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Effect of the maternal childbirth experience on a subsequent birth: a retrospective 7-year cohort study of primiparas in Finland

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ABSTRACT

Objective To study the effect of the childbirth experience on the likelihood and interval to a subsequent live birth.

Design Retrospective analysis of a 7-year cohort.

Setting Childbirths in Helsinki University Hospital delivery units.

Participants All parturients giving birth to a term and living baby from a single pregnancy in Helsinki University Hospital delivery units from January 2012 to December 2018 (n=120 437). Parturients delivering their first child (n=45 947) were followed until the birth of a subsequent child or the end of 2018.

Main outcome measure The interval to a subsequent childbirth connected to the experience of the first childbirth was the primary outcome of the study.

Results A negative first childbirth experience decreases the likelihood of delivering a subsequent child during the follow-up (adjusted HR=0.81, 95% CI 0.76 to 0.86) compared with those experiencing the first childbirth as positive. For parturients with a positive childbirth experience, the median interval to a subsequent delivery was 3.90 years (3.84–3.97) compared with 5.29 years (4.86–5.97) after a negative childbirth experience.

Conclusion The negative childbirth experience influences reproductive decisions. Consequently, more focus should be placed on understanding and managing the antecedents of positive/negative childbirth experiences.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ A large-scale data and up to a 7-year follow-up enable to reveal the association between the maternal childbirth experience and subsequent births.
⇒ An extensive and non-selected data set covering one-third of births in Finland.
⇒ A simple 10-point Visual Analogue Scale to measure the childbirth experience does not cover the multidimensional and subjective experience of childbirth but offers a simplified means to assess the overall childbirth experience.

INTRODUCTION

Childbirth is a life-changing and transformative experience in a woman's life. While many describe childbirth positively despite the pain and discomfort during delivery, some parturients perceive the holistic childbirth experience as a negative or even traumatic event. Such an experience can have many adverse effects on the well-being of the mother, baby and the whole family.[1] For example, a traumatic or negative childbirth experience has been associated with an increased risk for post-traumatic stress disorder,[2–5] lower postpartum mental health,[6–8] difficulties in maternal–infant bonding,[9] and problems in a couple's relationship.[10 11]

While different outcomes of negative childbirth experiences have been extensively studied, little is known about how the childbirth experience influences subsequent reproductive behaviour. We found only two small Swedish studies exploring the association between the childbirth experience and future reproduction, with contradicting results.[12 13] In the first study, parturients were followed up from 8 to 12 years after their first childbirth, finding that women with a negative experience had fewer subsequent children.[12] However, in another study, no significant correlation between the subsequent delivery and previous childbirth experience was detected in a 5-year follow-up.[13]

With a 7-year follow-up of over 120 000 childbirths in 5 Helsinki University Hospital (HUS) delivery units in Finland, we evaluate if the initial childbirth experience impacts the likelihood of subsequent births during the follow-up or affects the interval between the first and second deliveries.

DATA AND METHODS

We collected data for this study from five HUS delivery units between January 2012 and December 2018. These units cover the one-third of all childbirths in Finland (14) and all childbirth in HUS area are taken place in any

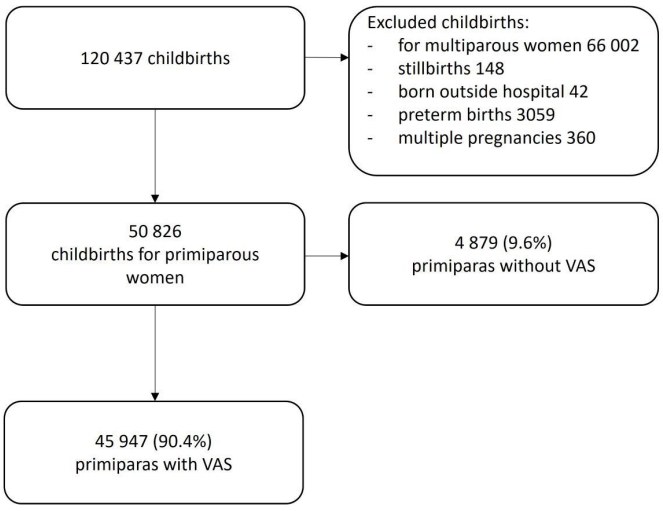

Figure 1 Inclusion criteria. VAS, Visual Analogue Scale.

of these units. Our study included 120 437 childbirths of 122 102 babies. We included the childbirths with a term and living baby from a single pregnancy born in a hospital. Since we focused on the association between the first childbirth experience and a subsequent childbirth, we excluded the childbirths of multiparous women and those lacking data on the childbirth experience (figure 1). The parturients were followed up to the end of 2018. The final data included 45 947 primiparous women, of whom 16 812 (36.6%) delivered their second child during the follow-up.

The childbirth experience was measured with a simple Visual Analogue Scale (VAS) from 1, indicating 'very negative childbirth', and 10, indicating 'very positive childbirth'. Midwives collected the VAS during the routine conversation about the delivery before discharge from the postpartum unit (usually less than 72 hours after delivery). The participants were encouraged to use a validated VAS ruler but could also give a verbal numeric answer. These VAS ratings were then rounded to whole numbers and recorded in the hospital database. The midwives in the post partum unit were guided to pursue as safe an atmosphere as possible during the conversation to permit the most reliable responses.

The childbirth experience was then combined with the Medical Birth Register (MBR) maintained by the Finnish Institute of Health and Welfare (THL) via the mother's identification number. MBR includes the data of mother, morbidity, pregnancy, delivery and the infant for up to 7 days. THL did the combination and data pseudonymisation.

The 10-point VAS scale was classified into two categories. VAS ratings from 1 to 5 indicated a negative experience; ratings from 6 to 10 indicated a neutral or positive childbirth experience. The VAS scale has been divided similarly into previous studies.[13 14]

The follow-up of parturients began on the date they delivered their first child. The parturients were followed up to the end of 2018 unless they delivered a subsequent child in any of the HUS delivery units before that.

The statistical analyses were conducted in two phases. First, Cox proportional hazard models were used to investigate the effect of the first childbirth experience on the interval to a subsequent child. Medians were calculated to differentiate the intervals by the first childbirth experience. Second, Cox proportional hazard models were used to account for several confounding factors that might associate with the negative childbirth experience and the likelihood of a subsequent birth. Accounted factors comprised the data about maternal age, body mass index (BMI) before pregnancy, mother's marital status, diagnosed fear of childbirth (FOC, treated during pregnancy with the International Classification of Diseases, 10th revision (ICD-10) code O998), fertility treatments (including any of in vitro fertilisation, oocyte maturation treatment or insemination), pre-eclampsia (ICD-10 codes O14–O15) and gestational diabetes (ICD-10 code O24.4). All confounding factors used were recorded during the first pregnancy and childbirth. Since the length of the follow-up for each participant differed due to the time of the first childbirth and the time of delivery has proven to impact the childbirth experience,[15] the year of the first childbirth was included in the model. The model adjusted these factors, and non-significant factors were excluded in the analysis backward stepwise ($p<0.1$). The model stability regarding these excluded factors was verified with an all-factor model (see online supplemental file 1). The proportional hazards assumption was tested using Schoenfeld residuals.

The data were analysed using R program V.4.2.1. Significant differences in the demographic and obstetric factors (table 1) according to the first childbirth were detected between negative and positive experiences using χ^2 tests.

Patient and public involvement

Due to the study design and use of register data, there was no patient or public involvement.

RESULTS

The childbirth experience assessment was collected from 90.4% of primiparous women giving birth in HUS delivery units from 2012 to 2018. Altogether, 90.5% of those (41 587) rated their experience as positive (VAS scale from 6 to 10), and 9.5% of primiparas (4360) rated theirs as negative (VAS from 1 to 5).

The average maternal age during the first childbirth was 29.5 (SD=5.14). Parturients with a negative childbirth experience were slightly older (mean=30.1, SD=5.14) compared with parturients with a positive childbirth experience (mean=29.4, SD=5.14) (t=8.10, df=5327.7, $p<0.001$). The marital status of parturients was divided between married or cohabitating with a partner and others including also 160 missing values. The diagnosed FOC was associated with a negative childbirth experience ($p<0.001$). Pre-eclampsia (diagnosed with ICD-10 codes O14–O15), gestational diabetes (ICD-10 code O24.4) and obesity were associated with a negative childbirth

Table 1 Background factors according to the first childbirth experience

	Total n=45 947 (%)	Negative VAS n=4360 (%)	Positive VAS n=41 587 (%)	Sig.
Maternal age during the first childbirth				
≤24	7974 (17.4)	643 (14.7)	7331 (17.6)	<0.001
25–32	25 279 (55.0)	2323 (53.3)	22 956 (55.2)	0.016
33–40	11 934 (26.0)	1311 (30.1)	10 623 (25.5)	<0.001
>40	760 (1.7)	83 (1.9)	677 (1.6)	0.170
Marital status				
Married, cohabitate	36 095 (78.6)	3352 (76.9)	32 743 (78.7)	0.005
Other	8377 (18.2)	848 (19.5)	7529 (18.1)	0.030
NA	1475 (3.2)	160 (3.7)	1315 (3.2)	0.071
Prepregnancy BMI				
<30	40 737 (88.7)	3772 (86.5)	36 965 (88.9)	<0.001
≥30	3950 (8.6)	462 (10.6)	3490 (8.4)	<0.001
NA	1258 (2.7)	126 (2.9)	1132 (2.7)	0.526
Fear of childbirth (O998)				
Yes	2875 (6.3)	365 (8.4)	2510 (6.0)	<0.001
No	43 072 (93.7)	3995 (91.6)	39 077 (94.0)	
Fertility treatments				
Yes	3867 (8.4)	391 (9.0)	3476 (8.4)	0.168
No	42 080 (91.6)	3969 (91.0)	38 111 (91.6)	
Pre-eclampsia (O14–O15)				
Yes	1040 (2.3)	148 (3.4)	892 (2.1)	<0.001
No	44 907 (97.7)	4212 (96.6)	40 695 (97.9)	
Gestational diabetes (O24.4)				
Yes	7080 (13.8)	734 (16.8)	5618 (13.5)	<0.001
No	43 757 (86.2)	3626 (83.2)	35 969 (86.5)	

BMI, body mass index; NA, not available; VAS, Visual Analogue Scale.

experience (p<0.001). Instead, IVF treatments (in vitro fertilisations, oocyte maturation treatment, inseminations) were unassociated (p=0.168) with a negative childbirth experience in the first delivery.

Altogether, 45 947 primiparas were identified, of which 16 812 (36%) had a subsequent child during the follow-up. The maximum follow-up time was up to 7 years; the average follow-up time was 2,7 years for positive and negative childbirth experience groups (p=0.34). Primiparas with a negative childbirth experience had a 21% lower likelihood of having a subsequent child (HR 0.79, 95% CI 0.74 to 0.83) than those with a positive childbirth experience.

Figure 2 depicts the cumulative proportion of having a subsequent child for the groups of negative and positive first childbirth experiences. The median interval between the first and second delivery is 3.90 (3.84–3.97) years for those with a positive first childbirth experience and 5.29 (4.86–5.97) for those with a negative first childbirth experience.

The Cox proportional hazard models were used to adjust the effect of several confounding factors to clarify the association between the first childbirth experience and the interval to a subsequent child. The model's construction dropped pregnancy-related in vitro fertilisation, pre-eclampsia and gestational diabetes as non-significant factors. Age at the first pregnancy was naturally associated with the likelihood of a subsequent child; proportions of higher age groups increased during the follow-up (p<0.001). Similarly, obesity before the first pregnancy was associated with lowering the likelihood of a subsequent child (HR=0.87, 95% CI 0.82 to 0.92); the proportion of obese women increased during the follow-up (8.0% in 2012 vs 10.6% in 2018, p<0.001). Consequently, an option of stratification procedure was executed to account for the time-varying effects of maternal age and prepregnancy BMI. The significant adverse impacts of being unmarried or not cohabitating with a partner, FOC and effect of the year during the first childbirth were adjusted in the analysis. The final model resulted in longer intervals and a decreased likelihood of a subsequent child during the follow-up for those with a negative first childbirth experience (HR=0.81, 95% CI 0.76 to 0.86) compared with those with a positive childbirth experience.

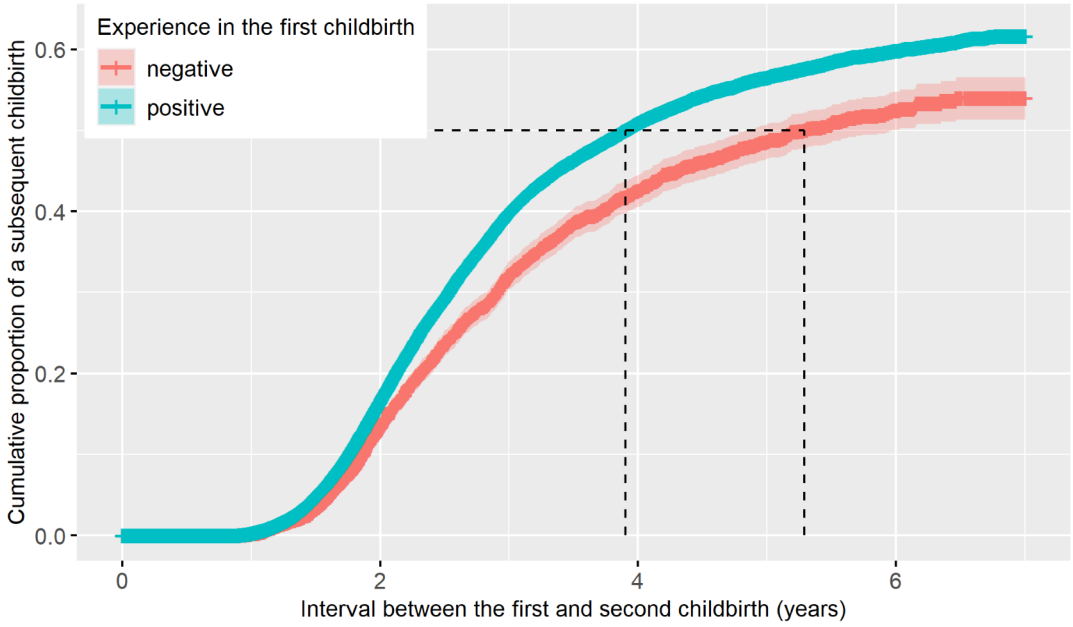

Figure 2 The cumulative likelihood (with 95% CIs) and medians for having a subsequent child during the follow-up based on the first childbirth experience.

DISCUSSION

We show that the childbirth experience in the first delivery is associated with the time of the subsequent delivery. The likelihood of another child during the follow-up decreased by 20% if the first childbirth experience was negatively perceived. The average interval between the first and second child was 1.4 years longer for those with a negative first childbirth experience. The childbirth experience clearly impacts the likelihood and interval of a second delivery when considering the complexity of reproductive-related decisions.

To our knowledge, there are no previous cohort studies using such large-scale data to study the effect of the maternal childbirth experience on subsequent births. Two small Swedish studies have explored the association between childbirth experience and reproduction, with slightly contradictory findings.[12 13] A study with 681 primiparas shows that a positive childbirth experience increased the likelihood of a subsequent child during the 8–10 years follow-up compared with a negative childbirth experience.[12] Thus, the results aligned with our findings, although they used a different scale to measure the childbirth experience. We classified VAS ≤5 as a negative experience, while they used a scale from 1 to 7, with 1 and 2 indicating a negative experience. This scale results in highly negative experiences in the negative childbirth experience group, while moderate experiences are classified as positive. In our study, corresponding inverse adjusted HR was slightly smaller, possibly due to the different definitions of what comprised a negative childbirth experience. The other Swedish study[13] did not show an association between the childbirth experience and subsequent births. However, this study used VAS to measure the childbirth experience, defining VAS ≤5 as a negative experience. The differences in findings could be due to only 355 women included in the follow-up study (compared with 16 812 women in our study), with VAS measured 9 months after delivery (compared with up to 72 hours in our study).

Several known risk factors have been associated with a negative childbirth experience include FOC,[16] lack of support from partner,[17] pregnancy-related morbidity and obesity[18 19] in previous research. We found that FOC was associated with a negative childbirth experience. A proxy of partner support—being married or cohabitating with a partner—was more common in a positive childbirth experience. Also, obesity and gestational diabetes were determinants of a negative childbirth experience. This negativity could be at least partially due to a fetus who is large for their gestational age, which is associated with a prolonged and complicated delivery.[20] Similarly, pre-eclampsia is associated with complications during pregnancy and delivery,[21] which could negatively affect the entire childbirth experience.

Our study's main strength is an extensive and non-selected data set covering one-third of births in Finland.[22] The length of the follow-up period is adequate for the study purpose because 60% of primiparas had a new child during the 7-year follow-up, approaching the overall percentage (67.6%) of women having a second child in Finland.[22] A mandatory and comprehensive MBR[23] gives accurate data on pregnancy and childbirth. Combining the MBR data with the hospital database of childbirth experience provides reliable data.

Our study also has limitations. We used a simple 10-point VAS to measure the childbirth experience, which does not cover the multidimensional and subjective experience of childbirth but offers a simplified means to assess

the overall childbirth experience. Furthermore, prior literature shows that VAS sufficiently measures the childbirth experience[14 24–27] and correlates with more detailed measures of the childbirth experience.[14 24 28] A lack of demographic and socioeconomic data in our study limited the possibility of studying the impact of these factors on subsequent childbirth, although microlevel indicators based on these discrepancies have been shown to influence on entire maternal care continuum.[29] An essential confounding factor we could not control in the analysis was whether unwanted pregnancy impacts the childbirth experience and, therefore, influences the likelihood of a second child, nor did we have data on induced or spontaneous abortions after the first childbirth. However, we may assume that prior childbirth experience does not affect the risk of spontaneous abortion. Also, induced abortion could be considered a method to avoid another childbirth, which the results account for. Involuntary infertility may affect the likelihood of a subsequent child. Thus, we considered fertility treatments before the first pregnancy—a factor that was revealed as insignificant.

We postulate that our results could be generalised at least to other Nordic countries, where the reproduction-related institutional and sociocultural settings are mainly similar to Finland's.[30 31] Our study was executed retrospectively using the childbirth experience in the first childbirth as a classification factor to model the interval to the subsequent delivery. For ethical reasons, this was the only study design to explore this association since the interventional study is impossible to execute. The impact of different interventions after a traumatic childbirth on the interval between the first and second child should be studied going forward. The results reveal the importance of FOC as an antecedent of negative childbirth experience as well as a factor on the likelihood of having a subsequent child. Therefore, the access to the effective treatment on FOC should be ensured for each parturient in need. Furthermore, the effects of demographic and socioeconomic factors and the previous family plans on the association between the childbirth experience and subsequent childbirth need further research.

Positive maternal childbirth experience is a major societal issue. The consequences of a negative childbirth experience can contribute to challenges that directly and indirectly affect resources of parents and, thus, might reflect their subsequent family plans. These microlevel decisions may cumulate into macrolevel consequences of population development. Thus, society should more widely pursue the importance of a positive maternal childbirth experience. Since this association does not guarantee causality, we cannot conclude that more resources for obstetric care would lead to a higher proportion of positive childbirth experiences and, therefore, to an increased number of childbirths. However, adapting the result to the whole population produces an interesting estimate. In Finland, 20 000 primiparas give birth yearly,[22] and almost 10% perceive their childbirth experience as negative, resulting in approximately 2000 mothers having a negative experience annually. According to our findings, this negativity contributes to a decline of 400 potential childbirths yearly in Finland, further underlining the importance of a positive childbirth experience.

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Contributors TM, SH, V-MU and MG did the study design and conducted the data collection. JMJ performed the statistical analysis and wrote the manuscript. TM, SH, MG, HS, HR and PT read and approved the manuscript. All authors approved the final manuscript. JMJ acts as guarantor of this article.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval The Institutional Review Board of the Helsinki University Hospital (HUS/483/2020) approved this study. Ethical approval was not required since the data were register based and pseudonymised before accession.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available. These data were granted for use only in this study. These data are not allowed to be reused or shared without separate permission.

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