

Negative childbirth experience – what matters most? a register-based study of risk factors in three time periods during pregnancy

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ARTICLE INFO

Keywords:

Childbirth experience
Labour
Self-perceived health
Fear after birth
Birth satisfaction
Psychological birth trauma

ABSTRACT

Objective: To explore the impact of risk factors representing three different time periods during pregnancy on negative childbirth experience.

Methods: This was a register-based cohort study of 80 482 primiparas giving birth to singleton, term infants in Sweden 2013–2018, elective caesarean sections (CS) excluded. Hierarchical logistic regression was performed to calculate adjusted odds ratios (aOR) with 95% confidence intervals (CIs) in three blocks, each representing risk factors from one of three time periods: I) before pregnancy, II) pregnancy, III) childbirth.

Results: Of the pre-gestational factors, only poor self-rated health (SRH) remained associated with negative childbirth experience after adjustment for pregnancy- and childbirth-related factors (aOR 1.20, 95% CI 1.08–1.34). Psychiatric care during pregnancy and fear of childbirth were both associated with negative birth experience (aOR 1.51, 95% CI 1.35–1.69; aOR 1.50, 95% CI 1.32–1.70), as were all childbirth-related factors included in the model. Women giving birth operatively vaginally or by unplanned CS under regional anaesthesia had three-fold higher ORs for rating their overall childbirth experience as negative (aOR 3.29, 95% CI 3.04–3.57; aOR 3.07, 95% CI 2.80–3.38). The highest OR, 5.44, was seen among women undergoing unplanned CS under general anaesthesia (95% CI 4.55–6.50).

Conclusion: The main contributing factors to negative childbirth experience are related to labour and birth, but poor SRH prior to pregnancy, together with psychiatric care during pregnancy and fear of childbirth, place the woman in a vulnerable position, and require extra attention.

Introduction

A woman's childbirth experience refers to her subjective perception of the birthing process. Only the woman herself can identify the experience as positive or negative, meaning that even obstetrically normal births can be perceived as negative or traumatic. [1] A negative childbirth experience increases the risk of mental ill-health following childbirth, especially postpartum depression [2] and post-traumatic stress disorder, [3] both serious conditions affecting the whole family. Accordingly, impaired bonding with the infant and affected breastfeeding have been reported after negative childbirth experience. [4] Moreover, a negative experience of giving birth can lead to delay or avoidance of subsequent pregnancies. [5] Among parous women, negative childbirth experience is the strongest predictor of fear of childbirth, which is associated with higher levels of anxiety, fatigue and

depressive symptoms during pregnancy, as well as with psychiatric care and use of psychotropic medication. [6]

When overall experience is evaluated, the prevalence of negative childbirth experience is commonly estimated at around 10%. [7] Primiparas more often than multiparas report negative experience. [7] Sociodemographic factors associated with negative childbirth experience are unemployment, being a single mother and smoking. [8] Findings related to maternal age are mixed; both low [8] and high age [9] have been associated with negative childbirth experience. Limited research is available on the connection between self-rated health (SRH) prior to pregnancy and childbirth experience, but poor SRH appears to be a strong predictor of negative childbirth experience. [9] Lastly, fear of childbirth is a risk factor for negative childbirth experience, also in first-time mothers. [7]

Labour- and birth-related factors associated with negative childbirth

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<https://doi.org/10.1016/j.srhc.2022.100779>

Received 9 October 2021; Received in revised form 13 July 2022; Accepted 9 September 2022

Available online 17 September 2022

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experience are induction of labour, prolonged labour, epidural anaesthesia, unplanned caesarean section (CS), operative vaginal birth, [7] postpartum haemorrhage, [10] anal sphincter rupture, [11] and infant's low Apgar score or transferral to neonatal ward. [7]

Since negative childbirth experience can have considerable short- and long-term consequences, factors related to negative childbirth experience need to be addressed, and their interactions explored. To improve care of women in conjunction with pregnancy, there is a need to establish whether factors related to background, pregnancy or labour and birth affect childbirth experience the most, as this would impact on the timing of efforts to prevent negative childbirth experience. Although many risk factors for negative childbirth experience have been identified, most studies have considered these simultaneously in their analysis. Therefore, the aim of this study was to explore the contribution of risk factors representing three different time periods: I) before pregnancy, II) pregnancy, and III) childbirth, on negative childbirth experience.

Methods

Study design and data source

This was a cohort study using data retrieved from the Swedish Pregnancy Register of births between 1 January 2013 and 31 December 2018. The Swedish Pregnancy Register presently covers >90% of all births in Sweden. [12] The register includes demographic, reproductive and maternal health data, prospectively collected from first visit at the antenatal care unit, which usually takes place between gestational weeks 9 and 12, until the postnatal check-up at 8–16 weeks postpartum. At the first antenatal visit, the midwife assigned to the pregnancy interviews the woman about her medical history and sets up electronic medical records (EMR) for the pregnancy. Most data for the Swedish Pregnancy Register are retrieved directly from the EMR, whereas data on country of birth, education, occupation, psychiatric care, counselling for fear of childbirth, and antenatal education are entered into the register manually by the midwife assigned to the pregnancy. This also applies to data on SRH, which are collected exclusively for the Swedish

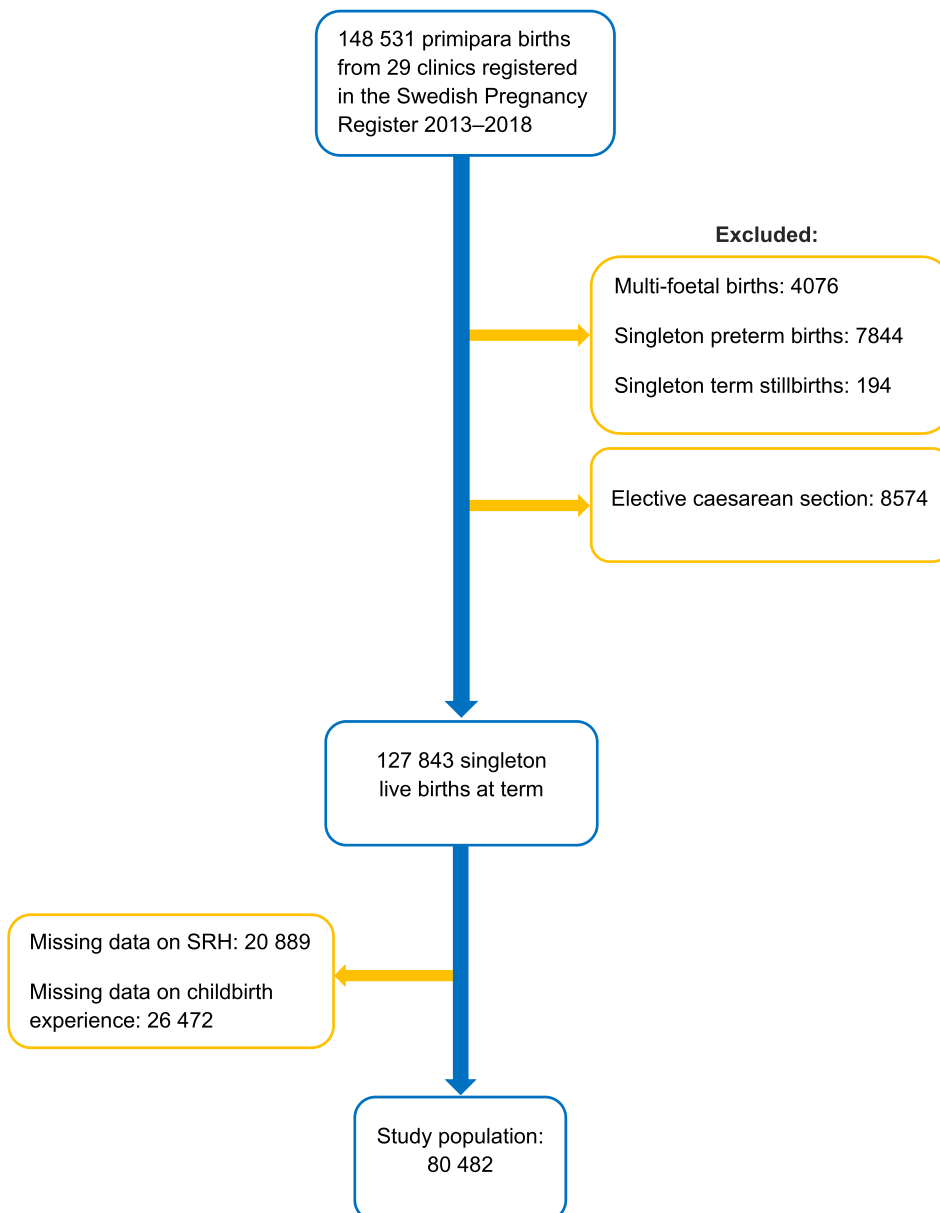


Fig. 1. Flowchart of participants.

Pregnancy Register. [12]

In the present study, primiparas with singleton pregnancies and a live term birth (i.e., after 37 weeks of gestation) were included. Only births in hospitals with a reporting rate for childbirth experience of >50% during the study period were included, which corresponded to 29 birth clinics from different parts of Sweden. The choice to focus on primiparas was made since they have most of their reproductive future ahead of them, and negative childbirth experience may thus impact on any future pregnancies and births, including the psychological aspects thereof. Women with elective CS were excluded, since the aim was to elucidate labour- and birth-related characteristics. Since SRH before pregnancy was an important exposure to assess, pregnancies for which data on SRH had not been collected ($n = 20\,889$, 16.3%) were also excluded. Lastly, pregnancies without data on the outcome, childbirth experience ($n = 26\,472$, 20.7%), were excluded. The final sample consisted of 80 482 women and is shown in Fig. 1.

Outcome measurement

Childbirth experience was measured on a scale from 1 to 10, where 1 corresponds to the worst possible childbirth experience and 10 the best possible. The scale is a validated instrument for rating pain, mood and other feelings. [13] It is established as a tool for measuring overall childbirth experience in clinical practice in Sweden, and has also been used in international research. [10,14,15]

In line with previous studies on the subject, negative childbirth experience was defined as ratings ≤ 4 . [10,15] Childbirth experience was collected as part of clinical routine during one of the first days after birth, either before discharge from the hospital or at a follow-up visit approximately three days postpartum. [12] Usually, the rating was collected by a midwife or assistant nurse who did not assist during labour or birth.

Risk factors

Pre-gestational variables

Pre-gestational variables encompassed sociodemographic and maternal health characteristics collected retrospectively at first antenatal visit in gestational week 9–12. Sociodemographic characteristics included age at conception (categorised as ≤ 19 , 20–34 or ≥ 35 years), country of birth (categorised as high-income countries, upper middle-income countries, lower middle-income countries or low-income countries, based on the 2018 World Bank classification [16]), education (categorised as > 12 , 10–12 or ≤ 9 years in school), occupational status (categorised as ‘working’, which included employed/parental leave/student, or ‘not working’, which included being on sick leave/receiving disability benefits/being unemployed) and civil status (categorised as cohabiting with father of child, single mother or ‘other situation’, which included living with same-sex partner or living with an extended family). Maternal characteristics included body mass index (BMI) calculated from weight and height measured at first antenatal visit (categorised as < 18.5 [underweight], 18.5–24 [normal weight], 25–29 [overweight] or ≥ 30 [obesity] kg/m²), hazardous alcohol use before conception (defined as score ≥ 6 on the Alcohol Use Disorders Identification Test [AUDIT], no or yes [n/y]) and daily smoking at first antenatal visit, regardless of quantity (n/y). SRH prior to pregnancy, was scored by the woman on a 5-point Likert scale of ‘very poor’, ‘poor’, ‘neither good nor poor’, ‘good’ and ‘very good’ as an answer to the question “How would you summarize your health prior to pregnancy?”, asked by the midwife. Poor SRH was defined as ratings of ‘very poor’, ‘poor’ or ‘neither good nor poor’, whereas good SRH was defined as ratings of ‘good’ or ‘very good’, in line with previous studies. [17,18] Further, history of psychiatric care (n/y), pre-gestational medical disorder (n/y) and in vitro fertilisation (IVF, [n/y]) were included. History of psychiatric care was retrieved from the midwife’s registration at first antenatal visit using predefined checkboxes in EMR. The checkbox indicating previous

psychiatric care covers a broad range of psychiatric and psychological conditions and may encompass counselling, psychotherapy, pharmaceutical treatment or hospitalisation at a psychiatric ward. Pre-gestational medical disorders were recorded in EMR using checkboxes and/or diagnosis codes from the International Classification of Diseases, tenth version (ICD-10), shown in S1. [19] For the purpose of the present study, a summary variable indicating pre-gestational medical disorders was used, i.e., presence of any of the following medical conditions: diabetes, systemic lupus erythematosus, endocrine disorder, epilepsy, inflammatory bowel disease or hypertension.

Pregnancy-related variables

Pregnancy-related variables manually entered into the register at a check-up at 8–16 weeks postpartum included psychiatric care during pregnancy (pharmaceutical or psychological treatment [n/y]), counselling for fear of childbirth (n/y), mother attended antenatal education group (n/y) and partner attended antenatal education group (n/y).

Childbirth-related variables

Childbirth-related variables encompassed variables connected to labour and birth, and included induction of labour (n/y), duration of labour contractions (hours, calculated from self-reported start time of contractions to time of birth), epidural anaesthesia (n/y), mode of birth (categorised as spontaneous vaginal birth, operative vaginal birth [vacuum extraction or forceps], unplanned CS in regional anaesthesia or unplanned CS in general anaesthesia), blood loss (categorised as ≤ 1000 , 1001–2500 or > 2500 ml), anal sphincter rupture (n/y) and Apgar score < 7 at five minutes of age (n/y).

Statistical analyses

Descriptive statistics were used to present pre-gestational, pregnancy-related and childbirth-related characteristics of the sample and of women excluded due to missing information on SRH or childbirth experience, and reported as means and standard deviations (SD) or numbers (n) and percentages (%).

To examine the respective impacts on negative childbirth experience of factors related to the period before pregnancy, pregnancy or childbirth, a hierarchical logistic regression analysis was performed in three blocks, each representing one of these three time periods. Independent variables entered in each block were chosen based on previous research and clinical experience, and evaluated against the outcome variable by means of univariable chi-squared tests or independent samples t-tests. Block I, representing pre-gestational factors, included age, country of birth, education, BMI, SRH and pre-gestational medical disorder. In block II, pregnancy-related factors were added to block I. Block II thus included the factors from block I and psychiatric care during pregnancy and counselling for fear of childbirth. In block III, representing childbirth-related factors, induction of labour, duration of labour contractions, mode of birth, blood loss and Apgar score < 7 at five minutes of age, were added to block II. Associations are presented as adjusted ORs (aORs) with 95% confidence intervals (CI), using positive childbirth experience as reference.

Prior to running the hierarchical logistic regression analysis, all independent variables were tested against each other to detect risk for multicollinearity. Variables in each block showing the strongest association with negative childbirth experience, but without association with each other, were included in the hierarchical logistic regression described above. One exception was made regarding associations between independent variables among pregnancy-related variables, where both *psychiatric care during pregnancy* and *counselling for fear of childbirth* were kept. While these variables were strongly correlated, not all women receiving psychiatric care during pregnancy attended counselling for fear of childbirth or vice versa. Variables not included in final analysis were occupational status, civil status, alcohol use, smoking, history of psychiatric care, IVF, antenatal education group, epidural

anaesthesia and anal sphincter rupture. All statistical analyses were performed using IBM SPSS Statistics version 27.0 (IBM Corp., Armonk, N.Y., USA).

Ethical approval

The Regional Ethical Board in Uppsala approved the study, Dnr: 2017/276, on September 13, 2017.

Results

Sample characteristics

Characteristics of the total sample and by childbirth experience are shown in Table 1. The majority of the women were 20–34 years old, born in a high-income country, had >12 years of education, were working and cohabited with the child’s father. Most women had a normal BMI, reported non-hazardous use of alcohol and were non-smokers. Less than a tenth (n = 6878, 8.5%) reported poor SRH, or had a pre-gestational medical disorder (n = 7251, 9.0%) prior to pregnancy, while 11.8% (n = 9502) had a history of psychiatric care. During pregnancy, 6.3% (n = 5043) received psychiatric care and 4.7% (n = 3799) attended counselling for fear of childbirth, with an overlap of 940 women (data not shown in table). Labour was induced in 22% of the pregnancies and more than half (57%) received epidural anaesthesia. Most births (77%) were spontaneous vaginal, and among the 11% (n = 9112) operative vaginal births, a minority (0.8%, n = 74) were with forceps (data not shown).

Attrition analyses showed some differences between women included in the study and those excluded due to missing information on SRH and childbirth experience (Fig. 1, S2). Women excluded for this reason were somewhat younger, more often gave birth operatively or had a baby with low Apgar score. Further, they appeared to more often be foreign-born, have low education and not be working, but they also had more missing data on sociodemographic variables, as displayed in S2.

Negative childbirth experience

The prevalence of reported negative childbirth experience was 8.4%. Among the pre-gestational variables, significant risk factors for negative childbirth experience were maternal age ≥ 35 years (aOR 1.32, 95% CI 1.19–1.46), overweight (aOR 1.12, 95% CI 1.04–1.21), obesity (aOR 1.24, 95% CI 1.12–1.37) and poor SRH (aOR 1.31, 95% CI 1.18–1.45) (Table 2, Fig. 2). Protective associations were observed for women originating from a lower middle-income country (aOR 0.70, 95% CI 0.56–0.88), as well as for women with a low level of education (aOR 0.85, 95% CI 0.72–0.99).

When adding pregnancy-related factors to the model in block II, all associations in block I remained significant. The strongest associations in this block were observed for treatment for psychiatric care (aOR 1.48, 95% CI 1.32–1.65) and counselling for fear of childbirth (aOR 1.61, 95% CI 1.43–1.82).

After adding childbirth-related factors in block III, the only positive associations remaining were poor SRH, psychiatric care during pregnancy and counselling for fear of childbirth (aOR 1.20, 95% CI 1.08–1.34; aOR 1.51, 95% CI 1.35–1.69; aOR 1.50, 95% CI 1.32–1.70). Originating from a lower middle-income country and low education level were still associated with lower odds of negative birth experience (aOR 0.60, 95% CI 0.48–0.76; aOR 0.82, 95% CI 0.69–0.97), as was originating from a low-income country (aOR 0.75, 95% CI 0.62–0.91). Furthermore, all childbirth-related variables included were associated with negative childbirth experience. The major risk factors concerned mode of birth, where women undergoing unplanned CS under general anaesthesia had five-fold higher odds ratios for reporting negative childbirth experience (aOR 5.44, 95% CI 4.55–6.50), compared with

Table 1
Characteristics of the sample and by childbirth experience.

Characteristics		Total n (%)	Childbirth experience n (%)	
			Positive 73 685 (91.6)	Negative 6797 (8.4)
Age, years	Mean ± SD	28.5 ± 4.7	28.4 ± 4.7	29.1 ± 4.7
	≤ 19	2084 (2.6)	1958 (2.7)	126 (1.9)
	20–34	71 016 (88.2)	65 097 (88.3)	5919 (87.1)
	≥ 35	7381 (9.2)	6629 (9.0)	752 (11.1)
	Missing	1 (0.0)	1 (0.0)	0 (0.0)
Country of birth by income level ^a	High	67 699 (84.1)	61 874 (84.0)	5825 (85.7)
	Upper middle	6779 (8.4)	6173 (8.4)	606 (8.9)
	Lower middle	2497 (3.1)	2362 (3.2)	135 (2.0)
	Low	3206 (4.0)	2998 (4.1)	208 (3.1)
	Missing	301 (0.4)	278 (0.4)	23 (0.3)
	Education, years	> 12	42 697 (53.1)	39 016 (52.9)
10–12		28 992 (36.0)	26 519 (36.0)	2473 (36.4)
≤ 9		4019 (5.0)	3754 (5.1)	265 (3.9)
Missing		4774 (5.9)	4396 (6.0)	378 (5.6)
Occupational status	Working ^b	73 869 (91.8)	67 628 (91.8)	6241 (91.8)
	Not working ^c	3783 (4.7)	3400 (4.6)	383 (5.6)
	Missing	2830 (3.5)	2657 (3.6)	173 (2.5)
Civil status	Cohabitant	73 063 (90.8)	66 907 (90.8)	6156 (90.6)
	Single mother	1502 (1.9)	1379 (1.9)	123 (1.8)
	Other situation	3969 (4.9)	3603 (4.9)	366 (5.4)
	Missing	1948 (2.4)	1796 (2.4)	152 (2.2)
BMI, kg/m ²	Mean ± SD	24.3 ± 4.4	24.2 ± 4.4	24.7 ± 4.6
	< 18.5	2267 (2.8)	2097 (2.8)	170 (2.5)
	18.5–24	49 660 (61.7)	45 674 (62.0)	3986 (58.6)
	25–29	17 877 (22.2)	16 251 (22.1)	1626 (23.9)
	≥ 30	8395 (10.4)	7552 (10.2)	843 (12.4)
	Missing	2283 (2.8)	2111 (2.9)	172 (2.5)
Alcohol, AUDIT ≥ 6	No	61 546 (76.5)	56 473 (76.6)	5073 (74.6)
	Yes	5732 (7.1)	5212 (7.1)	520 (7.7)
	Missing	13 204 (16.4)	12 000 (16.3)	1204 (17.7)
Smoking	No	70 852 (88.0)	65 067 (88.3)	5785 (85.1)
	Yes	2948 (3.7)	2702 (3.7)	246 (3.6)
	Missing	6682 (8.3)	5916 (8.0)	766 (11.3)
Self-rated health	Good	73 604 (91.5)	67 557 (91.7)	6047 (89.0)
	Poor	6878 (8.5)	6128 (8.3)	750 (11.0)
History of psychiatric care	No	61 635 (76.6)	56 701 (77.0)	4934 (72.6)

(continued on next page)

Table 1 (continued)

Characteristics		Total n (%)	Childbirth experience n (%)	
			Positive 73 685 (91.6)	Negative 6797 (8.4)
Pre-gestational medical disorder ^d	Yes	9502 (11.8)	8442 (11.5)	1060 (15.6)
	Missing	9345 (11.6)	8542 (11.6)	803 (11.8)
	No	71 829 (89.2)	65 850 (89.4)	5979 (88.0)
	Yes	7251 (9.0)	6543 (8.9)	708 (10.4)
	Missing	1402 (1.7)	1292 (1.8)	110 (1.6)
In vitro fertilization	No	67 422 (83.8)	61 880 (84.0)	5542 (81.5)
	Yes	5343 (6.6)	4890 (6.6)	453 (6.7)
	Missing	7717 (9.6)	6915 (9.4)	802 (11.8)
Psychiatric care during pregnancy	No	68 569 (85.2)	62 938 (85.4)	5631 (82.8)
	Yes	5043 (6.3)	4394 (6.0)	649 (9.5)
	Missing	6870 (8.5)	6353 (8.6)	517 (7.6)
Counselling for fear of childbirth	No	69 847 (86.8)	64 093 (87.0)	5754 (84.7)
	Yes	3799 (4.7)	3272 (4.4)	527 (7.8)
	Missing	6836 (8.5)	6320 (8.6)	516 (7.6)
Antenatal education group, mother	No	19 783 (24.6)	18 133 (24.6)	1650 (24.3)
	Yes	55 014 (68.4)	50 284 (68.2)	4730 (69.6)
	Missing	5685 (7.1)	5268 (7.1)	417 (6.1)
Antenatal education group, partner	No	23 736 (29.5)	21 765 (29.5)	1971 (29.0)
	Yes	51 061 (63.4)	46 652 (63.3)	4409 (64.9)
	Missing	5685 (7.1)	5268 (7.1)	417 (6.1)
Induction of labour	No	62 718 (77.9)	58 022 (78.7)	4696 (69.1)
	Yes	17 764 (22.1)	15 663 (21.3)	2101 (30.9)
Duration of labour contractions, hours	Mean ± SD	21.5 ± 13.3	21.2 ± 13.2	25.0 ± 14.0
	Missing	14 699 (18.3)	13 125 (17.8)	1574 (23.2)
Epidural anaesthesia	No	34 360 (42.7)	32 266 (43.8)	2094 (30.8)
	Yes	46 122 (57.3)	41 419 (56.2)	4703 (69.2)
Mode of birth	Spontaneous vaginal	62 222 (77.3)	58 646 (79.6)	3576 (52.6)
	Operative vaginal	9112 (11.3)	7555 (10.3)	1557 (22.9)
	Unplanned CS, regional anaesthesia	7911 (9.8)	6568 (8.9)	1343 (19.8)
	Unplanned CS, general anaesthesia	1237 (1.5)	916 (1.2)	321 (4.7)
Blood loss, ml	Mean ± SD	513.7 ± 399.3	503.1 ± 386.9	629.3 ± 500.2
	≤ 1000	73 513 (91.3)	67 687 (91.9)	5826 (85.7)
	1001–2500	6516 (8.1)	5628 (7.6)	888 (13.1)
	> 2500	371 (0.5)	299 (0.4)	72 (1.1)
	Missing		71 (0.1)	11 (0.2)

Table 1 (continued)

Characteristics		Total n (%)	Childbirth experience n (%)	
			Positive 73 685 (91.6)	Negative 6797 (8.4)
Anal sphincter rupture	No	82 (0.1)	70 195 (95.3)	6197 (91.2)
	Yes	4090 (5.1)	3490 (4.7)	600 (8.8)
Apgar score < 7 at 5' age	No	79 625 (98.9)	73 026 (99.1)	6599 (97.1)
	Yes	822 (1.0)	631 (0.9)	191 (2.8)
	Missing	35 (0.0)	28 (0.0)	7 (0.1)

SD = standard deviation, BMI = body mass index, AUDIT = alcohol use disorders identification test; ≥ 6 points indicates hazardous use of alcohol, CS = caesarean section.

^a Based on the 2018 World Bank country classifications.

^b Employed, parental leave, student.

^c On sick leave/receiving disability benefits, unemployed.

^d Includes any of the medical disorders diabetes, systemic lupus erythematosus, endocrine disorder, epilepsy, inflammatory bowel disease or hypertension.

women with spontaneous vaginal birth. Three-fold higher odds ratios were found for both operative vaginal birth and unplanned CS under regional anaesthesia (aOR 3.29, 95% CI 3.04–3.57; aOR 3.07, 95% CI 2.80–3.38) compared with spontaneous vaginal birth. Both women with excessive blood loss (>2500 ml) and women giving birth to a baby with low Apgar score had two-fold higher odds ratios for experiencing the birth as negative (aOR 1.97, 95% CI 1.38–2.82; aOR 1.99, 95% CI 1.61–2.47).

Discussion

Main findings

In this study, we explored the relative contributions of pre-gestational, pregnancy- and childbirth-related risk factors for negative childbirth experience. Poor SRH was the only pre-gestational factor remaining associated with negative childbirth experience after adjustment for pregnancy- and childbirth-related factors. Originating from a lower middle-income or low-income country appeared protective for negative childbirth experience, as did low education level. Psychiatric care during pregnancy and fear of childbirth were both associated with negative childbirth experience, as were all childbirth-related factors included in the model. Women giving birth operatively vaginally or by unplanned CS under regional anaesthesia had three-fold higher odds ratios for rating their overall childbirth experience as negative. The highest odds ratio for a negative childbirth experience, 5.44, was seen among women undergoing unplanned CS under general anaesthesia.

Interpretation

In line with the results from the only previous research we know of on the subject – a Canadian population-based cross-sectional study [9] – only SRH remained associated with negative childbirth experience following adjustment for childbirth-related risk factors. SRH is a health marker covering physical, emotional and social well-being, and an established predictor for morbidity in the general population. [20] It has a predictive value also in pregnant populations, [21] though more studies are needed. The present study highlights the possibility of using SRH ratings to find women at higher risk of experiencing childbirth as negative. A previous study exploring poor SRH prior to pregnancy concluded that the rating was largely characterized by a history of

Table 2
Pre-gestational, pregnancy-related and childbirth-related factors associated with negative childbirth experience.

n = 54 255		Block I ^a aOR (95 % CI)	Block II ^b aOR (95 % CI)	Block III ^c aOR (95 % CI)
Age, years	20–34	1	1	1
	≤ 19	0.83 (0.67–1.04)	0.83 (0.66–1.04)	0.99 (0.78–1.24)
	≥ 35	1.32 (1.19–1.46)	1.30 (1.17–1.44)	1.04 (0.93–1.15)
Country of birth by income level ^d	High	1	1	1
	Upper middle	1.05 (0.94–1.18)	1.07 (0.95–1.19)	1.00 (0.89–1.12)
	Lower middle	0.70 (0.56–0.88)	0.72 (0.58–0.90)	0.60 (0.48–0.76)
	Low	0.85 (0.71–1.03)	0.89 (0.74–1.08)	0.75 (0.62–0.91)
Education, years	> 12	1	1	1
	10–12	0.99 (0.93–1.06)	0.98 (0.92–1.05)	1.01 (0.95–1.08)
	≤ 9	0.85 (0.72–0.99)	0.82 (0.69–0.97)	0.82 (0.69–0.97)
Body mass index, kg/m ²	18.5–24	1	1	1
	< 18.5	0.93 (0.76–1.14)	0.93 (0.76–1.13)	0.97 (0.79–1.19)
	25–29	1.12 (1.04–1.21)	1.12 (1.04–1.21)	1.04 (0.96–1.12)
	≥ 30	1.24 (1.12–1.37)	1.23 (1.11–1.36)	1.07 (0.97–1.19)
Self-rated health	Good	1	1	1
	Poor	1.31 (1.18–1.45)	1.18 (1.06–1.31)	1.20 (1.08–1.34)
Pre-gestational medical disorder ^e	No	1	1	1
	Yes	1.10 (0.99–1.22)	1.08 (0.97–1.20)	1.04 (0.93–1.15)
Psychiatric care during pregnancy	No	1	1	1
	Yes	1.48 (1.32–1.65)	1.48 (1.32–1.65)	1.51 (1.35–1.69)
Counselling for fear of childbirth	No	1	1	1
	Yes	1.61 (1.43–1.82)	1.61 (1.43–1.82)	1.50 (1.32–1.70)
Induction of labour	No	1	1	1
	Yes	1.35 (1.25–1.46)	1.35 (1.25–1.46)	1.35 (1.25–1.46)
Duration of labour contractions, hours	No	1	1	1
	Yes	1.02 (1.02–1.02)	1.02 (1.02–1.02)	1.02 (1.02–1.02)
Mode of birth	Spontaneous vaginal	1	1	1
	Operative vaginal	1	1	3.29 (3.04–3.57)
	CS, regional anaesthesia	1	1	3.07 (2.79–3.38)
	CS, general anaesthesia	1	1	5.44 (4.55–6.50)
Blood loss, ml	≤ 1000	1	1	1
	1001–2500	1.40 (1.27–1.55)	1.40 (1.27–1.55)	1.40 (1.27–1.55)
	> 2500	1.97 (1.38–2.82)	1.97 (1.38–2.82)	1.97 (1.38–2.82)
Apgar score < 7 at 5' age	No	1	1	1
	Yes	1.99 (1.61–2.47)	1.99 (1.61–2.47)	1.99 (1.61–2.47)

CS = caesarean section.

^a Block I = pre-gestational factors.

^b Block II = block I + pregnancy-related factors.

^c Block III = block I + block II + childbirth-related factors.

^d Based on the 2018 World Bank country classifications.

^e Includes any of the medical disorders diabetes, systemic lupus erythematosus, endocrine disorder, epilepsy, inflammatory bowel disease or hypertension.

psychiatric care. [18] In line with this, women who received psychiatric care during pregnancy in the present study were more likely to have a negative childbirth experience. However, severity and type of psychiatric disorder treated during pregnancy were unknown. The variable was strongly correlated with *counselling for fear of childbirth*. A strong link between, for example, depression and fear of childbirth among nulliparous women has been observed in previous studies. [22,23].

In the present study, women originating from a lower middle-income or low-income country were less likely to experience childbirth as negative. Origin has not previously been directly investigated in relation to childbirth experience, but Waldenström and co-authors did not find language barriers to be a risk factor. [8] Our finding concerning origin is somewhat surprising, considering that fear of childbirth and unplanned CS are more common among foreign-born pregnant women in Sweden. [24,25] Studies on overall childbirth experience in lower middle-income and low-income countries are scarce, but findings from Rwanda report only 3% prevalence of negative childbirth experience, [26] despite a generally higher level of adverse pregnancy outcomes in the country. The practice of measuring overall childbirth experience has, however, been questioned, [27] since it is unknown which aspects of the experience women include in the rating. When the 1–10 scale was validated against the more extensive Wijma Delivery Experience Questionnaire, a moderate correlation of 0.52 was noted. [28,29] One possibility might be that women from low-income countries include other aspects in the rating than Swedish-born women do, but this warrants further research. Another aspect is a possible language barrier, as no information on Swedish language skills was available for the sample.

In line with previous studies, we observed an association with mode of birth. [7] Women delivering via CS under general anaesthesia had five-fold higher odds ratios for experiencing childbirth as negative, compared with women giving birth spontaneously vaginally. The main reason for performing CS under general anaesthesia in Sweden is a need for immediate CS, due to an acute threat to the mother's or child's life, which can be a traumatic event. The nature of our study precluded the possibility to draw conclusions based on causality, but both unplanned CS and operative vaginal birth can elicit feelings known to be connected to traumatic childbirth experiences, such as lack of control and fear for the baby's health. [30] One should bear in mind that a birth is preceded by a chain of events, each contributing to the overall childbirth experience. Nevertheless, there is evidence that interventions during labour can be perceived differently postpartum depending on mode of birth, with a more negative experience in women who have undergone unplanned CS. [31]

Strengths and limitations

The present study has several strengths, starting with the sample size. To the best of our knowledge, no previous study has considered risk factors from different time periods using hierarchical models in relation to negative childbirth experience in a sample of this size. Another strength is the broad range of demographic, reproductive and maternal health data variables available in the Swedish Pregnancy Register, including detailed information on duration of labour and type of anaesthesia during CS, which has rarely been reported before.

We included clinics with a reporting rate of > 50% during the study period. Currently, asking about childbirth experience shortly after birth is part of standard care at all birth clinics in the country, but this was not the case at the beginning of the study period. Hence, some of the missing values on childbirth experience can be attributed to slow implementation of the procedure, and thus represent specific clinics during specific years. The majority of the clinics were well above the 50% limit, with lower reporting rates during the early inclusion years, increasing substantially with time. Included clinics represent small and large clinics from rural and urban areas. Despite 37% of women being excluded due to missing values on SRH and childbirth experience, only small differences were detected between included women and women with missing

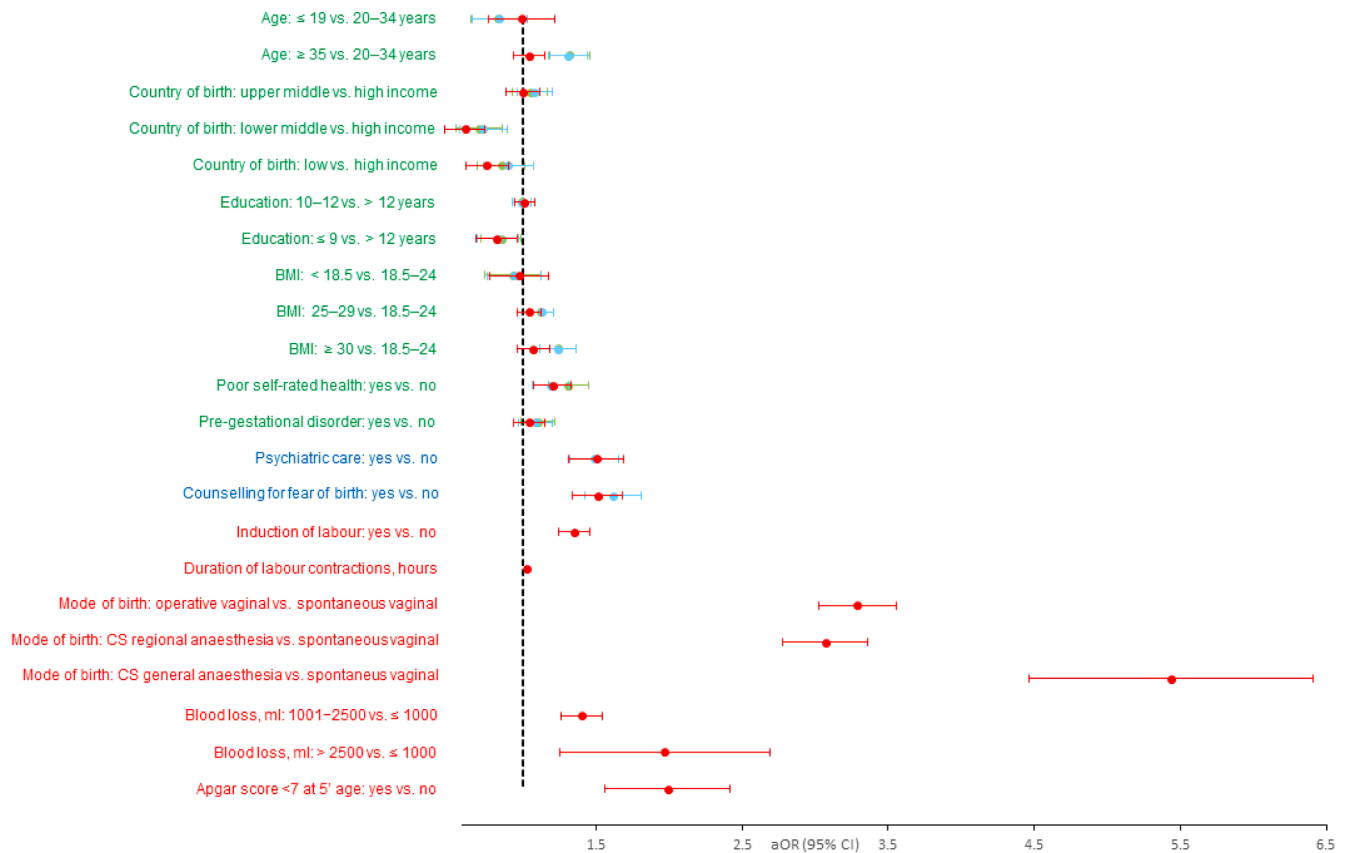


Fig. 2. Pre-gestational, pregnancy-related and childbirth-related factors associated with negative childbirth experience. Associations for respective time period are marked in green (before pregnancy), blue (pregnancy) and red (childbirth).

data on SRH and childbirth experience, which may strengthen generalisability. As the study focused only on the negative childbirth experience of primiparous women, results are not generalisable to multiparous women.

A broad range of variables, corresponding to measures from three time periods connected to pregnancy, were used in this study. All pre-gestational variables were collected retrospectively in gestational week 9–12. As most relate to characteristics unlikely to be affected by retrospective assessment (e.g., age, education, civil status, etc.), we believe this will not have influenced the results. However, there is a risk of recall bias concerning SRH prior to pregnancy, as the rating could be influenced by present health status. Nevertheless, the clinical value of SRH as a predictor for negative childbirth experience still remains. In addition, the variable *counselling for fear of childbirth* was retrospectively entered by the midwife at postnatal check-up at 8–16 weeks postpartum. However, whether women participated in a support programme or not should be less susceptible to recall bias than e.g. ratings of SRH prior to pregnancy. Counselling for fear of childbirth was in this study used as a proxy for fear of childbirth. This, however, does not correspond to the true prevalence of fear of childbirth, as women may decline counselling, or give birth before the counselling is provided, which must be noted.

The variables were explored as potential risk factors for negative childbirth experience by means of a hierarchical logistic regression. This method is useful for evaluating the contribution of predictors above and beyond previously entered predictors, as a means of statistical control. However, residual confounding should be considered. While containing a wide range of information, the Swedish Pregnancy Register does not provide information on several of the factors previously shown to play a substantial role for childbirth experience, e.g., expectations on childbirth, support from caregivers and involvement in decisions made during labour and birth. [27] The limited use of pregnancy-related factors in the hierarchical logistic regression model can also be questioned, but

the decision was made not to include pregnancy complications in the analyses to avoid multicollinearity. For example, pregnancy complications are a common reason for induction of labour.

In addition to the aforementioned uncertainty regarding the rating of overall childbirth experience, the timing must also be considered. There are clinical advantages of identifying negative childbirth experiences at an early stage, but there is a risk of ‘falsely high’ ratings when these are obtained during the immediate postpartum period at the hospital. Not only is there the possibility of social desirability, when a woman is asked about her experience by her caregivers shortly after giving birth, but the woman can also be affected by feelings of relief from having survived a traumatic labour and birth.[2] It has been suggested that a later assessment could better reflect the childbirth experience and its consequences, [2,7] but only one timepoint is currently available in the Swedish Pregnancy Register.

Conclusion

Although the main contributing factors to negative childbirth experience appear to be labour- and birth-related, poor SRH prior to pregnancy, psychiatric treatment during pregnancy and fear of childbirth also place the woman in a vulnerable position and require extra attention.

Funding

SH was supported by the Regional Research Council Mid Sweden [grant number RFR-848391] and by Thuring’s foundation [grant number 2019–00469]. Grants included external peer review for scientific validity. The funders had no involvement in planning, data collection, data analysis or writing the paper. The corresponding author had full access to all the data in the study and is responsible for the decision to

submit for publication.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.srhc.2022.100779>.

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