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ORIGINAL ARTICLE

Intrapartum pudendal nerve block analgesia and childbirth experience in primiparous women with vaginal birth: A cohort study

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Abstract

Background: A negative childbirth experience has short- and long-term consequences for both mother and child. This study aimed to investigate the association between intrapartum pudendal nerve block (PNB) analgesia and childbirth experience.

Methods: Primiparous women with a singleton cephalic vaginal live births at term at Oslo University Hospital from January 1, 2017, to June 1, 2019, were eligible for inclusion. The main outcome was total score on a childbirth experience questionnaire (range 1.0–4.0, higher score indicates better childbirth experience). An absolute risk difference of 0.10 was considered clinically relevant. Propensity score matching was used to adjust for differences in baseline characteristics between women with and without PNB. The analyses were stratified by spontaneous vs instrumental birth. Subanalyses of the questionnaire's domains (own capacity, professional support, perceived safety, and participation) were performed.

Results: Of 979 participating women, mean age was 32 years. Childbirth experience did not differ between women with and without PNB, either in spontaneous (absolute risk difference of the mean: −0.05, *P* value 0.36) or in instrumental birth (absolute risk difference of the mean: 0.03, *P* value 0.61). There were no statistically significant differences between PNB group scores for the separate domains.

Conclusions: Women's childbirth experiences did not differ between birthing people with or without PNB, either in spontaneous or in instrumental births. The clinical implications of our study should be interpreted in light of the pain-relieving effects of PNB.PNB should be provided on clinical indication, including for individuals with severe labor pain.

KEYWORDS

birth, childbirth experience, obstetric, pudendal block, pudendal nerve block

1 | INTRODUCTION

Pudendal nerve block (PNB) provides pain relief during the second stage of labor and for perineal or vaginal suturing after birth. PNB ensures analgesia to the vulva and anus[1–3] by infiltration in close proximity to the pudendal nerve. During the first stage of birth (3 to 10 cm cervical dilatation), however, the most efficient pain relief is epidural analgesia. PNB is most relevant during the second stage of birth (10 cm to birth), during the final descent of the fetal head and expulsion of the neonate. PNB may be provided in both spontaneous and instrumental (vacuum and/or forceps extraction) vaginal births. Known adverse effects of PNB include a slight transient decline in uterine activity[3] and a reduction in the bearing down reflex,[4] especially when epinephrine is added. Case studies of PNB have described local hematoma[5] and abscess development,[6] as well as interference with the newborn's breast-seeking behavior after birth.[7] We have recently shown that PNB has no significant adverse urine voiding effects after vaginal birth.[8]

Childbirth experiences may have short- and long-term consequences for mother and child. A negative childbirth experience is known to contribute to poorer mental health outcome, including posttraumatic stress disorder and postpartum depression.[9–11] A negative experience is also associated with a decreased likelihood of having more children, longer intervals between pregnancies,[12,13] and a demand for cesarean in subsequent pregnancies.[14,15] In addition, strong labor pain may contribute to women developing posttraumatic stress disorder.[16] Conversely, a positive experience may contribute to a sense of empowerment, an increase in women's self-esteem,[17] and may have a positive impact on breastfeeding.[18] In recent years, childbirth experience has been addressed as an important maternal outcome after childbirth,[19] and is considered an indicator of quality of care.[20]

Evaluation of childbirth experience is complex, and a variety of factors may influence a woman's experience. The most prominent obstetric risk factors include operative birth (in particular, emergency cesarean and instrumental vaginal birth), prolonged labor, oxytocin augmentation, induction of labor, pain, absence of pain relief, and primiparity.[21–24] Lack of support from partner or caregivers during labor and perceived lack of control (by the delivering woman) represent additional risk factors.[25] Protective factors against a negative experience are perceived maternal control during labor and maternal satisfaction with respect to support from health care professionals and partner[23] as well as the provision of pain relief and a low pain intensity.[24,26] However, previous research with respect to the importance of pain relief on childbirth experience is conflicting. The effect of pain relief during childbirth is challenging to review because of different outcome measures and analytical approaches in individual studies.[27]

Ideally, a randomized controlled trial (RCT) design should be used to evaluate the childbirth experiences of women with vs without PNB. However, randomization to either receive a PNB or not is unethical. Thus, an observational study may provide the best available methodology, especially when taking into account the potential imbalances in baseline characteristics, and the bias of "confounding by indication". Propensity score methods have been recommended to meet such challenges of observational studies.[28,29]

Pain relief during childbirth can affect a woman's birth experience,[23] even years after the event,[30] and PNB is a proven and effective pain relief method during birth.[2,3] However, it is unknown if PNB affects women's overall childbirth experience. The objective of this study was to investigate the association between intrapartum PNB and childbirth experience after spontaneous and instrumental vaginal birth, using the Childbirth Experience Questionnaire (CEQ).[31,32] We hypothesized that women with PNB would have a more positive childbirth experience than women without PNB.

2 | METHODS

2.1 | Setting

This study was conducted at the Department of Obstetrics, Oslo University Hospital, that has two units: Ullevål (Unit 1) with 6950 births/year and Rikshospitalet (Unit 2) with 2500 births/year. The units share clinical guidelines and management. PNB is provided on indication and is a shared decision between the woman and health care provider. Unit 2 promoted a clinical training and active "reintroduction" of PNB in 2014, aimed at ensuring rapid pain relief availability for birthing people, which resulted in increased use of PNB.

Inclusion criteria were primiparous women with a singleton cephalic vaginal live birth at term (gestational week $\geq 37^{+0}$), during the period January 1, 2017, until June 1, 2019. All women who were exposed to PNB during birth were invited to participate (PNB group). For each invited woman exposed to PNB, the subsequent woman unexposed to PNB at the same birth unit was invited to participate (non-PNB group).[8] Invited women received written study information 4 weeks after birth. Participants were informed that a response to the questionnaire about childbirth experiences was considered a confirmation of written informed consent to participate in the present study.

We excluded women transferred during birth from the low-risk midwife-led birth unit (with no medical pain relief available), women with allergy to local anesthetics, and women with uncertainty of PNB timing (whether exposure before or after birth). Furthermore, we excluded women with missing information of either the outcome or analytical covariates (Figure 1).

2.2 | Sample size

Previous studies about PNB and childbirth experience are scarce, limiting the possibilities for precise power calculation. However, the difference in total CEQ score between women delivering spontaneously vs instrumentally has been shown to be 0.16–0.34.[21,33–36] Assuming that differences in pain experience contribute to this disparity, we hypothesize that providing pain relief may prevent a negative childbirth experience. Taking into account that women with instrumental birth have a higher risk for requesting a cesarean in a subsequent pregnancy, this difference has an impact on practice. We considered that a slightly lower difference than 0.16 would be clinically relevant and considered a difference of at least 0.10 between the PNB group and the non-PNB group to be clinically relevant in this study.

The sample size was calculated a priori based on the assumed difference in total CEQ score of at least 0.10 points in equally sized groups, 80% power, and a significance level of 5%. This would require a total sample size of 700 women if the study would have been a randomized trial. Since this is an observational cohort and we needed to adjust for several factors, we increased the sample size to 1000 women.

2.3 | Variables

Childbirth experience was assessed by the Childbirth Experience Questionnaire (CEQ).[31] The CEQ was

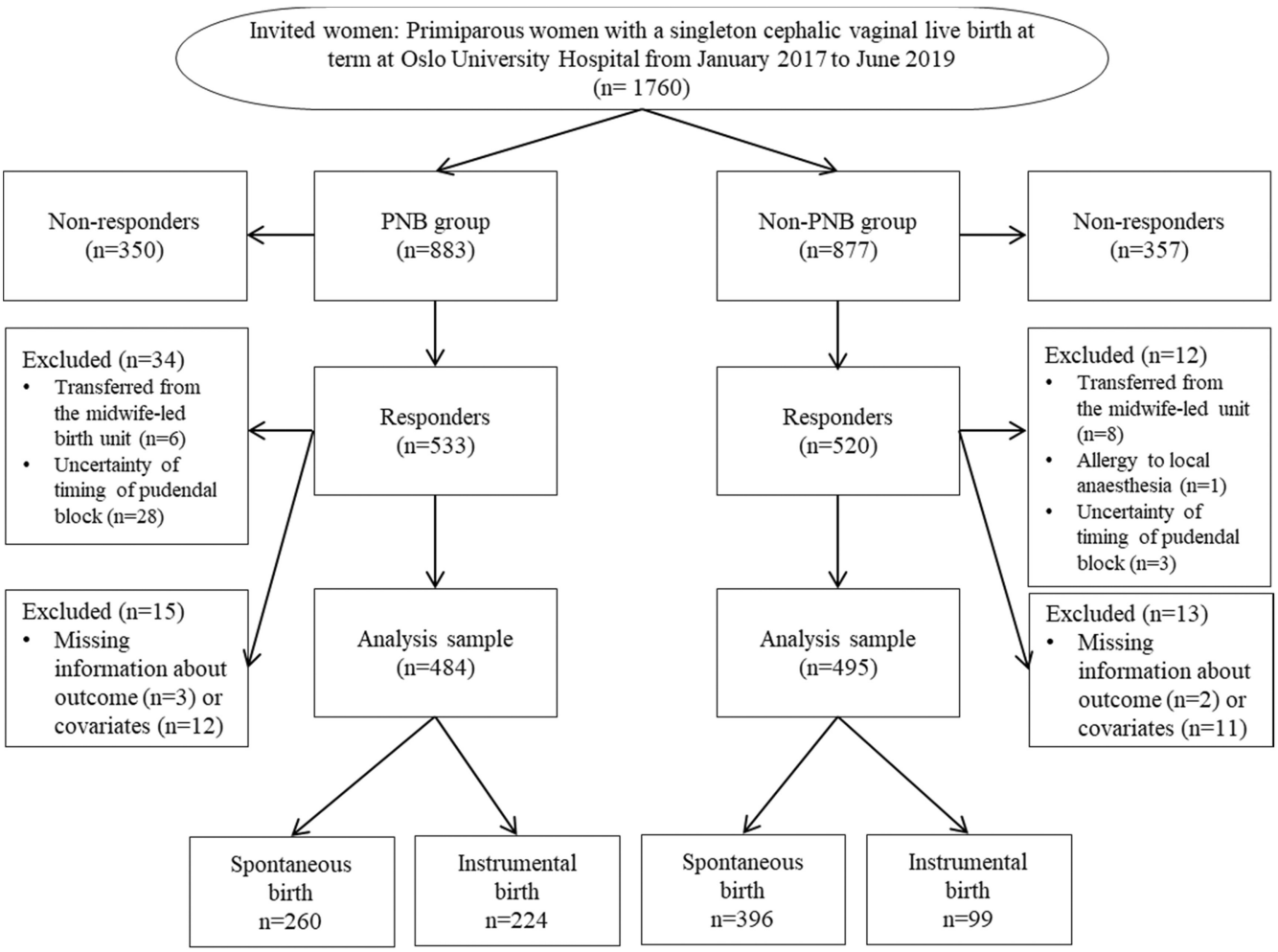

FIGURE 1 Flow diagram of the inclusion process of women into either pudendal nerve block group (PNB group) or nonpudendal nerve block group (non-PNB group)

developed and validated in Sweden,[31] and has been translated into Norwegian and several other languages.[34,35,37–41] The CEQ contains 22 questions that may be categorized into four domains: own capacity, professional support, perceived safety, and participation.[31] For 19 of the questions, the response is on a 4-point Likert scale, whereas 3 of the questions were assessed using a visual analogue scale (VAS). To match the VAS scores to the 4-point Likert scale, the VAS scales' scores were converted into four categories (0–40 mm = 1, 41–60 mm = 2, 61–80 mm = 3, and 81–100 mm = 4). Negatively worded items were reversed before constructing the subscales. Responses were aggregated to domains for each respondent using the half scale method, where values were computed when the respondent had answered at least half of the questions in the domain.[31] Total score is the mean score of the four subscales and ranges from 1.0 to 4.0.[34,35] A higher CEQ score indicates better childbirth experience. In this study, Cronbach's alpha (a measure of internal consistency) was 0.80 for own capacity, 0.88 for professional support, 0.85 for perceived safety, 0.70 for participation, and 0.90 for total score.

The exposure in this study was PNB provided transvaginally during birth, whereas total score calculated from the Childbirth Experience Questionnaire was the main outcome. Secondary outcomes were the scores of the four domains of childbirth experience: own capacity, professional support, perceived safety, and participation.

Clinical data included maternal characteristics such as age at birth (years), marital status (married/cohabiting or single), and body mass index (kg/m^2). To capture a psychological dimension assumed to affect childbirth experience, a composite variable was constructed and named "special vulnerability." Included in this category were women with registered information about anxiety and/or depression under treatment, antenatally diagnosed fetal malformations (diagnosed on ultrasound during pregnancy), and/or known fear of childbirth. Fetal characteristics included gestational length (days) and birthweight (grams). Birth characteristics included induction of labor, epidural analgesia and/or spinal analgesia, long duration of birth (>12 h), prolonged second stage of birth (>3 h), and instrumental vaginal birth (forceps and/or vacuum extraction). Pain was registered on a visual analogue scale (VAS 0–100) in the CEQ. Mode of birth was either spontaneous or instrumental birth. PNB duration was calculated in minutes from administration to the birth of the baby. Birth unit was either unit 1 or unit 2. The pharmaceutical agents used in PNB were bupivacaine, lidocaine or bupivacaine with epinephrine, and mean time from administration to birth was 67 minutes (standard deviation ±61 minutes), numbers presented previously.[8] Clinical data were collected from the electronic medical records.

2.4 | Statistical analyses

Descriptive analyses were presented as frequencies with proportions and mean with standard deviation as appropriated. We used propensity score-matched analysis to compare women in the PNB group with women in the non-PNB group, to reduce the effects of confounding by indication caused by differences in baseline characteristics.[28,29] We stratified by mode of birth, as instrumental birth is a strong factor influencing childbirth experience, and as it happens chronologically after the provision of PNB.

The first step in the analyses was to calculate the propensity score, ie, the probability of being exposed and unexposed to PNB. We included potential confounders, risk factors for poor childbirth experience, and proxies for them based on previous knowledge and clinical experience. The propensity scores of PNB were estimated with a multivariable logistic regression model. Based on the propensity scores, we created matched pairs of PNB/non-PNB women. Matching was performed with the 1:1 nearest-neighbor matching method with replacement with a caliper of 0.2 standard deviation of the logit propensity score. The replacement was chosen with the aim of including as many of the exposed women as possible as the groups were unevenly distributed. The balance of covariates across the groups of women with and without PNB before and after matching was assessed by the standardized mean difference (SMD). A covariate with a SMD of less than 10% between matched groups was considered well balanced.[42] We tested a set of various propensity score models with the aim to create a matched sample in which the distribution of observed baseline variables is similar between women with and without PNB. This may represent a trade-off between number of matched pairs and smallest SMD, in which we aimed to include the largest sample within a well-balanced matching. If balancing was not satisfied, we included the unbalanced variable(s) in the final model. Finally, the estimated treatment effect was calculated as the average treatment effect on the treated.[43] Robust standard error estimation was used to take into account the sampling variability when matching with replacement. Results are presented as absolute risk difference (ARD) with 95% confidence intervals (CI).

In secondary analyses, we investigated the association between PNB and the separate CEQ domains using the same propensity score model as for the total CEQ score.

We conducted several sensitivity analyses to assess the influence of modeling choices on the estimates by changing the variables included in the propensity score model. For spontaneous vaginal birth, we also fitted a model where the women in the PNB group were matched to women in the non-PNB group without replacement.

Statistical analyses were performed using R (version 4.0.3) and Stata (version 16). We considered a two-sided *p* value less than 0.05 as being statistically significant.

3 | RESULTS

A total of 1053 (60%) of the 1760 invited women participated in the study. We excluded women transferred from the midwife-led birth unit (n = 14), allergy to local anesthetics (n = 1), uncertainty of timing of PNB (n = 31), and women with missing information about the outcome (n = 5) and covariates (n = 23) (Figure 1). Thus, 656 women with spontaneous birth and 323 with instrumental birth were included in the complete set analysis.

The mean age at birth was 32 years, 95% were either married or cohabiting, and 72% had epidural analgesia (Table 1). Maternal characteristics (married/cohabiting, age at birth, and special vulnerability) and birth characteristics (induction of labor, epidural and/or spinal analgesia, duration of second stage of labor, duration of labor, retrospectively reported birth pain score, and unit), before and after propensity score matching, are presented in Table 2, and stratified by mode of birth (spontaneous or instrumental vaginal birth). The maternal and obstetric characteristics were considered adequately balanced in PNB/non-PNB women after matching. In women with instrumental vaginal birth, there was a slight residual confounding on the variable special vulnerability (SMD = 0.13) (Table 2). We therefore adjusted for special vulnerability in the final analyses by covariate adjustment.

Among women with spontaneous births, those in the PNB group did not differ significantly from participants in the non-PNB group in total CEQ score (ARD −0.05, 95% CI −0.15; 0.05, *P* 0.36) or in the separate CEQ domains (Table 3). Likewise, among women with instrumental birth, we observed no association between PNB and childbirth experiencein total CEQ score (ARD 0.03, 95% CI −0.09; 0.15, *P* 0.61) or in any of the four CEQ domains (Table 3).

Sensitivity analyses, where the propensity score model was based on other covariates, and those with matching without replacement, showed similar results (data not shown).

TABLE 1 Characteristics of all the included primiparous women with a singleton cephalic vaginal live birth at term, n = 979

	Mean ± SD or *n* (%)
Maternal characteristics	
Age at birth (years)	32.1 ± 4.1
Married/cohabiting	931 (95.1)
Body mass index (n = 796)	23.1 ± 4.1
"Special vulnerability"[a]	78 (8.0)
Under treatment for depression and/or anxiety	10 (1.0)
Known fear of childbirth	50 (5.1)
Antenatally diagnosed fetal malformations	21 (2.2)
Fetal characteristics	
Gestational length (days)	281 ± 8
Birth weight (grams)	3479 ± 451
Birth characteristics	
Induction of labor	276 (28.1)
Epidural and/or spinal analgesia	706 (72.1)
Long duration of birth (>12 h)	167 (17.1)
Prolonged second stage of birth (>3 h)	176 (18.0)
Mode of birth	
Instrumental birth	323 (33.0)
Spontaneous birth	656 (67.0)
Pudendal block time from administration to birth (minutes)[b] (n = 387)	67 ± 61
Birth unit	
Unit 1	329 (33.6)
Unit 2	650 (66.4)

Abbreviation: SD, standard deviation.

[a]Under treatment for depression and/or anxiety, known fear of childbirth and/or known fetal malformations.

[b]In women receiving pudendal nerve block.

4 | DISCUSSION

Overall, the total childbirth experience scores were high for both women with and without intrapartum PNB, both in spontaneous and instrumental birth groups, as reported by primiparous women 4 weeks after birth. Contrary to our initial hypothesis, our study did not identify any difference in childbirth experience among women with and without intrapartum PNB. This lack of difference was observed both in women with spontaneous and instrumental vaginal birth, as well as in total CEQ score and in the separate domains of the questionnaire.

This was an observational study in which PNB was provided on clinical indication and through shared decision-making between the woman and her health care provider. We assume that women receiving a PNB were the women who perceived the most pain. To limit the risk of confounding by indication, we used propensity score-matched analyses, which also included women's self-rated pain score. Therefore, we can conclude that given balanced characteristics, there was no difference in rated childbirth experience in women with or without PNB in our study.

TABLE 2 Maternal and birth characteristics by pudendal nerve block group (PNB group) vs nonpudendal nerve block group (non-PNB group) of included primiparous women with a singleton cephalic vaginal live birth at term, before and after propensity score matching, and stratified by mode of birth

	Spontaneous vaginal birth n = 656					
	Before propensity score matching			**After propensity score matching**		
Characteristics	**PNB group n = 260 Mean ± SD or n (%)**	**Non-PNB group n = 396 Mean ± SD or n (%)**	**Standardized mean difference, %**	**PNB group n = 260 Mean ± SD or n (%)**	**Non-PNB group n = 260 Mean ± SD or n (%)**	**Standardized mean difference, %**
Married/cohabiting	248 (95.4)	375 (94.7)	0.03	248 (95.4)	248 (95.4)	<0.001
Age at birth (years)	31.3 ± 4.0	31.9 ± 3.9	0.14	31.3 ± 4.0	31.1 ± 3.8	0.06
Special vulnerability[a]	25 (9.6)	29 (7.3)	0.08	25 (9.6)	25 (9.6)	<0.001
Induction of labor	52 (20.0)	107 (27.0)	0.18	52 (20.0)	53 (20.4)	<0.01
Epidural and/or spinal analgesia	149 (57.3)	271 (68.4)	0.22	149 (57.3)	160 (61.5)	0.09
Duration of second stage of labor (>3 h)	32 (12.3)	37 (9.3)	0.09	32 (12.3)	38 (14.65)	0.07
Duration of labor (h)	6.2 ± 4.0	6.3 ± 3.8	0.02	6.2 ± 4.0	6.4 ± 3.9	0.05
Retrospectively reported birth pain score (VAS 0–100)	69.6 ± 21.7	67.9 ± 23.2	0.08	69.6 ± 21.7	70.4 ± 22.1	0.04
Unit 1	100 (38.5)	129 (32.6)	0.12	100 (38.5)	109 (41.9)	0.07
	Instrumental vaginal birth n = 323					
	Before propensity score matching			**After propensity score matching**		
Characteristics	**PNB group n = 224 Mean ± SD or n (%)**	**Non-PNB group n = 99 Mean ± SD or n (%)**	**Standardized mean difference, %**	**PNB group n = 217[c] Mean ± SD or n (%)**	**Non-PNB group n = 217 Mean ± SD or n (%)**	**Standardized mean difference, %**
Married/cohabiting	218 (97.3)	90 (90.9)	0.40	213 (98.2)	212 (97.7)	0.03
Age at birth (years)	32.9 ± 4.2	33.5 ± 4.0	0.13	33.0 ± 4.2	33.1 ± 4.0	0.02
Special vulnerability[a]	19 (8.5)	5 (5.1)	0.12	18 (8.3)	26 (12.0)	0.13
Induction of labor	81 (36.2)	36 (36.4)	<0.01	77 (35.5)	69 (31.8)	0.08
Epidural and/or spinal analgesia	194 (86.6)	92 (92.9)	0.19	191 (88.0)	191 (88.0)	<0.001
Duration of second stage of labor (h)	2.6 ± 1.1	2.2 ± 1.2	0.35	2.5 ± 1.1	2.4 ± 1.2	0.07
Retrospectively reported birth pain score[b] (VAS 0–100)	88 (39.3)	39 (39.4)	<0.01	87 (40.1)	83 (38.2)	0.04
Unit 1	65 (29.0)	35 (35.4)	0.14	63 (29.0)	56 (25.8)	0.07

Abbreviations: PNB, pudendal nerve block; SD, standard deviation; VAS, visual analog scale.

[a]Under treatment for depression and/or anxiety, known fear of childbirth and/or known fetal malformations.

[b]Upper 25%: ≥86 points on VAS 0–100.

[c]In seven PNB women, matching was unsuccessful.

TABLE 3 Main results of the association between pudendal nerve block and childbirth experience by mode of birth in propensity score analyses with treatment average effect in primiparous women with a singleton cephalic vaginal live birth at term

	Spontaneous vaginal birth (n = 656)				
Childbirth experience questionnaire	**PNB group mean**	**Non-PNB group mean**	**Absolute risk difference**	**95% CI**	***P* value**
Total score	3.26	3.31	−0.05	−0.15; 0.05	0.36
Own capacity	2.66	2.74	−0.08	−0.20; 0.04	0.18
Professional support	3.76	3.76	0.00	−0.09; 0.10	0.92
Perceived safety	3.33	3.41	−0.08	−0.20; 0.04	0.21
Participation	3.32	3.35	−0.03	−0.19; 0.13	0.72
	Instrumental vaginal birth (n = 323)				
Childbirth experience questionnaire	**PNB group mean**	**Non-PNB group mean**	**Absolute risk difference[a]**	**95% CI**	***P* value**
Total score	3.14	3.11	0.03	−0.09; 0.15	0.61
Own capacity	2.44	2.45	−0.01	−0.16; 0.14	0.88
Professional support	3.73	3.67	0.05	−0.09; 0.20	0.47
Perceived safety	2.97	3.04	−0.06	−0.25; 0.12	0.54
Participation	3.44	3.29	0.15	−0.12; 0.41	0.28

Abbreviations: CI, confidence interval; PNB, pudendal nerve block.

aAdjusted for "special vulnerability".

To the best of our knowledge, the association between PNB and childbirth experience has not been investigated previously. High perception of pain and absence of pain relief are predictors of a negative childbirth experience.[23,24] Contradictory to this, some studies have found pain relief to be associated with a negative childbirth experience.[23,44–46] Women without epidural may report a more positive experience,[47] even though pain relief (ie, epidural) has proven effective to manage pain in labor.[27] This contradictory evidence may be explained by the assumption that women recall pain at its peak and that women receiving pain relief have experienced a higher level of pain than those not receiving pain relief. However, childbirth experience is complex and not only affected by pain and/or pain relief. Women emphasize several factors as important to them during childbirth, such as compassionate and respectful care, family focus, continuity, and a sense of security.[48] We found high CEQ scores in both groups, possibly indicating that women had sufficient support during the birth process that facilitated coping with pain experiences, regardless of PNB.

Measuring childbirth experience has several methodological challenges and different questionnaires exist. A systematic review evaluated existing instruments for their psychometric properties and found the Childbirth Experience Questionnaire (CEQ),[31] used in our study, to be valid and reliable.[32] We also found good internal consistency for the questionnaire in this study.

4.1 | Strengths and limitations

One limitation in observational cohorts, such as ours, is the risk of selection bias and confounding by indication. We have attempted to address this risk by using propensity score-matched analysis that accounts for the conditional probability of treatment selection. This method reduces confounding by indication, including self-rated pain in baseline characteristics in the propensity score. Therefore, we believe that the risk of confounding by indication in our study is limited. There was a remaining imbalance after propensity score matching in the variable "special vulnerability" in women with instrumental vaginal birth, which we subsequently included in the final analyses.

Women responded to the questionnaire 4 weeks after birth, which is a potential limitation, especially when retrospectively scoring pain during birth. However, the alternative of scoring pain during labor is also challenging. Experience of pain changes throughout labor and birth, making it challenging to standardize an assessment that also takes into account the duration and stage of labor. It is, however, possible that the rating of pain 4 weeks after birth is appropriate. We suggest that this memory may be representative of the long-lasting impressions the woman brings with her when facing future pregnancies and that may affect her birth and pain relief preferences in a subsequent birth.

A strength of this study is that the childbirth experience questionnaire is validated. However, it can be seen

as a limitation that the questionnaire was translated from Swedish into Norwegian in a back and forward process and not previously validated in a Norwegian setting. We, however, view the Swedish and Norwegian contexts as well as population and obstetric care as similar. We only distributed the questionnaire in Norwegian, which limits the generalization to Norwegian-speaking women.

Including only primiparous women is a strength as it excludes parity as a confounder. Our results can be generalized to primiparous women in similar settings. Results, however, cannot be generalized to multiparous women. We were not permitted to record data from nonresponders. Data from the Medical Birth Registry of Norway, however, indicate that women in our cohort are similar to the total eligible population of primiparous women delivering in Oslo University Hospital (mean age 32 years; 94% married/cohabitant) suggesting a representative sample.[49] Generalizability could also be influenced by incomplete matching. However, in our study, only seven women had unsuccessful matching. Furthermore, we also used a narrow caliper (0.2 SD), increasing the probability of matching pairs being equal. The power calculation performed for this study was conducted without stratification and this may have limited the strength to identify the difference in our stratified analyses.

The use of epidural analgesia in our study was high (72%). However, epidural analgesia and PNB are used in different stages of childbirth. We do not know whether including only women provided with PNB without epidural analgesia could have yielded a different study result. We included epidural in our statistical analyses to attempt to adjust for the influence of epidural analgesia.

PNB has been shown efficient for pain relief during the second stage of labor,[2,3] but our study shows no association between PNB and women's overall childbirth experience in analyses with propensity score matching that reduces the risk for confounding by indication. We conclude that PNB had no independent effect on childbirth experience in our study.

4.2 | Clinical implications

We found no difference in childbirth experience in women with or without PNB. However, previous research has shown PNB to reduce pain efficiently and some women are likely to benefit from PNB during second stage of labor. The alternative strategy in vaginal deliveries, not providing PNB to women in the second stage of labor in need of pain relief (and not having time for alternative spinal/epidural analgesia) would likely have resulted in a much more negative childbirth experience in our study in the non-PNB group. Therefore, we believe that the clinical implications of our study should be interpreted in the light of previous evidence of the pain-relieving effect of PNB, meaning that PNB should be provided on clinical indication.

AUTHOR CONTRIBUTIONS

ÅH Waldum: Project development, data collection, data analyses, and manuscript writing. M Lukasse: Project development, manuscript writing, and supervision. AC Staff: Project development, manuscript writing, and supervision. RS Falk: Project development, data analyses, manuscript writing, and statistical supervision. IK Sørbye: Project development, manuscript writing, and supervision. AF Jacobsen: Project development, data analyses, manuscript writing, and main supervision. All authors revised the manuscript and agreed on the last version being submitted.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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