diseases (asthma, repeated cystitis, ulcerative colitis, kidney disease, epilepsy, diabetes) and infant outcomes (infant birth weight and head circumference) were retrieved from the Swedish Medical Birth Register (MBR). The register includes information from the standardized medical records used by all antenatal clinics and delivery units in Sweden, and information concerning 98-99% of all births in Sweden are received by the register (25, 119). A quality control of the register conducted in 2002 showed that data on infant birth weight, infant length, fetal presentation, single/multiple birth and analgesia had reasonable quality, whereas data on maternal weight and height were missing in 15-20% of cases (119).

Paper IV

For the qualitative study, thinkaloud interviews were used. This method has been shown to be useful in capturing the process of answering a survey question (see below). The respondents are asked to say out loud everything that comes into their minds, from the moment they first see the question until they finally give their answer. Thinkalouds are obtained either concurrently during the process of answering the question, or

retrospectively if the thinkaloud comes immediately after the question has been answered. For optimal quality of data, a combined concurrent and retrospective interview has been suggested (101-103). To further assure rich data of the four cognitive tasks, a complementary semi-structured interview has been suggested (120). As the method of thinkaloud and the model describing the answering processes are fairly unknown, these are described in detail.

Answering a survey question

Data for investigations of self-reported health problems are commonly collected by means of questionnaires. To be able to draw accurate conclusions from such surveys, researchers need to know how respondents understand the specific questions. For this purpose, psychologists and survey researchers have developed a model describing four cognitive tasks that respondents perform when answering a survey question (101) (Figure 2). First, the respondent interprets the question. This includes comprehension of the specific words, the meaning of the entire question and response alternatives, and interpretation of the researcher's intentions. Second, the respondent retrieves relevant information from memory. Third, the respondent forms a judgment, which may be accessible in memory or needs to be computed. Finally, he/she translates the judgment into a response.

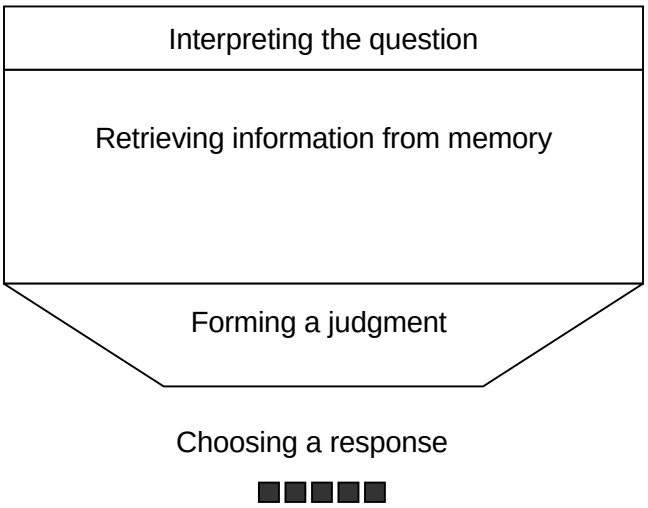

Figure 2. The four tasks performed by a respondent when answering a survey question. The process may go back and forth or be performed in a sequential order. (Based on Sudman et al 1996)

The respondent may perform these tasks in a sequential order, or may switch back and forth in the process. Each task may be affected by the general context of the question and the questionnaire; information may be included because it is close in memory due to answering a preceding question, or excluded if the respondent assumes that it is already included in a response to a previous question ('order effect') (101, 121-123).

Procedure

To assure that the respondent had understood the task of thinkaloud a few questions were used for practice, such as 'What is the weather like today' (101). The following instruction was given (101, 102): *'We are interested in your answers, but also in how you go about making them. I would like you to answer a question and tell me everything that comes into your mind when answering this question. I want you to say out loud everything that you are thinking, from the time you first see the question until you give an answer. Don't try to explain anything to me, just act as if you are alone saying out loud everything that you think to yourself silently. It is most important that you talk continuously. I will remind you to talk if you remain silent for any longer period. The more you can tell me, the more useful it will be to us'*.

We wanted the women to answer the SRH question in a context similar to that of our previous study of risk factors for SRH one year after childbirth (124). Women were therefore asked to start by filling in the section on the mother's health retrieved from the third questionnaire from the KUB study. After having answered these questions, the concurrent thinkaloud interview commenced and the question 'How would you describe your general state of health?' was presented in writing, with the response alternatives 'very good', 'good', 'neither good nor bad', 'bad' and 'very bad'. The respondent was asked to say out loud everything that came into her mind. If the respondent had given an immediate answer to the SRH question without any or very little additional information, the question 'How did you go about answering that question?' was asked. All women were also asked 'Did you think about anything you did not say out loud?' These two questions turned the interview into a retrospective thinkaloud. Finally, a semi-structured interview was conducted, which included questions about the interpretation of the question, what the response alternatives meant, comparisons of own health status with others, and strategies for choosing a response. Information was also collected about socio-demographic background, obstetric history, social support, health behavior, chronic disease, height and length, and the baby's

health. To minimize interaction between the interviewer and the respondent, the interviewer sat beside the woman during the thinkaloud interview. During the follow-up interview the interviewer moved and sat opposite the woman.

All interviews were tape-recorded and transcribed verbatim by the first author. All texts were reread to detect errors. The concurrent thinkalouds lasted 12 to 256 seconds (mean 79 seconds), and the whole process included 13 to 52 minutes (mean 27 minutes), 702 minutes of recording in all.

ANALYSES

Quantitative analyses (Papers I-III)

Descriptive statistics and epidemiological methods were used. Comparisons between the study group and all women who gave birth in Sweden in 1999 were calculated by Chi^2 test and Student's *t*-test. In the process of identifying predictors and risk factors, the analyses were generally conducted in two steps. First, all explanatory variables were tested one by one in a separate univariate analysis. The associations between possible predictors or risk factors and the outcome were described as risk ratios (RR), which were calculated as the ratio between the risks for the outcome in women, exposed and unexposed to a specific variable, with 95% confidence intervals (CI). Statistically significant and clinically important variables in the univariate analysis were then tested by means of multivariate logistic regression and are presented as OR with 95% CI. When appropriate, confounding factors were adjusted for.

Statistical analyses were conducted using Statistical Package SPSS for Windows (SPSS Inc., Chicago, Illinois, USA).

Paper I

Comparisons between primiparous and multiparous women were calculated by Chi^2 test and differences in prevalence of symptoms over time were estimated by McNemar's test. Univariate and multiple logistic regression analyses were used to investigate the association between SRH and physical symptoms, in all women as well in primiparous and multiparous women separately.

Paper II

The associations between possible predictors and symptoms of stress incontinence were analyzed in all women and in primiparas and multiparas separately, and also in women with a vaginal delivery and cesarean section respectively. In the univariate analyses, single status was associated with reporting stress incontinence in the primiparous women, and non-Swedish-speaking background in the multiparous. Theoretically, these factors should not cause stress incontinence and were consequently regarded as potential confounders, which were adjusted for in the multivariate analyses.

Paper III

The analyses of risk factors were conducted at the two time points for the primiparous and multiparous women separately. The level of statistical significance was set at 0.05, despite the large number of items tested, in order not to lose any risk factors by chance. Associations between covariates were tested by correlation analyses in order to assure that highly associated variables were not entered into the main effect model. In the logistic regression analyses, blocks of statistically significant or clinically important variables were entered in a stagewise manner, one by one. To test the stability of 'socio-demographics', these variables were entered first in both models (two months and one year), and then 'physical symptoms', 'emotional problems', 'social support' and 'infant' as experienced at the respective time point, were entered in sequential order. Finally, 'pregnancy and birth' variables were entered. Explained variance (Nagelkerke R^2) of SRH was calculated in two ways: for each block when entered as the first block (one by one), and as cumulative explained variance when added to the preceding blocks in the order described above.

Qualitative content analysis (Paper IV)

The text was analyzed using qualitative content analysis according to Graneheim and Lundman (125). The text was read several times to gain a sense of the whole. The parts of the text describing the different cognitive tasks were assembled into separate content areas. The manifest content, describing what was obvious and visible in the women's reasoning, was addressed in the analyses of all content areas. The latent content was also considered in describing the *significance* of retrieved information in the responding process. In order to identify health aspects that women did not include in their reasoning when answering the SRH question, comparisons were made with 1) women's responses to the predefined questions that preceded the thinkaloud interview

and 2) the semi-structured interview. The text in each content area was condensed and coded, and categories were created inductively by the first author, using NVivo 2.0® (QRS International Pty Ltd, Cardigan, UK). All three authors discussed the categorizations, and comparisons and adjustments were made until agreement was reached.

ETHICAL CONSIDERATIONS

The studies were approved by the Regional Research and Ethics Committee at Karolinska Institutet, Sweden (Dnr 98-358). Informed consent was obtained from all participants.

Papers I-III

All women who had consented to participate in the study and not contacted us to notify withdrawal were also sent the second questionnaire. Due to delays in registration of records in the Swedish Medical Birth Register, we were not able to identify women who had lost their child before, during or after the delivery, and consequently, some of these women received the questionnaire two months postpartum. Therefore, the following passage was included in the cover letter:

> *'Of all women who answered the first questionnaire in the KUB project, there may be some who have lost their child, during pregnancy or after the birth and others whose baby is unhealthy. If you belong to this group we would like to express our sympathy and are sorry if this letter causes further pain. However, your experiences are most valuable for the study, and we would be very grateful to receive your answers. Leave the questions that are not applicable unanswered and please make a note of what has happened to your child'.*

For these ethical reasons, the third questionnaire was not sent to those women who did not answer the first or the second questionnaire, to women who had not been registered for a delivery in the MBR, or to women who were known to have had an infant who had died. All three questionnaires included contact details to a midwife who was available for questions.

Paper IV

During the interviews, sensitive issues evoking strong negative emotions were sometimes dealt with. After the interview session, the interviewer gave the respondent time for further discussion about these matters. The interviewer helped to establish contact with a health professional, such as the CHC or assisting midwife at the delivery ward, for further consultation if the woman felt a need for it.

RESULTS

PHYSICAL SYMPTOMS AFTER CHILDBIRTH

(Paper I)

Figure 3 shows the number of symptoms reported by the women two months and one year after the birth. Approximately 25% had five symptoms or more. At two months, few women, only 9% of the primiparas and 11% of the multiparas, had none of the listed symptoms. At one year, 13% of the primiparas and 12% of the multiparas did not report any symptoms.

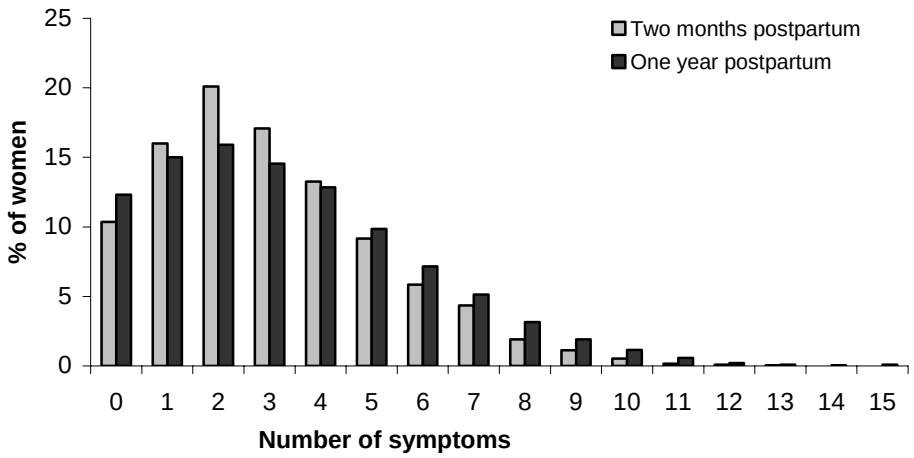

Figure 3. Number of self-reported symptoms in women two months and one year after childbirth.

Two months postpartum

Four to eight weeks after the birth, tiredness was the most common problem, reported by almost two thirds of the women (Table 3). In women who had had a cesarean section, more than one third reported minor or major problems with postoperative pain. Neck and shoulder pain, low back pain and dyspareunia came third in ranking and were listed by 28-29% of the women. Other frequently reported problems were headache, hemorrhoids and constipation. Most women who had any of the listed symptoms said their problems were minor; however, the most common symptoms caused women the greatest problems. Some of the physical symptoms were more common in primiparas, such as sore nipples, perineal pain, dysuria and dyspareunia,

the latter being the second most common problem reported by the primiparas, affecting 39% and causing major problems in 9% of the women.

Table 3. Self-reported physical health problems 4-8 weeks after childbirth

	All women n=2413	Primiparas n=1065		Multiparas n=1348		
	Minor + major problems n (%)	Minor problems n (%)	Major problems n (%)	Minor problems n (%)	Major problems n (%)	p[4]
General						
Tiredness	1534 (63.8)	535 (50.5)	127 (12.0)	696 (51.8)	176 (13.1)	0.43
Headache	550 (23.0)	211 (20.0)	32 (3.0)	264 (19.8)	43 (3.2)	0.96
Sleeping problems	417 (17.4)	161 (15.2)	41 (3.9)	177 (13.2)	38 (2.8)	0.12
Musculoskeletal						
Neck and shoulder pain	702 (29.4)	245 (23.2)	83 (7.9)	279 (20.9)	95 (7.1)	0.28
Low back pain	671 (28.0)	236 (22.3)	62 (5.9)	274 (20.5)	99 (7.4)	0.22
Breast[1]						
Sore nipples	326 (15.2)	131 (13.8)	35 (3.7)	117 (9.9)	43 (3.6)	0.02
Engorgement	289 (13.5)	97 (10.2)	39 (4.1)	108 (9.1)	45 (3.8)	0.64
Mastitis	30 (1.4)	6 (0.6)	9 (1.0)	4 (0.3)	11 (0.9)	0.62
Urogenital						
Dyspareunia	531 (28.5)	234 (30.0)	71 (9.1)	198 (18.3)	28 (2.6)	<0.0001
Pain from cesarean section[2]	118 (36.4)	50 (29.6)	12 (7.1)	48 (30.8)	8 (5.1)	0.76
Perineal pain[3]	200 (15.6)	117 (17.4)	28 (4.2)	46 (7.5)	9 (1.5)	<0.0001
Urinary incontinence	333 (13.9)	126 (12.0)	14 (1.3)	175 (13.1)	18 (1.3)	0.70
Dysuria	111 (4.6)	58 (5.5)	11 (1.0)	38 (2.8)	4 (0.3)	<0.0001
Gastrointestinal						
Hemorrhoids	586 (24.6)	195 (18.5)	63 (6.0)	262 (19.7)	66 (5.0)	0.46
Constipation	491 (20.5)	153 (14.5)	62 (5.9)	227 (17.0)	49 (3.7)	0.01
Stomachache	250 (10.5)	103 (9.8)	22 (2.1)	104 (7.8)	21 (1.6)	0.15
Nausea	69 (2.9)	34 (3.2)	4 (0.4)	29 (2.2)	2 (0.1)	0.15
Anal incontinence	42 (1.8)	17 (1.6)	2 (0.2)	20 (1.5)	3 (0.2)	0.96

[1]Includes only women who breastfed at 4-8 weeks postpartum
[2]Includes only women who had had a caesarean section
[3]Includes only women who had a perineal tear or episiothomy
[4]Differences between primiparas and multiparas analyzed by Chi^2 test

One year postpartum

Similarly to the two-month assessment, tiredness was the most common symptom one year after the birth, and this accounted for most of the cases classified as a major problem (Table 4). One in four women had sleeping problems. Symptoms that were still common one year after birth, and reported by about one third of the women, were headache, neck and shoulder pain, and low back pain. Other common problems were colds, hemorrhoids, stomachache and stress incontinence. Table 4 also shows that most symptoms did not differ by parity. However, multiparas had more problems with colds and stress incontinence, and primiparas had more problems with perineal pain and dyspareunia.

Table 4. Self-reported physical health problems one year after childbirth

	All women n=2413	Primiparas n=1065		Multiparas n=1348		
	Minor + major problems n (%)	Minor problems n (%)	Major problems n (%)	Minor problems n (%)	Major problems n (%)	p[3]
General						
Tiredness	1374 (57.8)	468 (44.6)	118 (11.2)	631 (47.5)	157 (11.8)	0.22
Headache	747 (31.2)	263 (25.0)	45 (4.3)	378 (28.2)	61 (4.6)	0.18
Colds	664 (27.9)	214 (20.3)	44 (4.2)	348 (26.2)	58 (4.4)	<0.01
Sleeping problems	573 (24.2)	186 (17.8)	58 (5.5)	256 (19.4)	73 (5.5)	0.60
Allergic symptoms	217 (9.1)	80 (7.6)	9 (0.9)	106 (7.9)	22 (1.6)	0.22
Musculoskeletal						
Neck and shoulder pain	851 (35.5)	291 (27.5)	86 (8.1)	357 (26.6)	117 (8.7)	0.81
Low back pain	808 (33.7)	264 (25.0)	104 (9.8)	316 (23.6)	124 (9.3)	0.60
Breast[1]						
Sore nipples	16 (3.3)	4 (2.1)	2 (1.1)	8 (2.7)	2 (0.7)	0.84
Engorgement	11 (2.2)	2 (1.1)	1 (0.5)	4 (1.3)	4 (1.3)	0.68
Mastitis	2 (0.4)	0 (0.0)	1 (0.5)	1 (0.3)	0 (0.0)	0.33
Urogenital						
Stress incontinence	520 (21.6)	179 (16.9)	15 (1.4)	292 (21.8)	34 (2.5)	<0.001
Dyspareunia	253 (10.7)	110 (10.5)	25 (2.4)	102 (7.8)	16 (1.2)	<0.01
Perineal pain[2]	61 (4.7)	35 (5.2)	8 (1.2)	16 (2.5)	2 (0.3)	<0.01
Dysuria	55 (2.3)	16 (1.5)	4 (0.4)	30 (2.2)	5 (0.4)	0.45
Urinary incontinence during intercourse	23 (0.9)	11 (1.1)	1 (0.1)	11 (0.8)	0 (0.0)	0.46
Gastrointestinal						
Hemorrhoids	415 (17.6)	150 (14.4)	26 (2.5)	209 (15.8)	30 (2.3)	0.63
Stomachache	307 (13.0)	107 (10.2)	20 (1.9)	153 (11.6)	27 (2.0)	0.58
Constipation	252 (10.6)	91 (8.7)	18 (1.7)	123 (9.3)	20 (1.5)	0.82
Nausea	211 (8.8)	85 (8.1)	19 (1.8)	90 (6.7)	17 (1.3)	0.24
Flatus incontinence; during exertion	226 (9.5)	87 (8.3)	3 (0.3)	123 (9.3)	13 (1.0)	0.08
Flatus incontinence (without exertion)	126 (5.3)	55 (5.2)	3 (0.3)	60 (4.5)	8 (0.6)	0.39
Feces incontinence	36 (1.5)	15 (1.4)	3 (0.3)	18 (1.4)	0 (0.0)	0.15

[1]Includes only women who breastfed at one year postpartum
[2]Includes only women who had a perineal tear or episiothomy
[3]Differences between primiparas and multiparas analysed by Chi^2 test

Prevalence and predictors of stress incontinence at one year

(Paper II)

Stress incontinence was reported by 22% of the women at one year after delivery; however, only 2% said it caused them major problems (Table 5). Stress incontinence was more common in multiparas than primiparas (RR 1.3, CI 95% 1.1-1.5), and in women who had had a vaginal birth compared with those who had had a cesarean section (RR 2.2, CI 95% 1.6-3.1).

Table 5. Stress incontinence one year after childbirth: prevalence and severity of symptoms

	All women		Primiparous women		Multiparous women		Vaginal birth		Cesarean section	
	n=2390	%	n=1051	%	n=1339	%	n=2065	%	n=321	%
Prevalence	518	21.7	193	18.4	325	24.3	483	23.4	34	10.6
Severity of symptoms										
Minor problems	470	19.7	178	16.9	292	21.8	440	21.3	30	9.3
Major problems	48	2.0	15	1.4	33	2.5	43	2.1	4	1.2

Table 6 presents the predictors of stress incontinence, in all women, in primiparas and multiparas, and in women with a vaginal delivery and a cesarean section. Four factors remained statistically significant for *all women*: urinary incontinence postpartum, constipation postpartum, multiparity and cesarean section, the latter reducing the risk by half. In addition, three factors bordered on statistical significance: age above 35 years, obesity and perineal rupture of first- and second degree. In *primiparous women*, urinary incontinence postpartum was a predictor, whereas obesity and constipation bordered on statistical significance. Cesarean section seemed to reduce the risk of incontinence. In *multiparous women*, the only predictor was urinary incontinence postpartum, whereas age over 35 and perineal rupture of first- and second degree bordered on statistical significance. In the *vaginal delivery group*, the following predictors were found: urinary incontinence 4-8 weeks postpartum, multiparity, obesity, and constipation. Age over 35 and perineal rupture of first- and second degree bordered on statistical significance. In the *cesarean section group*, the only predictor was urinary incontinence 4-8 weeks postpartum.

Table 6. Predictors of stress incontinence one year after childbirth, analyzed by logistic regression. Each variable adjusted for the remaining variables in the table and civil status "single" and native language other than Swedish.

	All women		Primiparous women		Multiparous women		Vaginal delivery		Cecarean section	
	n=1847		n=815		n=1032		n=1619		n=228	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age, years										
>35	1.5	1.0-2.1	1.1	0.5-2.5	1.6	1.0-2.4	1.5	1.0-2.2	1.8	0.5-6.1
Parity										
Multiparas	1.4	1.1-1.8	-	-	-	-	1.4	1.1-1.8	1.3	0.5-3.3
Pregravida BMI										
Obesity	1.5	1.0-2.2	1.8	1.0-3.4	1.4	0.9-2.2	1.6	1.1-2.4	0.3	0.0-2.6
Constipation										
4-8 weeks after childbirth	1.4	1.1-1.9	1.6	1.0-2.5	1.3	0.9-1.9	1.4	1.1-1.9	1.5	0.5-4.5
Urinary incontinence (overall leakage of urine)										
4-8 weeks after childbirth	5.7	4.3-7.6	4.7	3.0-7.4	6.4	4.4-9.4	5.5	4.1-7.4	11.8	2.9-48.1
Mode of delivery										
Vaginal	1.0		1.0		1.0		-	-	-	-
Vacuum extraction/forceps	1.1	0.7-1.8	0.9	0.5-1.6	1.7	0.8-3.9	-	-	-	-
Cesarean section	0.5	0.3-0.9	0.4	0.2-0.9	0.6	0.3-1.1	-	-	-	-
Spontanous perineal rupture										
No perineal rupture	1.0		1.0		1.0		1.0			
First- and second degree	1.2	1.0-1.6	0.9	0.6-1.3	1.4	1.0-2.0	1.2	1.0-1.6	-	-
Third- and fourth degree	1.0	0.4-2.5	0.7	0.2-2.6	1.2	0.3-4.5	1.0	0.4-2.5	-	-

SELF-RATED HEALTH AFTER CHILDBIRTH

(Papers I, III, IV)

The vast majority of women said that their general health, SRH, was ‘very good’ or ‘good’ at two months after the birth (primiparas: 92%; multiparas: 91%) with a slight reduction one year after the birth (primiparas: 86%; multiparas: 85%), (Table 7). Reporting fair/poor health at two months after birth increased the risk of making the same assessment at one year (RR 4.1, CI 95% 3.4-4.9). (Paper I).

Table 7. Self-rated health two months and one year after delivery

	Two months			One year		
	All women n=2407	**Primiparas** n=1062	**Multiparas** n=1345	**All women** n=2389	**Primiparas** n=1054	**Multiparas** n=1335
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Very good	1053 (43.7)	519 (48.9)	534 (39.7)	837 (35.0)	420 (39.8)	417 (31.2)
Good	1148 (47.7)	462 (43.5)	686 (51.0)	1212 (50.7)	488 (46.3)	724 (54.2)
Neither good nor bad	164 (6.8)	62 (5.8)	102 (7.6)	276 (11.6)	116 (11.0)	160 (12.0)
Bad	38 (1.6)	17 (1.6)	21 (1.6)	51 (2.1)	26 (2.5)	25 (1.9)
Very bad	4 (0.2)	2 (0.2)	2 (0.1)	13 (0.5)	4 (0.4)	9 (0.7)
Primiparas vs multiparas: p-value	<0.001			<0.001		

Differences between primiparas and multiparas analysed by Chi^2 test

Risk factors for poor self-rated health

(Paper III)

It was hypothesized that SRH was associated with 1) women's socio-demographic background; 2) women's specific life situation at two months and one year after the birth in terms of physical and emotional wellbeing, social support and experience of the infant; and 3) childbirth events, such as mode of delivery and experience of the birth. The analyses were conducted for primiparas and multiparas separately, since many of the investigated factors may differ between women who experience childbirth and motherhood for the first time compared with those who have already gone through this dramatic life experience one or more times.

Primiparous women

Table 8 shows that only one of the socio-demographic factors listed in the Appendix was associated with poor SRH in the primiparas: previous unemployment in the one-year assessment. Risk factors frequently reported in other studies, such as marital status, education and professional background, were not statistically significant at either time point and consequently removed from the model.

Of the variables measuring physical symptoms, tiredness was most strongly associated with poor SRH at two months as well as one year after the birth, and affected a majority of the primiparas. At the two-month measurement, low back pain and perineal pain were also statistically significant, as were nausea and abdominal pain at one year.

Table 8. Risk factors for poor SRH at 2 months and 1 year after childbirth in primiparous women, analyzed by logistic regression analysis.

Risk factors	2 months (n=906)				1 year (n=949)			
	Total	Poor SRH			Total	Poor SRH		
	n	n (%)	OR	CI 95%	n	n (%)	OR	CI 95%
Block 1: Socio-demographics								
Unemployed								
No	588	40 (6.8)	1.0		590	57 (9.7)	1.0	
Yes, the year prior to pregnancy	139	12 (8.6)	0.6	0.3-1.5	140	34 (24.4)	1.5	0.8-2.8
Yes, previously	332	29 (8.7)	0.9	0.5-1.8	333	54 (16.2)	1.9	1.1-3.1
Block 2: Physical symptoms (at 2 months and 1 year respectively)								
Tiredness								
No	394	5 (1.3)	1.0		465	21 (4.5)	1.0	
Yes	659	76 (11.5)	5.8	2.2-15.5	583	124 (21.3)	3.4	1.9-6.2
Nausea								
No	1012	74 (7.3)	1.0		947	104 (11.0)	1.0	
Yes	38	7 (18.4)	2.0	0.7-5.9	102	41 (40.2)	2.8	1.5-4.8
Abdominal pain								
No	924	64 (6.9)	1.0		915	94 (10.3)	1.0	
Yes	124	17 (13.7)	1.0	0.5-2.2	127	50 (39.4)	2.8	1.6-4.9
Low back pain								
No	753	43 (5.7)	1.0		687	67 (9.8)	1.0	
Yes	297	37 (12.5)	2.3	1.3-4.2	367	79 (21.5)	1.2	0.8-2.0
Perineal pain								
No	825	48 (5.8)	1.0		1144	102 (8.9)	NA	
Yes	171	26 (15.2)	2.3	1.2-4.5	72	11 (15.3)		
Block 3: Emotional problems (at 2 months and 1 year respectively)								
Depressive symptoms (EPDS)								
0-11	949	46 (4.8)	1.0		928	79 (8.5)	1.0	
≥ 12	113	34 (30.1)	5.9	3.1-11.3	139	68 (48.9)	5.8	3.5-9.7
Worry about relationship with family and friends								
No worry	947	59 (6.2)	1.0		953	113 (11.9)	1.0	
Low	88	15 (17.0)	1.7	0.7-3.8	72	15 (20.8)	0.8	0.3-1.8
High	25	7 (28.0)	4.3	1.3-13.8	43	19 (44.2)	3.1	1.3-7.7
Block 5: Infant								
Prematurity (gestational age <37)*	114	15 (13.2)	3.1	1.1-8.6	59	8 (13.6)	0.6	0.2-1.8
Infant sleeping problems rated by mother*			NA		36	18 (50.0)	6.9	3.0-16.2
Mother's experience of breastfeeding								
Positive	714	33 (4.6)	1.0				NA	
Positive and negative	296	40 (13.5)	2.2	1.2-4.1				
Negative	35	3 (8.6)	1.3	0.3-5.1				
Block 6: Pregnancy and birth								
Mode of delivery in interaction with birth experience								
Vaginal delivery								
Positive	719	49 (6.8)	1.0		718	93 (13.0)	1.0	
Negative	36	4 (11.1)	1.4	0.4-4.6	39	9 (23.1)	1.9	0.7-5.7
Vacuum extraction or forceps								
Positive	105	8 (7.6)	1.2	0.4-3.4	111	4 (3.6)	0.4	0.1-1.3
Negative	29	7 (24.1)	1.6	0.5-5.5	24	9 (37.5)	3.4	1.0-11.0
Elective cesarean section								
Positive	39	2 (5.1)	1.8	0.4-8.9	37	4 (10.8)	0.9	0.3-2.9
Negative	2	1 (50.0)	Too few		4	3 (75.0)	Too few	
Emergency cesarean section								
Positive	98	9 (9.2)	1.3	0.5-3.9	93	14 (15.1)	1.8	0.9-3.9
Negative	23	0	0		28	9 (32.1)	3.5	1.2-10.3

* Reference: women whose infant was not exposed to the variable

NA (not applicable): not included in questionnaire, or removed because of high correlation with other independent variable

Table 9. Risk factors for poor SRH at 2 months and 1 year after childbirth in multiparous women, analyzed by logistic regression analysis

	2 months (n=1273)				1 year (n=1244)			
Riskfactors	**Total**	**Poor SRH**			**Total**	**Poor SRH**		
	n	n (%)	OR	CI 95%	n	n (%)	OR	CI 95%
Block 1: Socio-demographics								
Unemployed								
No	756	52 (6.9)	1.0		758	83 (10.9)	1.0	
Yes, the year prior to pregnancy	198	31 (15.7)	2.1	1.2-3.7	199	43 (21.6)	1.6	1.0-2.8
Yes, previously	393	41 (10.4)	1.4	0.9-2.3	393	70 (17.8)	1.7	1.1-2.6
Block 2: Physical symptoms								
Tiredness								
No	467	19 (4.1)	1.0		540	24 (4.4)	1.0	
Yes	867	105 (12.1)	1.7	1.0-3.2	788	169 (21.4)	2.6	1.6-4.3
Headache								
No	1016	62 (6.1)	1.0		902	80 (8.9)	1.0	
Yes	307	59 (19.2)	2.3	1.5-3.7	439	113 (25.7)	1.8	1.2-2.6
Neck and shoulder pain								
No	951	60 (6.3)	1.0		867	70 (8.1)	1.0	
Yes	373	62 (16.6)	2.0	1.3-3.1	475	122 (25.7)	2.6	1.8-3.9
Abdominal pain								
No	1195	102 (8.5)	1.0		1145	130 (11.4)	1.0	
Yes	125	20 (16.0)	0.7	0.4-1.5	179	63 (35.2)	2.0	1.3-3.2
Block 3: Emotional symptoms								
Depressive symptoms (EPDS)								
0-11	1189	74 (6,2)	1.0		1159	105 (9.1)	1.0	
≥ 12	158	52 (32,9)	4.2	2.6-6.8	193	90 (46.6)	4.8	3.2-7.3
Block 4: Social support								
Support (instrumental) from partner								
Satisfied			NA		1051	123 (11.7)	1.0	
Not satisfied or not applicable					290	69 (23.8)	1.6	1.1-2.3
Support from someone close								
Satisfied	975	59 (6,1)	1.0		866	84 (9.7)	1.0	
Not satisfied	373	67 (18,0)	2.1	1.4-3.3	480	112 (23.3)	1.6	1.1-2.4
CHC nurse attentive to mother´s needs								
Yes			NA		849	88 (10.4)	1.0	
No					487	107 (22.0)	1.9	1.3-2.7
Block 5: Infant								
Baby´s health rated by mother								
Good	1324	113 (8.5)	1.0		1276	170 (13.3)	1.0	
Poor	28	13 (46.4)	5.4	2.1-14.4	71	26 36.6)	2.9	1.5-5.7
Mother´s experience of breastfeeding								
Positive	1031	74 (7.2)	1.0				NA	
Positive and negative	260	37 (14.2)	1.5	0.9-2.4				
Negative	34	10 (29.4)	4.4	1.8-11.2				
Block 6: Pregnancy and birth								
Mode of delivery in interaction with birth experience								
Vaginal delivery								
Positive	1110	91 (8.2)	1.0		1104	142 (12.9)	1.0	
Negative	39	9 (23.1)	1.5	0.6-3.9	44	16 (36.4)	1.5	0.6-3.5
Vacuum extraction or forceps								
Positive	35	3 (8.6)	1.8	0.5-6.5	34	3 (8.8)	0.6	0.1-2.7
Negative	5	1 (20.0)	1.2	0.1-20.7	5	1 (20.0)	1.8	0.2-18.5
Elective cesarean section								
Positive	89	11 (12.4)	1.6	0.7-3.5	84	18 (21.4)	2.0	1.0-3.9
Negative	1	1 (100.0)	Too few		2	0 (0.0)	0	
Emergency cesarean section								
Positive	46	8 (17.4)	1.4	0.5-4.4	42	8 (19.0)	1.4	0.5-4.0
Negative	14	2 (14.3)	1.2	0.2-7.5	19	6 (31.6)	3.0	0.8-10.3

NA (not applicable): not included in questionnaire, or removed because of high correlation with other independent variable

Perineal pain was excluded from the one-year model due to high correlation with the variable ‘mode of delivery’. Depressive symptoms and the mother’s worry about her relationship with family and friends increased the risk of poor SRH, at two months as well as one year after birth. Of the infant-related variables, prematurity and mixed feelings about breastfeeding were associated with poor SRH at two months, and infant sleeping problems at one year after the birth. Of the labor outcomes, mode of delivery and overall experience of childbirth were associated with the one-year assessment of SRH but not with the two-month assessment. Table 8 shows the combination of these two variables by using ‘positive experience of a vaginal birth’ as the reference. The odds ratio for poor SRH in women who had a negative birth experience was increased regardless of mode of delivery, but this finding was statistically significant for instrumental vaginal delivery and emergency section only. Few women had a negative experience of an elective cesarean section and were excluded from the analyses.

Multiparas

Similarly to the primiparas, the only socio-demographic variable that remained in the one-year model was unemployment. However, in this group, unemployment was also statistically significant in the two-month model (Table 9). From the block of ‘physical symptoms’, tiredness, headache and neck and shoulder pain were risk factors at both time points and abdominal pain at one year only. Depressive symptoms were strongly associated with SRH on both occasions. In contrast to the primiparas, social support from someone close (both models), from the partner and the CHC nurse (one-year model), was associated with SRH in the multiparas. In addition, the mother’s experience of breastfeeding (two-month model) and her own assessment of her baby’s health (both models) were important risk factors for poor SRH. Table 9 also includes mode of delivery in combination with experience of childbirth, despite the lack of statistical significance. The analyses of the multiparous women were impeded by the low prevalence of operative delivery in this group. However, the tendency towards a long-term effect of a negative birth experience was similar to that of the primiparas. The number of women who had had an elective cesarean section was larger in the multiparas than in the primiparas, and in spite of its association with a positive experience it was associated with a twofold increase in poor SRH, a result bordering on statistical significance.

What does the measurement of self-rated health capture?

(Paper IV)

To further understand the measurement of SRH, we investigated how women reason when answering the question 'How would you summarize your state of health at present?', one year after childbirth.

Interpreting the question

The underlying reasons for ratings on the SRH scale were dependent on how the question was interpreted. Besides the presence or absence of physical or emotional problems or diseases, 'state of health' also included feelings in relation to the family, at work and with friends, as well as the ability to handle problems and deal with different events. One mother interpreted 'state of health' as follows:

> *Of course, state of health covers such a lot. It could be how you feel at work, how you feel at home, how you feel with friends. The big overall picture, I think. How I myself feel both physically and mentally. (18)*

'At present' was interpreted individually and most prominently as 'right now' or 'today'. However, a longer period of time, either a couple of days or recent months, could also be considered.

Retrieval of information

A multitude of information was retrieved from memory, and differed from one woman to another. One, or in some cases two, issues appeared to be more important in each individual's reasoning, and affected their subsequent judgment, and this information was classified as central (Figure 4). Central information mainly included statements concerning a woman's life situation in terms of family functioning and wellbeing, relationship with her partner and co-parent, the combining of motherhood and work, level of energy, physical symptoms and emotional problems that affect daily life, stressful life events, a chronic disease with ongoing symptoms, body image, physical exercise, and happiness and joy.

> *At the moment I feel good. Still a bit tired so let's mark 'good', not 'very good'. Anna hasn't slept very well up to now. (27)*

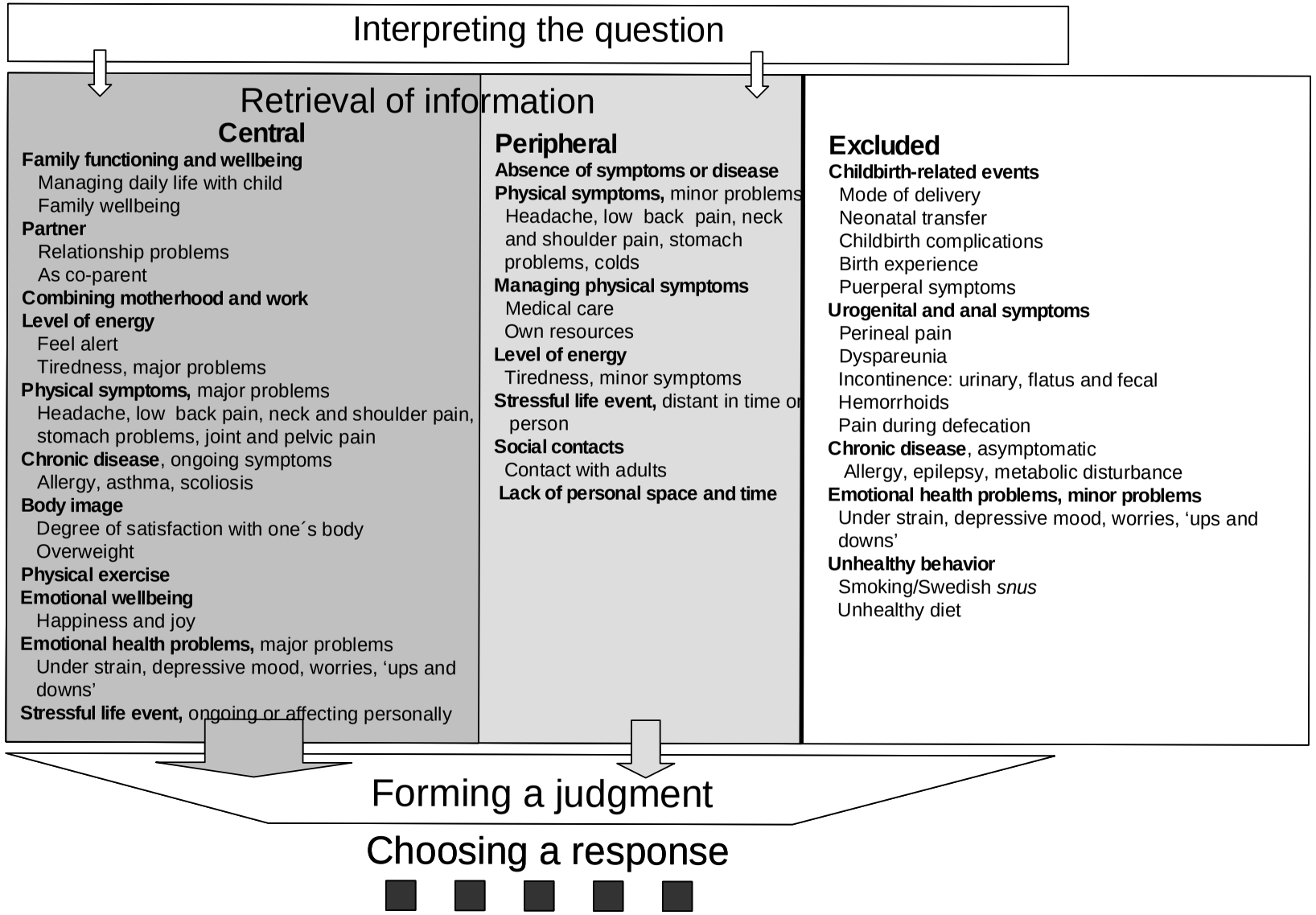

Figure 4. The process of responding to the question on SRH one year after childbirth. Retrieval of information was dependent on interpretation of question. The significance of included information was central or peripheral in the judgment, depending on the degree to which it affected the women in their daily life. The figure also shows information that was excluded from the thinkalouds.

Information that was not emphasized as strongly was classified as peripheral and seemed to have less significance for the ratings. None of the women mentioned childbirth-related events, overall experience of childbirth or physical symptoms during the puerperium, even though such issues were mentioned later in the interview. Additionally, urogenital and anal symptoms, a chronic disease if it was asymptomatic, minor emotional health problems, an unhealthy diet, smoking and use of Swedish *snus* were excluded from reasoning. Reasons for exclusion of certain health problems or behaviors were: ‘It does not fulfill the definition of 'at present'’, ‘It is part of me, I can handle it’, or ‘It is a minor problem that does not bother me’.

Forming a judgment

Two categories describing the judgment process emerged: ‘weighing’ and ‘comparison’. Weighing the severity of physical and emotional pros and cons was the most obvious. A strong negative feeling, such as extreme tiredness, could reduce otherwise good overall health and determine the final response. A very positive physical or emotional experience could also overshadow other health problems.

> *I think that it’s the way I feel physically and that … that’s so incredibly positive, so it evens out the weakness on the more mental side. I think that’s how I see it. (8)*

The weighing could also be based on timing, and women could try to estimate their average state of health over a shorter period of time. Comparisons could be made with others, such as a seriously ill person, others in general or new mothers, and in these cases women tended to assess their own health as better. However, what stood out was that the women just reflected on their own present state of health, even if a reflection on their own state of health at another time, for instance before pregnancy and birth or recently, could occur.

Choosing a response

Women who chose the response alternative ‘very good’ regarded themselves as free from health problems or were not bothered by the few or minor ones they had. A reason for the choice of ‘good’ was that SRH was perceived as good overall and most of the time, despite the presence of a number of health problems. Women who chose ‘good’ might have considered the ‘very good’ alternative but decided that it was not relevant

because of the presence of one or more central health problems. They could also have preferred a less positive alternative on the scale and considered ‘neither good nor bad’, but could not choose this alternative because of the problematic wording. Women found that this alternative ‘excluded everything’. ‘Neither good nor bad’ was chosen if pros and cons weighed equally, the state of health varied or if the burden of symptoms was too large to choose the positive alternatives. None of the women chose the ‘bad’ or ‘very bad’ alternatives, which were described with strongly loaded words and seemed to be beyond their present conditions.

DISCUSSION

The overall aim of this thesis is to describe women's health after childbirth in a national Swedish sample by investigating the prevalence of a number of physical symptoms and self-rated health, two months and one year after delivery.

PHYSICAL SYMPTOMS

When describing health after childbirth as the presence or absence of physical symptoms, a picture of new mothers as suffering from a large burden of physical symptoms emerged. We found that most women were bothered by at least one symptom and nearly one out of four of them had five or more symptoms at 4-8 weeks postpartum as well as ten months later.

Symptoms associated with pregnancy and delivery

Some symptoms that were most likely caused by the delivery, such as perineal pain, dyspareunia and pain from the cesarean section, were common during the first weeks after the birth and caused major problems. However, for most women these consequences of childbirth seemed to decrease over time. Even though 13% of the primiparas and 9% of the multiparas still had problems with dyspareunia at one year after the birth, these figures are similar to those reported by nulliparous women (29), suggesting that no effect of childbirth as such remained one year after birth. In contrast, other symptoms that may have occurred during pregnancy and childbirth, such as hemorrhoids and constipation, persisted in many women; this has also been reported by others (20).

Yet another symptom reported by many women (22%) one year after the birth was stress incontinence. However, the prevalence rate in this study could be an underestimation of the national figure because of the under-representation of non-Swedish-speaking women, and to some extent also of older women (> 35 years) and multiparas, all being groups of women with a higher rate of self-reported symptoms of stress incontinence. Generally, the prevalence rates between studies on stress incontinence are difficult to compare, as methods and time points of measurement differ. Studies using data collected by questionnaires have reported prevalence rates of 15-29% at three months postpartum (32, 38, 50) and 12-42% in long-term follow-ups and in large population studies (41, 45, 46, 126, 127). The finding in paper II that only

2% of the women said stress incontinence caused them major problems indicates that many had got used to occasional leakage and found ways of dealing with it. No questions were asked about how the women were informed about the risk of stress incontinence and its treatment, or if they had discussed their problem with a doctor. Such data would have provided valuable information in order to better understand the self-reports.

The results showed that many women who were at risk of stress incontinence one year after childbirth could be identified antenatally or at the time point when most women attend the postnatal check-up. The strongest predictor of stress incontinence was urinary incontinence (overall leakage) 4-8 weeks after a vaginal delivery as well as after a cesarean section. Forty-one percent of the multiparas and 31% of the primiparas who had symptoms during the third trimester, and 59% and 44% respectively who had symptoms postpartum, also had symptoms of stress incontinence one year after the birth. Other predictors in women with a vaginal delivery were multiparity, obesity and constipation, and older women tended to be at higher risk. These findings also suggest that stress incontinence may be an increasing health problem, as BMI is steadily increasing in the population (18) and women tend to postpone their first pregnancy (88). Knowledge about such risk factors is important not only for health professionals in order to identify women at risk, but also for women when making their choices and decisions before becoming pregnant. Apart from the presence of a perineal rupture and mode of delivery, I found no associations between stress incontinence and other obstetric factors. The finding that a cesarean section decreased the risk, but did not completely protect against subsequent urinary incontinence, has also been shown by others (30, 32, 53, 126, 128). Recent epidemiological studies of large samples have shown that women who have delivered their babies exclusively by a cesarean section are at higher risk than nulliparous women (126). Labor prior to the cesarean section, surgical factors, and processes during pregnancy, such as increased pelvic muscle pressure caused by a heavy fetus, obesity, and constipation may explain some of these results (46, 50), but these aspects have not been fully explored. A cesarean section is not justified if it is only in order to prevent stress incontinence, since the protective effect of such an operation declines over time, and a vaginal delivery does not seem to be a risk factor in perimenopausal women or beyond (129, 130), when urinary incontinence is most common (48). There is an ongoing debate about the role of other obstetric factors, but more research is necessary in order to get the full picture of the

causes of stress incontinence. Stress incontinence occurring during pregnancy or in relation to the delivery should probably be regarded as separate conditions with different origins (50, 131) . Data on stress incontinence before and in late pregnancy, as well more detailed and prospectively collected information about the delivery, would have provided a better basis for studying what causes the condition.

Symptoms associated with childcare

The physical and emotional stress of being a mother to a newborn baby and sometimes also to siblings seemed to be another cause of health problems. Tiredness was the most common symptom in this study as in other investigations of maternal health postpartum (19-23, 28). Sixty percent of the primiparas and also of the multiparas suffered from tiredness during the puerperium, with only a slight reduction in prevalence at one year, compared with 15% for women in the population of women of a similar age (132). Other symptoms related to the infant and the process of becoming a mother were breast problems, obviously restricted to the time point of our first measurement.

Symptoms that are common in women in general

Some of the most common symptoms, which also caused most problems, could not be explained solely by pregnancy, birth or childcare. Headache, neck and shoulder pain and low back pain that were frequently reported in this study were the same as those reported as the most common problems in the general female population. The prevalence rates at one year were fairly similar to those reported for the same age group in the Swedish population (18). The fact that neck and shoulder pain and low back pain were *less* common at 4-8 weeks after the birth, suggests that childbirth may contribute to a temporary decrease in these problems and could consequently be regarded as a health-promoting event. Rest from physical activity and mental relaxation is needed in order to prevent symptoms of neck and shoulder pain (133), and it cannot be ruled out that new mothers experience less stress when most of their focus is on their newborn baby, and when they (hopefully) can relax from other demands. It is also possible that women without symptoms receive better support from their partner and others than women with symptoms, since social support has been associated with low levels of stress after childbirth (134). The increase of symptoms at one year after the birth, to the same level as the total population, may be related to decrease in social support and increase in physical and emotional demands as the child grows and develops (135).

SELF-RATED HEALTH

When describing health after childbirth in terms of self-rated health, a somewhat different picture emerged. Despite the presence of a number of physical symptoms, poor SRH was reported by few women (9% at two months and 14% at one year). A comparison of our findings with a health survey conducted by Statistics Sweden in 2001 (132), including the question 'How would you assess your general state of health?' with response alternatives similar to those in the current study, showed that women in our sample rated their health as better at two months ($p<0.0001$) and one year ($p<0.05$) after the birth than women of the same age in the Swedish population (Figure 5). There may be several explanations for the more positive assessment made by women in our study. Otchet and colleagues (136) suggested that women's more positive perception of their health status soon after delivery, compared with a community sample, could be explained by the view that childbirth itself is an expression of good health. Others have shown that the breastfeeding hormone oxytocin has positive effects on a mother's emotional wellbeing (137), and most mothers (89%) in this sample breastfed their babies two months after delivery. Also, becoming pregnant and keeping the pregnancy can be seen as an indication of satisfaction with life situation, including one's health.

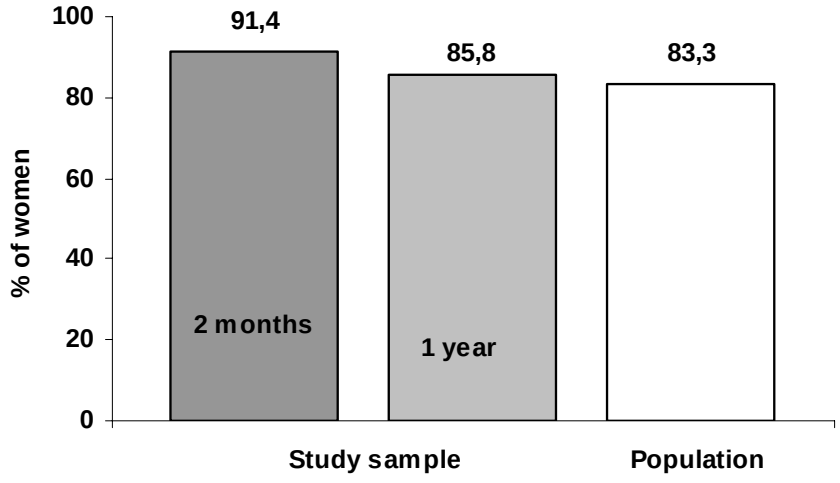

Figure 5. Proportions of women rating their overall health as very good/good in the study sample, at two months and one year after childbirth, and in a national sample of women of corresponding age.

The content of self-rated health

The more positive image of women's health found by analyzing the question on SRH compared with our studies of physical symptoms, called for further investigation of the content and meaning of SRH in the context of new motherhood.

Physical and emotional problems

The in-depth analysis of SRH gave more insight into the significance of the physical symptoms described earlier. We found that even though physical symptoms were the strongest explanatory factor for SRH, only a few specific symptoms affected women's assessments. These were mainly those that affected general wellbeing and everyday functioning as a mother, rather than minor or temporary symptoms (110). Tiredness, headache, low back pain and neck and shoulder pain were associated with SRH at both time points, at least in one of the parity groups. This finding was confirmed by the qualitative study, which showed that similar symptoms affected women's ratings, but only if they caused major problems and had a direct impact on daily life as a mother. Perineal pain was also associated with SRH in first-time mothers at two months, indicating that this problem causes major problems, at least temporarily. The association between SRH one year after birth and abdominal pain and nausea could possibly be explained by regained menstruation or a new pregnancy. Emotional wellbeing, in terms of depressive symptoms and worries, contributed to SRH to a similar degree as physical symptoms, even if these two 'blocks' of variables to some extent overlapped in the quantitative analyses. Symptoms measured in the physical block might have had a psychological component. Fylkesnes and colleagues (69) explored mechanisms involved in self-ratings of health by structural equation modeling and found that physical symptoms had a direct as well as an indirect impact on SRH, and reflected both physical illness or diseases, psychological state and situational stressors. They concluded that "SRH is the overall interpretation of own suffice in general, of how people handle the various stressors and the pain in life".

Being a mother

Women's health after childbirth was associated with motherhood as such. A negative experience of breastfeeding was a risk factor for poor SRH in both primiparous and multiparous women at two months after the birth, and such an experience may have

affected the mother's self-image (80, 82, 138). Rubin (83) suggested that in the transition to motherhood, a continuous evaluation of self-image and body image against the ideal image of a mother occurs, which may affect confidence and self-concept, previously described as part of the SRH concept (139). SRH may to some extent reflect the gap between a woman's present self-image and the ideal image, where the response alternative 'very good' health may be seen as the ideal reference with which to compare her current state of health. A negative experience of breastfeeding may also have been associated with stress, caused by an ongoing struggle to breastfeed or by other breastfeeding problems or a lack of experience of the physiological stress-reducing effect of breastfeeding (140). Many of the women who had negative breastfeeding experiences had stopped breastfeeding two months after the birth. Of those who reported a 'negative' or 'very negative' experience of breastfeeding, only 11% breastfed exclusively, compared with 88% of those who described their experience as 'very positive' or 'positive.

The logistic regression models describing risk factors for poor SRH in primiparous and multiparous women differed to some extent, indicating that childbirth and motherhood affect women's assessment of their own health in different ways, depending on whether these life events are encountered for the first time or not. A source of maternal stress that affected primiparous and multiparous women's SRH differently was the infant's health and behavior. Prematurity affected the SRH of first-time mothers when the baby was two months old but not ten months later, suggesting that the strain related to having a pre-term baby, due to separation, worry and the special circumstances of becoming a mother under such circumstances (84), decreased or disappeared over time, probably due to the mother's adaptation to the new situation. One year after the birth, the major problem affecting first-time mothers' SRH was problems with the infant's sleep. Infant sleep did not seem to be a problem in the multiparas, suggesting that they were more used to, or more inclined to accept, the sleeping pattern of the baby compared with the primiparas. Another interpretation of our findings could be that the variable 'baby's health rated by mother', which was the only infant-related variable that was statistically significant in the multiparas, overshadowed other infant variables. Many of the infant variables were based on the mothers' assessments and the answers may therefore reflect their own feelings projected onto the baby (141).

Tiredness also seemed to affect the SRH ratings of primiparous women more than those of the multiparas. The struggle towards maternal identity and competence is more obvious in first-time mothers who meet the demands of motherhood for the first time. When feeling overwhelmed, unprepared and unsure, women become drained and exhausted (80). Our finding that unemployment was less important in primiparas may also be understood in this context. Incorporating the professional self in the new identity as a mother may not be relevant two months after the birth. The generous Swedish system, which allows new parents 13 months of parental leave financed via the state budget up to a certain limit, may have helped the new first-time mothers to focus on adaptation to motherhood rather than worry about future employment. An alternative explanation for the limited contribution of socio-demographic background may be that the relatively large number of physical and psychological variables has disguised possible differences in maternal background. In a Norwegian study (66), the significance of socio-demographic factors decreased as the number of physical variables included in the model was increased.

In contrast, multiparous mothers were more likely to suffer from stress-related symptoms, such as headache, neck and shoulder pain; lack of support was also a greater problem for them than for first-time mothers. These findings indicate that the multiparous women's need for support may be neglected: by the woman's partner, by other close persons and by health professionals. These mothers have two or more children to care for, but it seems as if people around them expect experienced mothers to be self-sufficient and in less need of support. Multiparas may be expected to manage in their role, even though each childbearing situation is different and maternal identity develops through each childbearing experience (81).

The quantitative and qualitative studies: differences and similarities

A comparison between the quantitative (Paper III) and qualitative (Paper IV) studies describing SRH showed many similarities but also one interesting difference. In the quantitative study, mode of delivery in combination with overall experience of childbirth was associated with SRH one year after the birth, but was not mentioned by the mothers in the qualitative study. This difference between the two studies suggests that the qualitative approach, which in this case was based on women's verbal reasoning, may fail to reveal associations that are not obvious at a conscious level. It is possible that a negative birth experience might affect SRH one year after childbirth, for

instance by having an effect on self-confidence (139). Both of the studies found that the same physical symptoms affected women's SRH ratings, and emotional problems and tiredness were important in both studies. Support from the woman's partner and stressful life events were also identified in both studies, even if unemployment was the only statistically significant factor in the quantitative study. The major additional contribution of the qualitative study was the significance of the woman's life situation. How she managed with childcare and daily life, including issues related to combining motherhood and work outside the home, was important, and such factors were not included in the quantitative study. Altogether, this shows that the SRH question captures much more than physical and mental health, also in the context of new motherhood, and that different methods may be necessary to obtain the total picture. Factors which women may be unconscious of are by definition not captured by the thinkaloud technique, but could possibly be obtained by a carefully conducted quantitative approach or another qualitative method, such as narrative interviews (142). Had the qualitative study reported in paper IV been conducted prior to the quantitative study, additional questions related to the woman's family and social situation would have been included. The unspecified and broad term 'state of health' is probably the strength of the SRH question, since it is left open for the respondent to evaluate what is most important regarding his/her health (9).

Altogether, the findings of the studies on SRH gave some indications regarding how health may be defined in the context of childbirth. The broad definition of health, as defined by the WHO *(Health is a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity)*(63), was reflected in the diversity of factors associated with women's SRH ratings in this thesis. However, a *complete* state of wellbeing was not necessary in order to experience good health, rather that the mother's health status was good enough for her to manage in her daily life. The definition from 1948 has been criticized on this point for being a utopia (143). According to my interpretations of the results, a new mother's health is not only defined by her own wellbeing, but also includes the degree to which she can perform in daily life. In his theory of health, Nordenfelt (144) stresses the individual's ability to act and fulfill his/her goals. Good health is related to the extent to which the individual "can achieve his/her vital goals under standard circumstances". A *vital* goal is a condition "that is necessary for the realization of this person's state of minimal long-term happiness", and *standard circumstances* are related for instance to environment

and culture. Accordingly, health is dependent on the individual involved; on his/her goals and the circumstances in which he/she acts. The pattern of risk factors for poor SRH, and the women's reasons for choosing a particular response, seemed to mirror their ability to reach various goals, which differed from one time point to another, such as being able to breastfeed and being a capable mother in a happy family. Overall, the concept of SRH seems to be more accurately explained by the theory of Nordenfelt, since the ratings, also in studies of other populations, have been shown to adapt to changes during life course and also to differ between cultures (145).

SRH as an outcome measure after childbirth

Altogether, the studies showed what SRH captures, but the qualitative study also provided new insight into other aspects of the measurement, such as its limitations and how it may be analyzed. As an overall measurement of women's general health in their present life situation, SRH appears to be useful. However, our results do *not* support SRH as a single outcome measure of recovery after childbirth, since childbirth-related issues were not incorporated in the ratings. By combining the thinkaloud interviews with a semi-structured interview and a questionnaire we could identify what women left unreflected and why. Urogenital and anal symptoms were consistently excluded. Women may have avoided these problems because they felt they were embarrassing, especially in the initial phase of the interview before they felt confindent with the interviewer (123). The exclusion of smoking or being overweight may have the same explanation.

The qualitative study provided some support for how we dichotomized the 5-point response scale in the quantitative studies, i.e., 'very good' + 'good' versus 'neither good nor bad' + 'bad' + 'very bad' (105, 146). In addition to the skewed distribution of the responses, the findings of the interview study indicate that the two most positive response alternatives corresponded well, both in women's verbal descriptions of each response, and the reasons they gave for choosing them. The 'neither good nor bad' alternative differed distinctively from the two positive alternatives by corresponding to descriptions of state of health as less than healthy. The *content* of the opposite sides of the scale, good vs. bad, seemed to be similar; however, the *seriousness* or *extent* of problems increased with the lower ratings, supporting the view that SRH forms a continuum (74). Altogether these results suggest that dichotomizing SRH between 'good' and 'neither good nor bad' is reasonable in a sample of new mothers. The

comments on the middle response alternative, ‘neither good nor bad’, being without meaning were not surprising. However, the argument for choosing ‘*neither* good *nor* bad’ when ‘*some* was good and *some* was bad’ suggests that women were willing to help out when interpreting this response alternative (122). The fact that women may have chosen ‘good’ instead of ‘neither good nor bad’ because of problematic wording indicates that the prevalence of 14% of poor SRH (defined as less than good) one year after the birth (105) could be an underestimation. In future studies a middle alternative, such as ‘fair’ would be better, which would also agree with the wording of the question in the survey of living conditions by Statistics Sweden (132).

POSTPARTUM CARE

The women seemed to neglect some physical symptoms, either because they did not cause great problems or because they were perceived as ‘natural’ or not long-lasting, and this may explain why new mothers are reluctant to seek professional help (5, 20, 21). The physical symptoms that did seem to bother women were problems that are common not only after childbirth (19-22, 28) but also in women of the same age group in the population (132). The most common symptoms in this study predict long-term sick leave in Swedish women (18), and the findings indicate that general health in many women could possibly be improved by appropriate advice and treatment at this point in life. Pregnancy and childbirth may provide an opportunity to address these problems, since the maternity services reach a large proportion of young women. Even if most women experienced good health one year after delivery, 14% did not. Considering the predictive value of SRH for future morbidity and sick leave, women at risk of poor SRH should be paid greater attention during the postpartum period.

Although there is still a general lack of evidence-based treatment for postpartum health problems, there are some interventions that seem to be effective in preventing or treating some conditions, for instance, postpartum depression and stress incontinence. Intensive, professionally-based postpartum support seems to be an effective treatment for depressive symptoms postpartum (147), and may also benefit women at risk of poor SRH, since depressive symptoms constituted one risk factor and lack of support was another. Pelvic floor muscle exercise (PME) is recommended as a first treatment for stress incontinence (32, 148, 149). PME increases muscle strength (150) and seems to be most effective in young women who participate in supervised PME programs for at

least three months (151). Women at risk of stress incontinence may be identified already during pregnancy, mainly by being asked about symptoms of urinary incontinence, but also from information on parity, pre-pregnancy BMI, and symptoms of constipation. PME promotion may be most effective antenatally, since women seem to neglect their own physical symptoms after the birth when focusing on daily life with the baby (32).

METHODOLOGICAL CONSIDERATIONS

The quantitative studies

The KUB study provided data of high quality by including a large national sample of Swedish women. The Swedish civic registration number and the MBR gave us the opportunity to compare our sample with the population from which it was drawn, and assess the representativity of the sample. It was fairly well representative of all women who gave birth in Sweden in 1999, with the exception of non-Swedish-speaking women. Younger and older women, multiparas and smokers were also slightly underrepresented. Women who had major physical, psychological or social problems may also have been underrepresented, by not being invited or not responding. The selection of women in the study may therefore have resulted in a slight underestimation of women's health problems.

The limitations of the studies were mainly related to the questionnaires. Since the larger KUB study included many research areas, there was a limited number of questions that were specifically related to women's health. Questions about pre-pregnancy symptoms were not included, and comparisons over time were difficult and sometimes impossible, because all physical symptoms were not described consistently over the three questionnaires. The different time intervals during which symptoms were assessed, at two months and one year after the birth, meant that no certain conclusions could be drawn about changes over time. The one-year assessment included symptoms that had occurred during a shorter time period (the week prior to the questionnaire) than the two-month assessment (the last four weeks prior to the questionnaire). Lower rates at one year could be explained by the shorter assessment period; however, higher rates probably indicated an increase in symptoms.

Furthermore, we were not able to identify risk factors for *changes* in SRH over time, since some of the variables were measured differently between the two time points. In

order to assess whether childbirth as such changed women's perceptions of their own health we should have measured SRH prior to pregnancy. Without such a measure no certain conclusion about causality could be drawn. However, such studies of women who are planning to become pregnant would require a very large sample, based on an estimate of the percentage of pregnancies within a future defined time frame, and would therefore be almost impossible to conduct.

The optimal way to investigate health during pregnancy and the first year of motherhood would have been to design the study with this aim only. Prospectively and more frequently collected measurements of physical symptoms and SRH during the course of pregnancy and the postpartum period would have provided more valid data about the relative importance of pregnancy and delivery for long-term maternal health. If the qualitative study had been conducted first, the questionnaires would, for instance, have included further possible risk factors for poor SRH, the significance of physical symptoms, the women's own beliefs about causes of symptoms and their contacts with the health services.

Another limitation was that the sample was too small to allow valid conclusions about predictors of low prevalence. This was obvious in some analyses of long-term consequences of method of delivery, where we would have stratified the sample to explore more in-depth factors that obviously differ due to the different processes and experiences.

The qualitative study

The method of thinkaloud has not been validated but the strongest argument for the trustworthiness of thinkalouds is that they have consistently given results that make good sense theoretically (101). The similar results from the quantitative study served as a reference when considering the extent to which the results from the thinkaloud interviews made sense, a technique that may be referred to as triangulation (152). Concurrent thinkaloud gave rich data, especially on the task of retrieval of information, and retrospective thinkaloud either confirmed or added minor new information. However, data on the process of forming a judgment and interpretation of response alternatives was somewhat scarce, and for a more in-depth understanding, especially of these aspects of the process, the addition of a semi-structured interview was needed. It is possible that interviews with a larger number of women would have provided a

broader picture of women's reasoning on such a complex phenomenon as health. However, we reached saturation of information after approximately 18 interviews and the remaining 8 interviews added very little. A main shortcoming of this study was the failure to recruit women who rated their health as bad or very bad. In Paper I we found that only 2% of women rated their health in such a negative way. Consequently, about 100 interviews would have been necessary in order to obtain data from two women with 'bad' ratings. We cannot exclude the possibility that a negative perception of one's health could have been a reason for declining participation in the study. The main objection to the credibility of the study is our judgment of the similarities within and differences between categories describing latent content, i.e. central and peripheral information (125). Graneheim and Lundman (125) suggested two approaches to deal with this matter: showing representative quotations from the transcribed text, and seeking agreement among co-researchers. These approaches were followed, and this part of the analysis was also performed several times to assure accuracy.

The method of thinkaloud has been criticized because it is possible that by saying out loud anything that comes to mind, the thought that is intended to be studied may be disturbed (103). Additionally, the presence of a researcher may create distraction and a Hawthorne effect, i.e., that the study itself affects the process, and sensitive issues may be withheld from speech and therefore have an effect on the conclusions. However, our ambition was to create a relaxed atmosphere during the interviews, to minimize interaction between interviewer and respondent during the thinkaloud interviews and to be sensitive in the subsequent questioning in order to exert minimum influence on the way in which the respondent answered (102). Further, all women said that they would have recorded a similar rating, even if some believed that they would have given less thought to the judgment, if they had responded to the question in the context of other questions in a questionnaire.

Caution is required when deciding whether the findings of a study can be transferred to other settings or groups (125, 152). The purposeful sampling strategy aimed at including women with different backgrounds and experience, and >14% rating less than 'good' SRH, in order to increase transferability (104). The Swedish system for maternal care and parental leave is unique in a global perspective, and maternal mortality and serious morbidity is very low. It is possible that in a less advantaged part

of the world, women's reasoning would, for example, include a different point of reference when choosing a response.

GENERAL CONCLUSIONS

Physical health problems are common after childbirth and few women are free from symptoms two months and one year after the birth. Some symptoms seem to be temporary for most women, such as perineal pain, dyspareunia and breast problems. However, others seem to remain or increase over time, such as tiredness, headache, back pain, and neck and shoulder pain.

Stress incontinence one year after childbirth is a common symptom, affecting 22% of women one year after childbirth. The strongest predictor is urinary incontinence (overall leakage) 4-8 weeks after a vaginal delivery as well as after a cesarean section. Other predictors in women with a vaginal delivery are multiparity, obesity and constipation 4-8 weeks postpartum.

Despite the fact that physical symptoms are common two months and one year after the birth, the vast majority of women rate their health as ‘very good’ or ‘good’.

A new mother’s SRH is associated with her life situation. Ongoing physical and emotional problems, lack of support and infant factors seem more important than socio-demographic background.

The question on SRH seems to capture a woman’s total life situation, such as family functioning and wellbeing, relationship with partner, the issue of combining motherhood and professional work, level of energy, physical symptoms and emotional problems affecting daily life, stressful life events, chronic disease with ongoing symptoms, body image, physical exercise, and feelings of happiness and joy.

Whereas SRH is a measure of women’s general health and wellbeing in their present life situation, it may not measure recovery after childbirth specifically. Results regarding the effect of mode of delivery and childbirth experience on SRH were inconclusive in this study. The quantitative study suggests that mode of delivery and childbirth experience have long-term effects on SRH, but the qualitative study did not support this finding, showing that more research is needed on the long-term effects of childbirth on mothers’ experiences of their health.

CLINICAL IMPLICATIONS

For some women, there is a need for greater attention to be paid to health problems after childbirth. On the other hand, our results draw attention to childbirth as a health-promoting event, since women rated their health as better than women of corresponding age in the Swedish population, and also stated that some symptoms were less frequent during the postpartum period.

The findings of this thesis need to be taken into account when organizing and planning postpartum care. The postnatal check-up is an important opportunity for a midwife or doctor to counsel women on health problems so that they receive adequate treatment or advice. Further opportunities for counseling by a health professional on maternal health issues during the fist year of motherhood must be considered, and the importance of a supportive CHC nurse was confirmed.

Knowledge about risk factors for stress incontinence is important for women as well as for health professionals. Some women at risk for symptoms may be detected already during pregnancy, others at the postnatal check-up; suitable treatment or advice can then be given, and in some cases long-lasting symptoms can be prevented.

The results do not support SRH as a single outcome measure to evaluate the extent to which women have recovered from consequences of childbirth. However, as an overall measurement of women's general health in their present life situation, SRH seems to be useful, since women include their own view of what is most important at present.

FUTURE RESEARCH

Suggestions for topics to be studied in future research:

- The predictive value of SRH in new mothers for subsequent morbidity, sick leave and the use of health services;
- Physical health problems and SRH in women with a normal pregnancy and childbirth, compared with a complicated pregnancy or birth;
- Randomized controlled trials to study the effectiveness of interventions for postpartum health problems.

SVENSK SAMMANFATTNING – SWEDISH SUMMARY

Kvinnors *fysiska* hälsa efter barnafödande har inte uppmärksammats i samma utsträckning som kvinnors *psykiska* hälsa. Få studier beskriver kvinnors fysiska hälsa i stort och ingen sådan är genomförd i Sverige. De som har genomförts, huvudsakligen i engelskspråkiga länder, visar att symtom är vanliga och ofta kvarstår flera år efter förlossningen. I en studie av franska och spanska nyblivna mammor fann man att den redan höga förekomsten av symtom ökade ytterligare under andra halvåret efter förlossningen, medan i en australiensisk studie såg man en minskning under första halvåret.

Att studera fysiska symtom är ett sätt att beskriva hälsa. Ett annat mått på hälsa är självskattad hälsa (engelska self-rated health, SRH). SRH mäts vanligtvis med en enda fråga ”Hur vill du sammanfattningsvis beskriva ditt hälsotillstånd för närvarande” med tre till fem svarsalternativ och har visat sig predicera sjuklighet, dödlighet och sjukvårdsanvändning. Vad frågan egentligen fångar är oklart. Man har genomfört kvantitativa studier för att identifiera riskfaktorer för dålig SRH och kvalitativa studier för att studera vad som ligger till grund för hur individer besvarar frågan. Ingen sådan studie av nyblivna mammors SRH är genomförd.

Det övergripande syftet med denna avhandling är att undersöka kvinnors hälsa första året efter barnafödande i ett nationellt urval av svensktalande kvinnor. Specifika syften för respektive delarbete var I) att beskriva förekomsten av ett antal fysiska symtom två månader och ett år efter förlossningen och att undersöka samband mellan fysiska symtom och SRH; II) att undersöka prevalensen av ansträngningsinkontinens ett år efter förlossningen och att identifiera prediktorer; III) att identifiera riskfaktorer för dålig SRH två månader och ett år efter förlossningen; och IV) att studera hur kvinnor tänker när de besvarar frågan ”Hur vill du sammanfattningsvis beskriva ditt hälsotillstånd för närvarande”.

Delarbete I

Fysiska symtom var vanliga två månader och ett år efter förlossningen. Få kvinnor var fria från symtom och en fjärdedel av alla kvinnor hade fem symtom eller fler vid båda tidpunkterna. Trötthet, huvudvärk, nack- och skuldervärk och smärta i nedre delen av ryggen var vanliga problem både två månader och ett år efter förlossningen. Vid två

månader var smärta från kejsarsnitt, smärta vid samlag och hemorrojder också vanliga. På frågan ”Hur vill du sammanfattningsvis beskriva ditt hälsotillstånd för närvarande”, svarade emellertid de allra flesta ”mycket bra” eller ”bra”, 91 % vid två månader och 86 % vid ett år,.

Delarbete II

Ett år efter förlossningen hade 22 % av kvinnorna symtom av ansträngningsinkontinens och 2 % tyckte att de hade svåra besvär. Den starkaste prediktorn var urinläckage 4-8 veckor postpartum, både efter en vaginal förlossning och efter ett kejsarsnitt. Andra faktorer som predicerade symtom efter en vaginal förlossning var fetma, förstoppning och att vara omföderska. Kejsarsnitt minskade risken för ansträngningsinkontinens men skyddade inte helt.

Delarbete III

Den kvantitativa studien av riskfaktorer för dålig SRH visade att fysiska symptom, såsom trötthet, nack- och rygg- och magsmärtor, samt emotionella problem, såsom depressiva symtom, ökade risken hos både förstföderskor och omföderskor vid båda tidpunkterna. Riskfaktorer som var relaterade till barnet, för båda grupperna, var negativa upplevelser av amning (2 månader) och problem med barnets sömn (1 år), och hos förstföderskor var prematuritet en riskfaktor vid 2 månader. Hos omföderskor ökade risken för dålig SRH av dåligt stöd, medan hos förstföderskor ökade risken av ett negativt förlossningsutfall, såsom en negativ förlossningsupplevelse efter kejsarsnitt eller sugklocka vid 1 år och smärta från klipp eller bristning vid 2 månader.

Delarbete IV

Den kvalitativa studien visade att frågan om SRH var ett mått på en kvinnas totala livssituation, såsom familjens välbefinnande hur det dagliga livet med familjen fungerade, relationen till partnern, att kombinera moderskap och arbete utanför hemmet, energi, fysiska symtom och emotionella problem som påverkar det dagliga livet, påfrestande livshändelser, kroniska sjukdomar med pågående symtom, kroppsupplevelse, motion och känslor av lycka och glädje. Däremot fångade inte SRH i vilken utsträckning hon återhämtat sig efter förlossningen. När kvinnorna besvarade frågan ”Hur vill du sammanfattningsvis beskriva ditt hälsotillstånd för närvarande”, verkade de inte reflektera över händelser som inträffat under eller strax efter

förlossningen, och inte heller över symtom som kunde vara relaterade till förlossningen (urogenitala och anala).

Slutsatser

Denna avhandling visar att fysiska problem är vanliga efter förlossningen, men trots det anser få nyblivna mammor att de har dålig hälsa. Självskattad hälsa fångar framförallt en kvinnas totala livssituation och fysiska och emotionella problem som påverkar det dagliga livet. Den kvantitativa studien av självskattad hälsa visar att förlossningssätt och förlossningsupplevelse kan påverka en kvinnas självskattade hälsa på lång sikt, medan den kvalitativa studien inte bekräftade dessa fynd. Dessa resultat visar att mera forskning är nödvändig för att studera hur barnafödande påverkar kvinnors upplevelse av sin hälsa, på lång sikt.

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