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Do women's perceptions of their childbirth experiences change over time? A six-week follow-up study in a Danish population

Kristine Lyngbye[a,*], Dorte Melgaard[b,c], Victoria Lindblad[a], Kristian Hay Kragholm[d], Anya Eidhammer[a], Signe Westmark[b], Rikke Damkjær Maimburg[e,f]

[a] Department of Gynecology and Obstetrics, North Denmark Regional Hospital, Bispensgade 37, Hjoerring 9800, Denmark
[b] Centre of Clinical Research, North Denmark Regional Hospital, Bispensgade 37, Hjoerring 9800, Denmark
[c] Department of Clinical Medicine and Centre for Clinical Research, Aalborg University, Soendre Skovvej 15, Aalborg 9000, Denmark
[d] Unit of Clinical Biostatistics and Epidemiology - Department of Cardiology, Aalborg University Hospital, Hobrovej 18-22, Aalborg 9000, Denmark
[e] Department of Clinical Medicine, Department of Obstetrics and Gynecology, Palle Juul-Jensens Boulevard 103, Aarhus 8200, Denmark
[f] School of Nursing and Midwifery, Western Sydney University, Locked Bag 1797, Penrith NSW, Sydney 2751, Australia

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ABSTRACT

Objective: To evaluate how women's perception of the childbirth experience developed during the postpartum period. The secondary aim was to explore how selected birth interventions were subjectively perceived as part of the birth experience.
Design: A prospective cohort study comparing childbirth experience, assessed at one and six weeks postpartum, using the Childbirth Experience Questionnaire (CEQ).
Setting: A regional hospital in the northern part of Denmark, with 1,400 childbirths annually.
Participants: A total of 201 women with low-risk births who gave birth at North Denmark Regional Hospital were included in this study. We included both nulliparous and multiparous women.
Measurements and findings: More than 50% of the women changed their perceptions about their childbirth experience after six weeks. After six weeks the overall CEQ score and the domains 'Participation' and 'Professional support' had a lower CEQ score compared to scores obtained one week postpartum, although differences were small. Induction of labor, augmentation of labor, emergency caesarean section, epidural analgesia, and use of nitrous oxide were associated with a lower CEQ score.
Key conclusions: Women assessed their overall birth experience more negatively at six weeks postpartum compared to one week postpartum. Some interventions in the labor process influenced the women's assessment of their experiences negatively.
Implications for practice: Paying attention to preventive initiatives to ensure the women a spontaneous birth, if possible, may be essential to create positive perceptions of the childbirth experience.

Introduction

Childbirth is a landmark experience for both the woman and her partner, and it is a complex psychological event (Taheri et al., 2018; Ulfsdottir et al., 2014). Evidence has shown that the childbirth experience may influence emotions related to parenthood, maternal health, and the well-being of the family (Turkmen et al., 2018). It is estimated that 10-34% of all women experience a negative or traumatic childbirth (Taheri et al., 2018).

A negative childbirth experience is associated with an increased risk of postpartum depression, post-traumatic stress disorder (PTSD), challenged breastfeeding, poor attachment, and increased likelihood of caesarean section by maternal request in subsequent births (Maimburg et al., 2016; Turkmen et al., 2018). Further, a negative birth experience may impact future reproduction, as women with a negative birth experience may have fewer children and a longer time interval before a second baby (Gottvall and Waldenström, 2002). Conversely, a spontaneous birth, where the woman is well supported by a midwife, enabling her to have a feeling of control and strength, is associated with a positive and empowering childbirth experience (Dahlberg et al., 2016). Continuous one-on-one support from a midwife supports the psychological

* Corresponding author.
E-mail address: kristinelyj@icloud.com (K. Lyngbye).

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process of labor, as it optimises the function of the endogenous oxytocin, which plays an important role in the progression of labor, as well as in decreasing pain, stress, and fear (Olza et al., 2020). A positive childbirth experience is in line with the World Health Organization (WHO) recommendations that every parturient woman should receive respectful maternity care with continuous support during childbirth (World Health Organization, 2018).

Several factors are suggested to influence the childbirth experience. Interventions such as induction of labor (Maimburg et al., 2016; Schaal et al., 2019) and epidural analgesia (Lindholm and Hildingsson, 2015; Maimburg et al., 2016) are associated with a more negative childbirth experience. Further, instrumental vaginal birth (Hildingsson et al., 2013) or an emergency caesarean section (Maimburg et al., 2016) is also associated with a more negative experience of birth. For the mother, the ability to create immediate contact with the newborn seems essential, as separation of mother and child due to transfer to a neonatal intensive care unit (NICU) is associated with a more negative childbirth experience (Waldenström et al., 2004).

However, other factors seem to positively influence the childbirth experience. Giving birth together with a known midwife (Hildingsson et al., 2020) and feeling supported by empathic staff (Dahlberg et al., 2016; Karlström et al., 2015) are associated with a positive childbirth experience. Women feeling prepared for potential complications during birth also seems to affect the birth experience positively (Maimburg et al., 2016, 2010; Taheri et al., 2018).

Former studies have been inconclusive regarding birth pain and the influence of pain relief on the birth experience. Some studies report a more negative overall birth experience when using epidural analgesia (Jepsen and Keller, 2014; Kannan et al., 2001; Lindholm and Hildingsson, 2015), another study reported that severe pain and lack of control are associated with a negative birth experience (Waldenström et al., 2004).

Overall, women seem to create more positive memories from a spontaneous birth with a minimum of obstetrical interventions (Maimburg et al., 2016; Taheri et al., 2018). In a Danish five-year follow-up study, the authors suggested that women with spontaneous vaginal births are more likely to report a positive childbirth experience, and their childbirth experiences are more static at follow-up compared to women where the birth has been complicated by obstetrical interventions (Maimburg et al., 2016). A spontaneous birth with fewer obstetrical interventions may be challenging in a Danish context, as evidence indicates that childbirth is increasingly managed, monitored, and terminated by interventions such as induction of labor. A Danish follow-up study found induction of labor increased from 5.1% to 22.8% between 2000/2001 and 2016/2017 (Rydahl et al., 2021). More women experience interventions during childbirth and it is thus important to monitor women's perceptions of childbirth.

Evaluating the childbirth experience may be challenging as existing studies use very different measurements to follow the perceptions of the birth experience over time (Taheri et al., 2018; Waldenström, 2004). Former studies have suggested that measuring the woman's childbirth experience too soon after the birth will reflect a more positive experience, due to the immediate sense of happiness from giving birth to a healthy child. Giving the woman time to reflect will possibly influence her perception of the birth experience, consolidate it, and thereby provide a more valid measure (Maimburg et al., 2016; Waldenström, 2004). On the other hand, to reach out in time after a birth experience perceived as negative may be essential, to help the woman to process the experience (van Steijn et al., 2020).

A former study using the validated Childbirth Experience Questionnaire (CEQ) reported decreased satisfaction with the professional support by the midwife as well as the women's possibility to participate during the three-month follow-up period (Turkmen et al., 2018). This study included a study population of only 78 women, which was considered a weakness by the authors themselves (Turkmen et al., 2018).

There is thus a need to further explore the childbirth experience using a validated tool, including how the perception of the experience develops over time and its impact on different obstetrical interventions in a larger population sample. The primary aim of this study was to examine how perceptions of the childbirth experience developed during the postpartum period and, secondarily to explore the birth characteristics related to the childbirth experience.

Methods

The present study was designed as a six-week follow-up study at the Department of Gynecology and Obstetrics, North Denmark Regional Hospital.

Setting

Recruitment and data collection took place between September 2020 and April 2021 in the Department of Gynecology and Obstetrics, North Denmark Regional Hospital. The unit has approximately 15,00 annually, providing care for women giving birth after 32 weeks of gestation (except for women with insulin-dependent diabetes mellitus). The maternity ward is organised with midwives working in conventional obstetric care in different shifts. One-third of the midwives work in a continuity of care midwifery model with several days on-call followed by days off.

The midwifery staff is autonomous and responsible for all uncomplicated childbirths, including a singleton child in a vertex position from gestational age 37+0 to 41+6 with spontaneous labor onset, normal progression in all stages of labor, spontaneous placenta expulsion, and postpartum haemorrhage below 500 mL (Burmester, 2007). In case of any deviation, the midwives are responsible for advertising an obstetrician. Likewise, if complications arise concerning the newborn, the midwives need to advertise a paediatrician.

Participants

All women living in the hospital's catchment areas are offered a choice to give birth at North Denmark Regional Hospital or at home. The catchment area includes a population of approximately 200,000 inhabitants, and the maximum travel distance to the hospital of 61 km. The women are mainly Caucasian, but a minority is of non-western origin.

All women giving birth during the study period were invited to participate according to the following criteria:

Inclusion criteria:

- Giving birth to a singleton liveborn child from gestational age 37+0 to 41+6

Exclusion criteria:

- Women with no or little ability to read and understand Danish
- Homebirth
- Elective planned caesarean section
- Twin birth
- Stillbirth

Eligible women were recruited by a midwife at the outpatient clinic during a postnatal visit two or three days after giving birth. The women received oral and written information about the study and filled in a statement of consent, giving the study group permission to contact them by phone during the study period and using the birth data for analysis. During the first postpartum week,

Table 1
Characteristics of the study population, birth interventions and outcomes.

Characteristics	Total (n=237)	Nullipara (n=107)	Multipara (n=130)	P-value
Gestational age (weeks)	39.8 (1.2)	39.9 (1.3)	39.8 (1.1)	0.73
Age (years)	29.5 (4.3)	27.5 (4.0)	31.1 (3.9)	<0.001
BMI (kg/m^2)				
<18.5	7 (3.0)	3 (2.8)	4 (3.1)	
18.5-24.9	117 (49.4)	56 (52.3)	61 (46.9)	
25-29.9	57 (24.1)	20 (18.7)	37 (28.5)	
30-34.9	23 (9.7)	11 (10.3)	12 (9.2)	
>35	33 (13.9)	17 (15.9)	16 (12.3)	0.51[1]
Educational level				
No education	28 (13.9)	18 (19.0)	10 (9.4)	
Skilled (3-4 years after primary school)	35 (17.4) 31 (15.4)	15 (15.8) 12 (12.6)	20 (18.9) 19 (17.9)	
Further (1 -2 years after high school)	92 (45.8) 15 (7.5)	44 (46.3) 6 (6.3)	48 (45.2) 9 (8.5)	0.31[1]
Bachelor's degree				
Master's degree				
VBAC	20 (8.4)	0 (0)	20 (15.4)	<0.001[1]
Birth interventions and outcomes				
Known midwife	48 (20.3)	20 (18.7)	28 (21.5)	0.59[1]
Induction of labor	67 (28.3)	32 (29.9)	35 (26.9)	0.61[1]
Epidural analgesia	64 (27.0)	43 (40.2)	21 (16.2)	<0.001[1]
Nitrous oxide	108 (45.6)	58 (54.2)	50 (38.5)	0.02[1]
Augmentation of labor	56 (23.6)	40 (37.4)	16 (12.3)	<0.001[1]
Non-reassuring foetal heart rate	47 (19.8)	30 (28.0)	17 (13.1)	0.004[1]
Instrumental vaginal birth	15 (6.3)	13 (12.2)	2 (1.5)	0.001[1]
Emergency caesarean section	20 (8.4)	11 (10.3)	9 (6.9)	0.36[1]
Spontaneous birth[2]	88 (37.1)	29 (27.1)	59 (45.4)	0.004[1]
Postpartum haemorrhage (mL)				
<500	195 (84.05)	80 (76.9)	115 (89.8)	
500-1000	24 (10.3)	15 (14.4)	9 (7.0)	
>1000	13 (5.6)	9 (8.7)	4 (3.1)	0.03[1]
Birth weight (grams)	3652 (507.5)	3576 (508.2)	3715 (500.2)	0.04
Hours of admission in labor ward (hours)[#]	9.62 (8.9)	10.75 (10.9)	4.8 (4.8)	<0,001[#]
Newborn transferred to NICU[*]	9 (3.8)	2 (22.2)	7 (77.8)	0.16[1]

[*] Data is presented as numbers (%) or mean (SD).
[1] Chi-square-test.
[2] Vaginal birth without interventions.
[#] Interquartile range (median) and rank-sum test.

the women received the first questionnaire by security mail, using the database Research Electronic Data Capture (REDCap) hosted at The North Denmark Region (Harris et al., 2009, 2019). The same questionnaire was sent to the women six weeks postpartum. Non-responders received a reminder by e-mail. If a woman withdrew during the study period, all data were excluded from the analysis.

Data collection

The Danish version of the CEQ was used to evaluate and compare the women's subjective childbirth experiences at one and six weeks after birth. The CEQ was developed in Sweden in 2010 and is currently the most comprehensive tool for assessing childbirth experiences and perceptions among nulliparous women (Boie et al., 2020; Taheri et al., 2018).

The Danish version of the CEQ, validated in a Danish context in 2020, contains 22 statements assessing three domains of the childbirth experience: Own capacity, Participation, and Professional support. The domain 'Own capacity' includes questions regarding the woman's experienced emotions during birth, her feeling of safety and sense of control. 'Participation' reflects the woman's opportunity to influence the birth and 'Professional support' reflects the woman's satisfaction with the attending midwife and other staff (Boie et al., 2020).

In 19 of the 22 items a 4-point Likert scale is used ranging from 1 (Totally disagree), 2 (Mostly disagree), 3 (Mostly agree), and 4 (Totally agree); higher scores reflect more positive birth experiences. Three items – the woman's memories of the labor pain, her sense of control, and her sense of security – are rated on a 0–100 modified visual analogue scale (VAS). The modified VAS is categorised as 0–40 = 1; 41–60 = 2; 61–80 = 3; and 81–100 = 4.

The CEQ was supplemented with the following yes/no questions: 'During your pregnancy, did you have a known midwife?' and 'Did the same midwife attend your birth?'.

Characteristics and birth outcomes

Detailed information regarding obstetrical interventions and baseline characteristics was extracted from the women's electronic medical records. It was documented whether a woman experienced: Induction of labor, augmentation of labor, epidural analgesia, use of nitrous oxide, instrumental vaginal birth, or emergency caesarean section. Further, it was documented if the woman gave birth spontaneously and without interventions, if the foetal heart rate was non-reassuring, or if the woman experienced postpartum haemorrhage above 500 mL.

Statistical analysis

A descriptive analysis of maternal baseline characteristics, including socioeconomic status and birth outcomes, is presented in Table 1. This descriptive analysis was stratified by parity.

Continuous variables were analysed using a two-sample t-test if a normal distribution occurred, otherwise a Wilcoxon Rank test was be used. A Chi-square test was used when analysing categorical variables.

The mean CEQ score at one and six weeks postpartum was used to calculate the mean difference in the overall score and the domain-specific scores. The mean CEQ scores between baseline and follow-up were presented as mean and standard deviation (SD). To estimate a possible difference in birth experience between one and six weeks a paired t-test was used. Finally, an explorative multiple

Table 2
The overall Chilbirth Experience and the subscale scores.

N=201	1 week CEQ score Mean (SD)	6 weeks CEQ score Mean (SD)	Difference (95% CI)	P-value
Overall CEQ-score	3.35 (0.43)	3.32 (0.44)	0.03 (0.007;0.06)	0.01
Own capacity	3.09 (0.57)	3.09 (0.59)	0.005 (-0.03;0.04)	0.78
Participation	3.43 (0.67)	3.35 (0.70)	0.08 (0.006;0.15)	0.03
Professional support	3.86 (0.31)	3.78 (0.35)	0.08 (0.04;0.11)	<0.001

Table 3
Multiple regression model. Interventions and birth outcomes associated with the childbirth experience.

Birth outcomes N=201	Yes N (%)	No N (%)	Mean CEQ difference (95% CI)	P-value	Mean CEQ difference *adj (95% CI)	P-value
Known midwife	45 (22.4)	156 (77.6)	0.20 (0.05;0.34)	0.009	0.18 (0.04;0.33)	0.01
Induction of labor	54 (26.7)	148 (73.3)	-0.19 (-0.05;-0.33)	0.006	-0.19 (-0.05;-0.33)	0.006
Epidural analgesia	54 (26.7)	148 (72.3)	-0.24 (-0.10;-0.37)	0.001	-0.20 (-0.06;-0.34)	0.005
Nitrogen oxide	95 (47.0)	107 (53.0)	-0.27 (-0.15;-0.39)	<0.001	-0.26 (-0.14;-0.37)	<0.001
Augmentation of labor	51 (25.2)	151 (74.8)	-0.26 (-0,13;-0.40)	<0.001	-0.23 (-0.08;-0.37)	0.002
Non reassuring foetal heart rate	37 (18.3)	165 (81.6)	-0.19 (-0.03;-0.35)	0.02	-0.15 (-0.31;0.005)	0.06
Instrumental vaginal birth	11 (5.5)	191 (95.5)	-0.09 (-0.37;0.17)	0.47	-0.04 (-0.31;0.23)	0.78
Emergency caesarean section	16 (7.9)	186 (92.1)	-0.49 (-0.27;-0.71)	<0.001	-0.47 (-0.25;-0.69)	<0.001
Spontaneous birth[1]	78 (38.6)	124 (61.4)	0.18 (0.06;0.31)	0.005	0.15 (0.03;0.28)	0.02
Postpartum haemorrhage >500 mL	32 (16.2)	166 (83.8)	-0.06 (-0.23;0.11)	0.50	-0.03 (-0.20;0.14)	0.75

* Adjusted for parity and age (years).
[1] Vaginal birth without interventions.

linear regression model was used to assess the association between CEQ scores at six weeks postpartum and birth outcomes. The dependent variable was the CEQ score and the independent variables were birth interventions and outcomes. Parity and age were included as covariates to adjust for potential confounding. These potential confounding variables were identified based on existing literature.

Estimates in the multiple regression model were presented as mean differences in the CEQ score with 95% confidence intervals. A p-value <0.05 was accepted as statistically significant. Data management and the described analysis were performed using STATA statistical software, version 17.0 (StataCorp, College Station, TX, USA).

If a woman was lost to follow-up between one and six weeks after birth, her sociodemographic data, birth interventions, and outcomes were included in Table 1, but not in the CEQ scores (Table 2) or the multiple regression model (Table 3). Further, a failure to follow-up analysis was made to compare birth characteristics and CEQ scores of women who were lost to follow-up and the women who completed both questionnaires.

The sample size of this study was determined by the number of women responding to the questionnaire during the study period.

Ethics

Danish legislation does not require ethical approval if the research does not pose a risk to the participants' health or constitute a burden for the participants (The Danish Ministry of Health, 2020). However, because of the more rigorous approach to ethical approval in other countries, we asked the regional ethics committee for permission to conduct the research. The regional ethics committee of Northern Denmark waived the need for approval. The study was further registered at the Danish Data Protection Authority (2020-113).

We followed the Declaration of Helsinki and written informed consent was obtained from all participants. The collected data were anonymized.

Findings

Of a total of 673 women who gave birth during the study period, 314 women consented to participate in the study. A total of 69 did not meet the inclusion criteria, and 290 eligible women declined participation. A total of 237 women responded to the first questionnaire; these women are included in Table 1. Between one and six weeks postpartum, 35 women (15%) were lost to follow-up, and one had missing data. Thus, a total of 201 (85%) women were followed-up from one to six weeks postpartum.

Table 1 presents the sociodemographic characteristics and birth outcomes are presented and shows the distribution between nulliparous and multiparous women. Some characteristics were similar between the two groups, but nulliparous women were significantly younger than multiparous women. Further, some birth outcomes were similar between the two groups, but nulliparous women were more likely to use epidural analgesia and nitrous oxide as pain relief. More nulliparous women had an instrumental vaginal birth, augmentation of labor, non-reassuring foetal heart rate, or a postpartum haemorrhage above 500 mL. Further, nulliparous women had a longer duration of birth, measured by the time from admission to the time of birth. Multiparous women were more likely to have a spontaneous birth and a newborn with a significantly higher birth weight compared to nulliparous women.

As seen in Table 2, the mean CEQ scores at one and six weeks postpartum were all above three, reflecting a general satisfaction with the childbirth experience. At six weeks postpartum, the overall CEQ scores and the domains 'Participation' and 'Professional support' were all lower, reflecting a change in the women's sense of their childbirth experiences during follow-up. The domain 'Own capacity' showed no change between one week and follow-up (Table 2). Overall, 52% of the included women reported a lower total CEQ score at follow-up.

Obstetrical interventions and the selected birth outcomes were associated with a lower CEQ score six weeks postpartum (Table 3). In contrast, giving birth with a known midwife and spontaneous birth without interventions were associated with a higher CEQ score. A total of 45.6% of the women used nitrous oxide, which was associated with a lower CEQ score (p= <0.001). Using epidural analgesia during birth was also associated with a lower CEQ score (p=0.005).

Interventions in the labor process, such as induction of labor, augmentation of labor, and emergency caesarean section, were all associated with a lower CEQ score six weeks postpar-

tum. A non-reassuring foetal heart rate was not associated with a lower CEQ score (p=0.060), and neither were instrumental vaginal birth (p=0.780) and a postpartum haemorrhage above 500 mL (p=0.750).

Discussion

This prospective cohort study compared childbirth experience, assessed at one week postpartum and six weeks postpartum using the CEQ. A total of 201 women with low-risk births giving birth at North Denmark Regional Hospital were included.

The overall CEQ score and the domains 'Participation' and 'Professional support' decreased six weeks after birth compared to one week; the domain 'Own capacity' remained the same.

In a previous study by Turkmen et al., the subscales 'Participation' and 'Professional support' likewise decreased three months after birth (Turkmen et al., 2018). The overall CEQ score in the Turkmen et al. study was stable. However, in this present study we identified a decrease in the overall CEQ score, probably due to a larger study population. The identified difference in the overall CEQ score in this study was small, and the women produced high CEQ scores in general, but a reduction only six weeks postpartum may be clinically relevant in terms of the woman's future assessment of the childbirth experience. Further, the decrease was mainly seen in the clinically important domains 'Participation' and 'Professional support', as they describe the interaction between the woman and the healthcare professionals. The small decrease in the overall CEQ score may indicate that the subjective assessments of the childbirth experience develop negatively during the postpartum period. Studies have suggested that measuring the childbirth experience shortly after birth may be biased due to an immediate sense of happiness induced by giving birth to a healthy child (Maimburg et al., 2016; Waldenström, 2003, 2004). The follow-up periods in the mentioned studies were longer than the six weeks in our study, and were one and five years, respectively. In this current study, a large proportion of the women had already changed their first perceptions of their birth experience within the first six weeks, suggesting that these perceptions may change in both the early postpartum period as well as long-term (Fig. 1).

The women's satisfaction regarding their ability to influence the labor process by movement and birthing position decreased over the first six weeks, measured by the domain 'Participation'. This domain showed a greater reduction in the CEQ score than the overall score. The CEQ score in the 'Participation' domain reflects satisfaction with the birth experience, thus it is important that the midwife pays attention to a woman's wishes for her childbirth, as this may strengthen her feeling of self-determination and affect her confidence.

The women's satisfaction with professional support decreased during the first six weeks, and this domain also showed a greater reduction in the CEQ score than the overall score. Former studies suggest that support and guidance from a midwife during childbirth may be essential for women to cope and create positive birth experiences (Dahlberg et al., 2016; Karlström et al., 2015; Taheri et al., 2018). As six weeks postpartum is still an early time for assessment, the satisfaction regarding professional support may decrease even further. This may underline the importance of a postpartum conversation with the attending midwife. This conversation should be woman-centered, in collaboration with the family, and aim to prevent future childbirth anxiety (Gamble et al., 2005). However, the CEQ scores in the domain 'Professional support' reflected satisfaction with the support.

The women's own capacity was the only subscale with no change during follow-up. The domain 'Own capacity' reflects memories and feelings regarding the woman's coping and handling of the labor process and labor pain, and thus her self-efficacy (Boie et al., 2020). The fact that this score did not change may have several explanations. The women's feelings of their accomplishment, thereby their self-efficacy, may be more static and harder to affect. Another suggestion is that the follow-up period in this present study was too short to measure a change. The CEQ score in the domain 'Own capacity' at one and six weeks postpartum showed the lowest score. This may reflect, that the women's expectations regarding the birth process did not match the reality, and the women found the birth process more challenging than expected. Antenatal training sessions may help women to feel prepared for childbirth (Maimburg et al., 2010). A former study suggested that women participating in an antenatal training session programme are more likely to arrive at the labor ward in active labor and have less use of epidural analgesia (Maimburg et al., 2010). This may indicate that better preparation and coping may impact the woman's 'Own capacity'. Overall, the findings from the CEQ scores may suggest that women form their memories and feelings regarding their birth experiences based on the care given and their participation in the birth.

Women's birth experience six weeks postpartum was influenced by interventions in the labor process as well by selected birth outcomes. We selected birth outcomes for analysis which have previously been shown to affect the childbirth experience. It was, however, not possible to include waterbirths, even though evidence has shown that waterbirths can positively affect the woman's own capacity (Ulfsdottir et al., 2019).

The use of epidural analgesia was, in this study, associated with a less positive childbirth experience. This is in line with former studies and may be due to various factors such as women feeling disappointed about their decisions to have epidural analgesia (Jepsen and Keller, 2014; Kannan et al., 2001; Lindholm and Hildingsson, 2015; Maimburg et al., 2016). A former Danish study suggested that the partnership and cooperation between the parturient woman and the midwife may be challenged if the woman has epidural analgesia (Jepsen and Keller, 2014). It is, however, possible that women with a complicated birth may feel the need for epidural analgesia, and the lower satisfaction could thus reflect the birth process and not only the use of epidural analgesia.

In this study, 45.6% of the women used nitrous oxide as pain relief during birth, which was associated with a lower CEQ score. In a Swedish study, nitrous oxide was the most preferred pain relief in a population of 936 women (Lindholm and Hildingsson, 2015). No former Danish studies have examined the association between use of nitrous oxide and the CEQ scores. In some cases, the lower satisfaction may have resulted from the sedative effect of pain relief resulting in blurred memories of the childbirth; this hypothesis should be further examined.

Induction of labor and augmentation of labor were associated with a lower CEQ score, which is in line with previous studies (Bergqvist et al., 2012; Maimburg et al., 2016; Rijnders et al., 2008; Schaal et al., 2019). As more women experience induced and augmented labor due to slow labor progress (Rydahl et al., 2021; Schaal et al., 2019), paying attention to better diagnostics of labor progress, information, and shared decision-making may be essential to create positive birth experiences.

In this study, the women's childbirth experiences were not affected by a non-reassuring foetal heart rate. This is contradictory to former evidence showing that worries about the newborn's life are associated with a negative experience of birth (Rijnders et al., 2008; Waldenström et al., 2004). However, changes in the foetal heart rate may be a normal reaction during labor, and this may not cause concern for the attending midwife or obstetrician and thereby not affect the mother.

Giving birth with a known midwife was, in this study, associated with a higher CEQ score, which is in line with a study by Hildingsson et al. showing that women participating in a study of con-

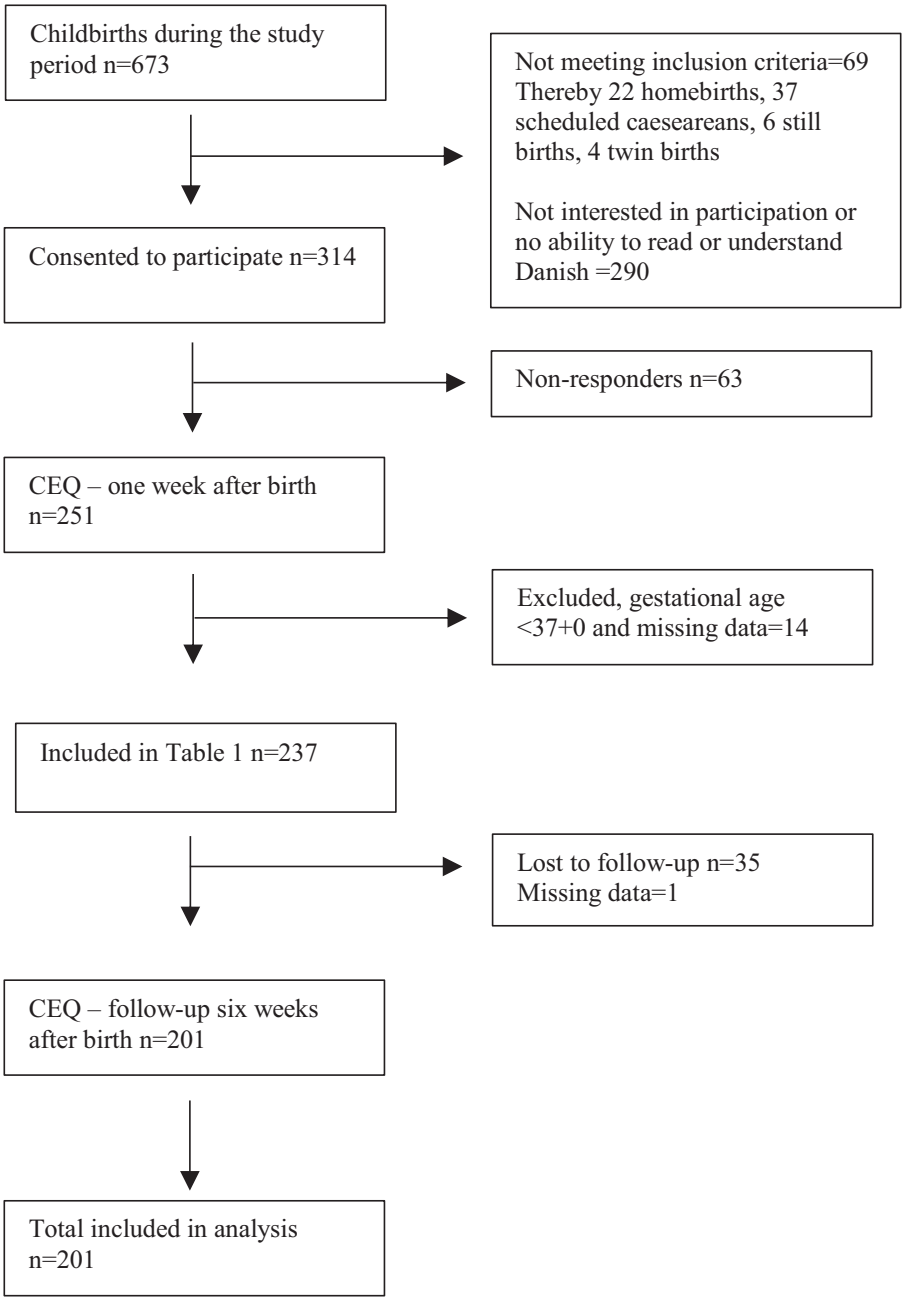

Fig. 1. Flowchart of participation.

tinuity of midwifery were more likely to have an overall positive birth experience (Hildingsson et al., 2020). This finding may underline the importance of supporting the implementation of continuity of midwifery care (Hildingsson et al., 2020).

Women with a spontaneous birth without interventions produced higher CEQ scores, which may reflect that these women experience a higher degree of coping and empowerment. This association is in line with a study by Maimburg et al. suggesting that women with a negative birth experience were less likely to have a spontaneous vaginal birth, and even after five years this association still existed (Maimburg et al., 2016; Taheri et al., 2018).

No confounding effect of the women's age or parity was found. This may suggest that differences in the childbirth experience are influenced by several other factors. Midwifery care and involvement in the birth process are universal needs for every parturient woman. However, as more multiparous women generally have more spontaneous births, however, multiparous women are still following the same protocol as nulliparous women regarding birth interventions making the difference between the women less apparent.

Strengths and limitations

The measurement of women's childbirth experiences was conducted using the CEQ. This tool was originally developed for assessing birth experience in nulliparous women (Boie et al., 2020). In this study, we also included multiparous women as well, in line with former studies (Maimburg et al., 2010; Schaal et al., 2019) to ensure a more general study population. The assessment of patient satisfaction is difficult, because there is no gold standard (Turkmen et al., 2018). The CEQ tool proved to be a useful method to predict women's satisfaction regarding their birth experience

and how it changed over time. The six-week follow-up is, however, still an early assessment, and it is unknown how the experience of this population will develop long-term.

A total of 35 women were lost to follow-up between one and six weeks postpartum and one had missing data. A failure to follow-up analysis found no difference in baseline characteristics or CEQ scores at one week and birth outcomes (data not shown). This may strengthen the internal validity of the results.

It is, however, unclear if the women who consented to participate but never responded to the one-week assessment had other characteristics and birth experiences than the study population. This may have caused some degree of selection bias. Approximately half of the eligible women declined to participate in this study. An analysis of the characteristics of these women from the annual number of births in the department showed no differences regarding parity, age, gestational age, or maternal BMI compared to the study population. Thus, the sample of 201 women seems representative to the general population (data not shown).

The one-week assessment of the professional support may show a ceiling effect as the score was skewed and the women frequently reported the maximum score. This was also the case in the Turkmen et al. study (Turkmen et al., 2018). As this is an observational study examining women's general perceptions regarding interventions and outcomes during birth, the number of women participating was considered sufficient. The size of the study population allowed for a stratified analysis of the birth experience into different domains. However, the sample size was too small to stratify on parity, which may be relevant in future studies with larger sample sizes. As this study did not include non-Danish-speaking women, the results may not be valid to non-Danish-speaking women and further studies are needed to explore this.

Conclusions

In this study, the childbirth experience was scored more negatively by more than half of the women six weeks postpartum compared to one week after birth. The childbirth experience was negatively associated with medical interventions, such as induction of labor, augmentation of labor, and emergency caesarean section. Pain relief such as epidural analgesia and use of nitrous oxide, was also associated with a more negative birth experience. Giving birth with a known midwife and having a spontaneous vaginal birth were associated with a positive childbirth experience. These findings indicate that paying attention to preventive initiatives to ensure the women a spontaneous birth, if possible, may be essential to create positive perceptions of the childbirth experience, as well as prioritizing continuity of midwifery care.

Author Agreement

This manuscript is the author's original work. The manuscript has not received prior publication and is not under consideration for publication elsewhere. All authors have seen and approved the manuscript being submitted and all authors has significantly contributed to this manuscript. The authors abide by the copyright terms and conditions of Elsevier.

Ethical Approval

This project is part of a quality improvement project. The Regional Ethical Committee of Northern Denmark waived the need for approval (2020-000922-80). The study was approved by the Danish Data Protection Authority (2020-113). We followed the Declaration of Helsinki and written informed consent was obtained from all participants. The collected data were anonymized.

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Declaration of Competing Interest

The authors have none to declare.

CRediT authorship contribution statement

Kristine Lyngbye: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration. **Dorte Melgaard:** Conceptualization, Methodology, Writing – review & editing, Visualization, Supervision, Project administration. **Victoria Lindblad:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Project administration. **Kristian Hay Kragholm:** Formal analysis, Visualization, Project administration. **Anya Eidhammer:** Conceptualization, Methodology, Project administration. **Signe Westmark:** Data curation, Project administration. **Rikke Damkjær Maimburg:** Writing – review & editing, Visualization, Supervision.

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