



## Research article

# Predictors of a positive birth experience in childbirth: A cross-sectional study

M. Roqueta-Vall-Ilosera<sup>a</sup>, D. Cámara-Liebana<sup>b</sup>, E. Serrat-Graboleda<sup>a</sup>,  
L. Salleras-Duran<sup>a,c</sup>, M. Buxó-Pujolràs<sup>d</sup>, C. Fuentes-Pumarola<sup>b,\*</sup>,  
D. Ballester-Ferrando<sup>b</sup>

<sup>a</sup> Nursing Department, Health, Gender and Aging Research Group, University of Girona, Girona, Catalonia, Spain

<sup>b</sup> Nursing Department, Quality of Life Research Group, University of Girona, Girona, Catalonia, Spain

<sup>c</sup> Hospital of Figueres. Salut Empordà Foundation, Figueres Catalonia, Spain

<sup>d</sup> Girona Biomedical Research Institute (IDIBGI), Girona, Catalonia, Spain

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## ABSTRACT

**Background:** Recognizing predictors of positive birth experience is viewed as essential for minimizing negative experiences during childbirth that are related to current obstetric care, especially when those could be attributed to intrapartum interventions. The CEQ-E is a suitable instrument for investigating maternal birth experience within the Spanish population, highlighting the necessity to identify predictors for all its domains. This study aimed to identify predictors of positive birth experience based on socio-demographic and clinical variables, and obstetric interventions. **Methods:** Cross-sectional study conducted with consecutive sampling (N = 301). Quantitative data were collected by the Childbirth Experience Questionnaire (CEQ-E) and an Ad hoc questionnaire. Clinical data was obtained from participants' medical records. Descriptive, bivariate and multivariate analysis were performed.

**Results:** The CEQ overall mean score was 3.18(SD:0.42), showing the highest score for the professional support (3.79; SD: 0.43) and the lowest for the own capacity (2.8; SD:0.57). All domains and overall score showed negative correlations with the number of intrapartum interventions ( $p \leq .001$ ). Inductions of labour, instrumental deliveries, and caesarean sections were inversely related to; overall birth experience score ( $p \leq .001$ ), perceived safety ( $p \leq .001$ ), and own capacity ( $p \leq .001$ ). Epidural analgesia was linked to worse values of birth experience ( $p \leq .001$ ). Predictors of positive birth experience were identified as having a midwife as birth attendant ( $p \leq .001$ ) and neonatal higher Apgar scores at birth ( $p \leq .001$ ), whereas higher maternal education grade ( $p = .04$ ), inductions of labour ( $p \leq .001$ ) and caesarean births ( $p \leq .001$ ) had worse values on birth experience.

**Conclusion:** Women reported a positive birth experience, and professional support was highly valued. Key predictors of lower scores in birth experience included higher maternal education, caesarean and instrumental deliveries, and neonatal intensive care unit (NICU) admission. Spontaneous labour onset predicted better capacity and safety. Epidural use decreased

\* Corresponding author.

**E-mail addresses:** [marta.roqueta@udg.edu](mailto:marta.roqueta@udg.edu) (M. Roqueta-Vall-Ilosera), [david.camara@udg.edu](mailto:david.camara@udg.edu) (D. Cámara-Liebana), [eva.serrat@udg.edu](mailto:eva.serrat@udg.edu) (E. Serrat-Graboleda), [laia.salleras@udg.edu](mailto:laia.salleras@udg.edu) (L. Salleras-Duran), [maria.buxo@udg.edu](mailto:maria.buxo@udg.edu) (M. Buxó-Pujolràs), [concepcio.fuentes@udg.edu](mailto:concepcio.fuentes@udg.edu) (C. Fuentes-Pumarola), [david.ballester@udg.edu](mailto:david.ballester@udg.edu) (D. Ballester-Ferrando).

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participation. Midwife-attended births reported better scores on birth experience, highlighting their importance in maternal care.

## 1. Introduction

Changes in childbirth and maternity care in recent times have been significant with the reduction of maternal and perinatal morbidity and mortality, both in our country and globally [1]. Modern obstetric care often involves women suffering from institutional routines, which can have adverse effects on the quality and outcomes of care, as well as on the lived experience of labour [2]. Those improvements in the quality of care have also been related to an increase in intrapartum obstetric interventions, although those are recognized as barriers to maternal satisfaction [3]. For this reason, the World Health Organization (WHO) urged governmental organizations to ensure more respectful childbirth care so that women can enjoy a positive birth experience, demonstrating that good standards in quality of care are linked to higher maternal satisfaction [4].

Maternal satisfaction is a difficult item to assess as its multifactorial influences [5], as is influenced by discrepancies between the main process of caring for the childbirth and the previous woman's expectations [6]. Different instruments were developed for exploring the childbirth experience or the maternal satisfaction related to the birth process in Spanish population [7,8], however the CEQ-E [9,10] was considered to be the more adequate tool as it also measures the sense of participation. Other authors identified predictors for positive childbirth experience [11]. However, it is imperative to explore predictors for all the CEQ domains, with a specific emphasis on additional factors related to a positive birth experience that necessitate a more thorough comprehension, including the impact of the primary healthcare provider childbirth particularly among high-risk pregnant women.

The objective of our research was to observe the differences between the results of childbirth according to the intrapartum interventions and the women's experience in labour, identifying the predictors of a positive in childbirth.

## 2. Materials and methods

### 2.1. Design of the study

This study used a quantitative descriptive cross-sectional design.

### 2.2. Setting, participants and sampling

Study was conducted in the Obstetric Unit of the Hospital of Girona Dr. Josep Trueta (Northern Spain) from April 2017 to September 2018, which is the reference hospital for high-risk pregnancies in the region and attends 1300 deliveries/year from 25 gestational weeks and above with different pregnancy risk categorizations (high-risk and low risk). Consecutive recruitment was carried out in the maternity ward during the postnatal stay period (between 24 and 72 h postnatally). A non-probabilistic simple size was calculated according to a priori values for a multiple regression model. Specifically, we fixed an anticipated effect size ( $f^2$ ) of 0.1, statistical power

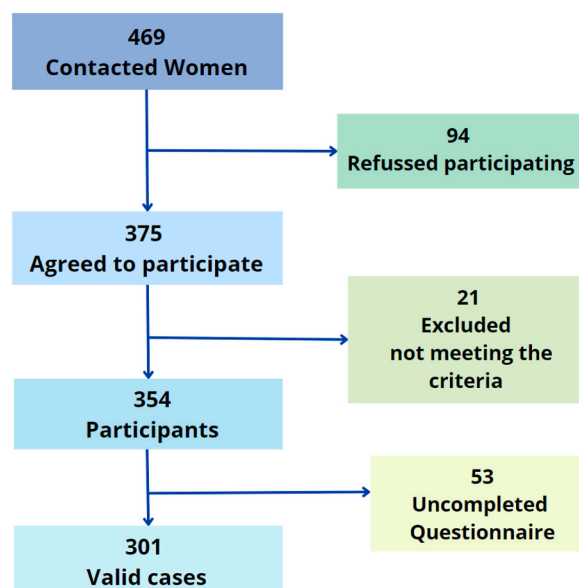


Fig. 1. Study Flowchart.

of 95 %, 15 predictors and 0.05 of statistical significance. According to this parameter, the minimum sample size required 293 [12]. All eligible women (n = 469) with low and high-risk pregnancies, who delivered in the main obstetric unit, aged between 16 and 50 years, who understood Spanish and had started a labour process, were asked to participate during their admission in the maternity ward. A total of 375 agreed to participate in the study, making a 79.95 % participation rate. Women who had delivered before arriving at the hospital, stillbirths, those who had an elective caesarean section or had language barriers to answer autonomously the questionnaire were excluded for not meeting the criteria (n = 21). Not having the informed consent was also criteria for exclusion. Women with uncompleted questionnaires or not having all the data required in the study were also excluded (n = 53). Consequently, the final study sample was 301 women (Fig. 1).

### 2.2.1. Measurements and instruments

Women's obstetric variables were obtained from the delivery book and clinical records and collected in a variable grid, such as: delivery outcome (normal vaginal delivery, instrumental or caesarean section, gestational age (weeks categorized in preterm or term pregnancies for analysis), pregnancy risk categorization (low risk or high risk), onset of labour (spontaneous or induced), parity collected by obstetric formula (categorized in nulliparous or multiparous for analysis), Apgar score at 5 min of life (categorized in  $\leq 7$  or  $\geq 8$ ), neonatal admission in NICU (yes or no) and intrapartum interventions used such as; intrapartum oxytocin, epidural analgesia, non-pharmacological analgesia, combined analgesia, induction of labour (yes or no). Socio-demographic data was collected with a self-administered questionnaire, obtaining the maternal age (numerical), educational level (secondary, higher and university/collage), origin (native or immigrant), occupation (employed or housework), coexistence (living alone or together), antenatal classes assistance (yes or no), and presence of birthing partner in labour (yes or no). All these data were collected by the researchers between 24 and 48 h after hospital discharge and anonymized with a code number in a digital database.

Childbirth experience variable was collected by the Childbirth Experience Questionnaire (CEQ), which is a self-administered questionnaire developed initially in Swedish [13], and later adapted in many different languages [14–16], one of them in Spanish [9]. The CEQ-E includes a total of 22 items related to maternal experiences with the childbirth process, of which 18 items have been categorized in an ordinal variable with 4 categories (totally disagree, quite disagree, quite agree, totally agree), and the remaining 3 items are rated on a Visual Analogue Scale (VAS, from 0 to 10 points), with a Cronbach's Alpha of 0.88 [9]. At the same time, all 22 CEQ questions have been numerically transformed for their analysis on a Likert scale from 1 to 4. Some questions are reverse scored as they have a negative connotation. The sum of all the Likert-rated questionnaire items plus the arithmetic mean expresses the overall childbirth experience, which ranges from 1 point (Totally disagree) to 4 points (Totally agree). In addition, the questionnaire is divided into 4 domains of satisfaction: own capacity (CP-CEQ) which consists of 8 items, professional support (PS-CEQ) which consists of 5 items, the perception of safety (S-CEQ) which consists of 7 items and participation (P-CEQ) which consists of 3 items. Each domain is the result of the summation and the arithmetic mean of all the questions and has been transformed into a discrete continuous variable to facilitate its analysis, with a minimum value of 1 point (Totally disagree) and a maximum value of 4 points (Totally agree).

### 2.2.2. Ethical consideration

Ethical approval for conducting the study was obtained from the Hospital Ethics Committee (reference number: 2017.044). All procedures performed in the study were in accordance with the ethical standards the national research committee and the Declaration of Helsinki [17]. Moreover, permission to use the questionnaires used in the study was obtained from the authors who developed them [9]. All the participants were informed of the purpose of the study, as well as confidentiality and protection data details before informed consent was obtained. Data will not be able to be associated to any specific informant and has been coded to prevent from identification of individual respondents by a third part.

### 2.2.3. Statistical analysis

Frequency distributions and univariate comparisons were used for socio-demographic, clinical and childbirth experience variables. Bivariate analysis was used as numerical data were distributed in a normal trend (Kolmogorov-Smirnov Test), the Student's T-test to obtain the mean of the two independent groups and the ANOVA test for more than two groups. For data non-normal distributed Kruskal Wallis Test and U of Mann-Whitney were used. For categorical variables, Pearson's Chi-squared test was used, or Fisher's Test when the expected counts were less than 5. To relate numerical variables the tests used were Pearson's correlation for normal distributed variables and Rho Spearman correlation for non-normal distribution variables. Cronbach's Alpha Test was performed to ensure reliability and internal consistency of the CEQ scale. A multivariate linear regression analysis was also performed to estimate the relationships between different variables. 15 variables were included in the multiple regression analysis, selected through a systematic process to ensure the model's robustness and validity. Initially, sociodemographic and clinical variables that demonstrated statistically significant associations with the outcome variable in the bivariate analyses ( $p < .05$ ) were chosen. Additionally, variables related to obstetric interventions were included regardless of their statistical significance in the bivariate analysis, as they were considered essential based on the study's objectives, conceptual framework, and previous literature. Significance levels of acceptance were considered ( $p < .05$ ). Data was analysed using the statistical package for social science (SPSS®) version 29 for Windows.

### 3. Results

#### 3.1. Socio-demographic background

301 women were included into the study after responding the entire CEQ-E questionnaire, with a mean age of 32.78 (SD:6.68). All Women's sociodemographic characteristics are shown in [Table 1](#).

#### 3.2. Childbirth experience related to socio-demographic variables

Grater own capacity (OC-CEQ-E) was reported for higher educated and employed women. No other significant differences were found between child experience and the socio-demographic variables studied, showed in [Table 2](#).

#### 3.3. Childbirth experience related to obstetric outcomes

Childbirth experience (CEQ-E) and its different domains (own capability, safety, professional support and participation) related to obstetric outcomes variables, as well as its frequencies and percentages are shown in [Table 3](#). Alpha Cronbach Test was performed to ensure reliability and internal consistency of the CEQ scale ( $\alpha = .86$ ) and its domains; own capacity ( $\alpha = .76$ ), professional support ( $\alpha = .89$ ), safety ( $\alpha = .71$ ), participation ( $\alpha = .70$ ). Regarding to the obstetric characteristics, the results show a greater childbirth experience in multiparous women and with low or medium risk pregnancies. Women with spontaneous onset of labour report have higher overall CEQ score and most CEQ domains. Women who have received interventions such as using intrapartum oxytocin and epidural analgesia show lower scoring for childbirth experience in most of the domains. While using non-pharmacological analgesic measures was related to higher scoring in overall childbirth experience, participation and safety. Women with a normal vaginal delivery (NVD) and were attended by a midwife during the delivery had higher sense of own capacity, safety, participation and overall CEQ score, whereas women who had an instrumental delivery had higher levels of professional support. When women had new-borns with low Apgar score, preterm age at delivery and admitted to neonatal intensive care unit (NICU), CEQ score was lower.

#### 3.4. Childbirth experience related to intrapartum interventions

More interventions applied during the intrapartum care showed lower levels of overall childbirth experience, own capacity, safety and participation. Correlations between childbirth experience variables and the number of interventions (intrapartum oxytocin, epidural analgesia, induction of labour, or instrumental/caesarean delivery) is shown in [Table 4](#).

#### 3.5. Predictors of a positive influence in the childbirth experience

Predictors of positive influence in the childbirth experience depending on sociodemographic and obstetric characteristics were obtained by a Linear Regression Multivariate Test for the overall CEQ score and the four domains. The statistically significant

**Table 1**  
Descriptive maternal sociodemographic characteristics (N = 301).

Socio-demographic Characteristics	n (%)
<b>Maternal age</b>	
16–29	79 (26.3)
30–39	197 (65.4)
>40	25 (8.3)
<b>Origen</b>	
Native	211 (70.1)
Immigrant	90 (29.9)
<b>Education</b>	
Secondary	64 (21.3)
Higher	93 (30.9)
University/College	144 (47.8)
<b>Occupation</b>	
Employed	213 (70.8)
Unemployed	88 (29.2)
<b>Coexistence</b>	
Living together	272 (90.4)
Living alone	29 (9.6)
<b>Antenatal classes</b>	
Yes	159 (52.8)
No	142 (47.2)
<b>Birth partner in labour</b>	
Yes	291 (97.3)
No	8 (2.7)

**Table 2**  
 Childbirth Experience (CEQ-E and domains) related to sociodemographic characteristics (N = 301).

Sociodemographic Characteristic	n (%)	Childbirth Experience CEQ-E									
		OC-CEQ-E		SP-CEQ-E		S-CEQ-E		P-CEQ-E		Overall score CEQ-E	
		Mean (SD)	<i>p</i>	Mean (SD)	<i>p</i>	Mean (SD)	<i>p</i>	Mean (SD)	<i>p</i>	Mean (SD)	<i>p</i>
<b>Maternal Age<sup>b</sup></b>	32.57 (5.47)	2.81 (0.57)	0.09	3.79 (0.43)	0.29	3.23 (0.56)	0.89	3.04 (0.87)	0.61	3.18 (0.42)	0.43
<i>Rho</i>			−0.98		0.06		−0.08		−0.03		−0.04
<b>Origin</b>											
Native	211 (70.1)	2.88 (0.59)	0.271	3.80 (0.43)	0.57	3.25 (0.59)	0.54	3.00 (0.89)	0.21	3.17 (0.44)	0.58
Immigrant	90 (29.9)	2.86 (0.50)		2.77 (0.44)		3.20 (0.50)		3.14 (0.82)		3.20 (0.39)	
<i>Cohen's d</i>		0.57		0.44		0.57		0.87		0.43	
<b>Education</b>											
Secondary	64 (21.3)	2.89 (0.53)	<b>.04</b>	2.78 (0.44)	0.76	3.17 (0.59)	0.64	3.09 (0.86)	0.55	3.20 (0.40)	0.28
Higher	93 (30.9)	2.88 (0.57)		3.81 (0.36)		3.25 (0.56)		3.09 (0.87)		3.22 (0.42)	
University/College	144 (47.8)	2.72 (0.57)		3.77 (0.47)		3.24 (0.56)		2.98 (0.87)		3.13 (0.43)	
<i>Eta squared</i>		0.02		0.001		0.003		0.004		0.009	
<b>Occupation</b>											
Employed	213 (70.8)	2.97 (0.48)	<b>≤.01</b>	3.80 (0.37)	0.72	3.26 (0.58)	0.65	3.07 (0.91)	0.71	3.25 (0.42)	0.06
Housework	88 (29.2)	2.74 (0.58)		3.78 (0.45)		3.22 (0.56)		3.03 (0.86)		3.15 (0.42)	
<i>Cohen's d</i>		0.56		0.44		0.57		0.88		0.42	
<b>Coexistence<sup>a</sup></b>											
Living Alone	29 (9.6)	3.00 (2.63–3.37)	0.15	4.00 (3.40–4.00)	0.07	3.33 (2.66–3.58)	0.81	3.00 (2.33–3.66)	0.3	3.27 (2.95–3.50)	0.93
Living Together	272 (90.4)	2.87 (2.40–3.25)		4.00 (3.80–4.00)		2.83 (2.83–3.66)		3.00 (2.66–4.00)		3.22 (2.90–3.50)	
<i>Cohen's d</i>		−0.08		0.10		0.14		0.06		0.004	
<b>Antenatal classes</b>											
No	142 (47.2)	2.85 (0.53)	0.16	3.77 (0.41)	0.9	3.24 (0.54)	0.8	3.101(0.85)	0.59	3.19 (0.40)	0.57
Yes	159 (52.8)	2.76 (0.59)		3.79 (0.45)		3.22 (0.59)		3.06 (0.89)		3.16 (0.44)	
<i>Cohen's d</i>		0.57		0.44		0.57		0.87		0.43	
<b>Birthing partner<sup>a</sup></b>											
No	10(3.3)	2.94 (2.25–3.19)	0.71	3.90 (3.50–4.00)	0.17	3.33 (2.33–3.70)	0.7	3.33 (2.25–4.00)	0.83	2.37 (2.94–3.12)	0.46
Yes	291 (96.7)	2.87 (2.50–3.25)		4.00 (3.80–4.00)		3.33 (2.83–3.66)		3.00 (2.66–4.00)		2.87 (2.50–3.25)	
<i>Cohen's d</i>		−0.02		−0.07		−0.02		−0.01		0.02	

CEQ-E range results from 1 to 4. T-Student and ANOVA Test results in Mean (SD).

<sup>a</sup> Mann-Whitney *U* Test results Med (P25-P75).

<sup>b</sup> Rho Spearman. Significant results showed in bold. OC-CEQ-E (Own Capacity). PS-CEQ-E (Professional Support). S-CEQ-E (Perceived Safety). P-CEQ-E (Participation). Cohen's (*d*): small effect = 0.2, medium effect = 0.5, large effect = 0.8). Eta squared: small effect = 0.01, medium effect = 0.06, large effect = 0.14).

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Table 3

Childbirth Experience (CEQ-E) related to obstetric outcomes (N = 301).

Obstetric Outcomes	n (%)	Childbirth Experience- CEQ-E									
		CP-CEQ-E		PS-CEQ-E		S-CEQ-E		P-CEQ-E		Overall score CEQ-E	
		Mean (SD)	<i>p</i>	Mean (SD)	<i>p</i>	Mean (SD)	<i>p</i>	Mean (SD)	<i>p</i>	Mean (SD)	<i>p</i>
<b>Parity</b>											
Nulliparous	144 (47.8)	2.74 (0.59)	0.05	3.77 (0.46)	0.52	3.17 (0.61)	0.07	2.96 (0.93)	0.15	3.12 (0.46)	<b>.03</b>
Multiparous	157 (52.1)	2.87 (0.55)		3.80 (0.41)		3.29 (0.52)		3.11 (0.82)		3.23 (0.38)	
<i>Cohen's d</i>		0.57		0.44		0.57		0.87		0.42	
<b>Pregnancy Risk</b>											
Low/Middle Risk	134 (44.5)	2.85 (0.53)	0.26	3.80 (0.48)	0.78	3.30 (0.51)	0.06	3.22 (0.79)	<b>.002</b>	3.24 (0.39)	<b>.03</b>
High/Very High Risk	167 (55.5)	2.77 (0.59)		3.78 (0.39)		3.18 (0.60)		2.90 (0.91)		3.13 (0.45)	
<i>Cohen's d</i>		0.57		0.43		0.56		0.86		0.42	
<b>Onset of labour</b>											
Spontaneous	200 (66.4)	2.87 (0.58)	<b>.04</b>	3.81 (0.42)	0.26	3.33 (0.56)	<b>≤.001</b>	3.12 (0.85)	<b>.02</b>	3.25 (0.42)	<b>≤.001</b>
Induction (IOL)	101 (33.6)	2.68 (0.53)		3.75 (0.45)		3.04 (0.53)		2.88 (0.90)		3.04 (0.40)	
<i>Cohen's d</i>		0.56		0.44		0.55		0.87		0.42	
<b>Intrapartum Oxytocin</b>											
No	78 (25.9)	2.86 (0.54)	0.17	3.77 (0.43)	0.3	3.37 (0.58)	<b>.008</b>	3.18 (0.90)	0.05	3.25 (0.42)	0.05
Yes	223 (74.1)	2.79 (0.58)		3.80 (0.44)		3.19 (0.55)		2.99 (0.86)		3.15 (0.42)	
<i>Cohen's d</i>		0.57		0.44		0.56		0.87		0.43	
<b>Epidural analgesia</b>											
No	67 (22.3)	2.88 (0.44)	0.77	3.80 (0.40)	0.42	3.47 (0.39)	<b>≤.001</b>	3.35 (0.77)	<b>≤.001</b>	3.31(0.31)	<b>≤.001</b>
Yes	234 (77.7)	2.78 (0.59)		3.78 (0.44)		3.16 (0.59)		2.95(0.88)		3.14(0.44)	
<i>Cohen's d</i>		0.57		0.44		0.54		0.86		0.42	
<b>Non-Pharmacological analgesia</b>											
No	258 (58.7)	2.80 (0.58)	0.52	3.79 (0.43)	0.45	3.19 (0.57)	<b>≤.001</b>	2.97 (0.88)	<b>≤.001</b>	3.15 (0.44)	<b>.01</b>
Yes	43 (14.3)	2.85 (0.45)		3.74 (0.46)		3.48 (0.43)		3.44 (0.69)		3.30 (0.33)	
<i>Cohen's d</i>		0.57		0.44		0.56		0.86		0.42	
<b>Combined analgesia</b>											
No	167 (55.5)	2.89 (0.54)	<b>≤.001</b>	3.77 (0.46)	0.36	3.29 (0.57)	0.06	3.00 (0.90)	0.43	3.21 (0.43)	0.08
Yes	134 (44.5)	2.69 (0.58)		3.81 (0.40)		3.16 (0.54)		3.08 (0.82)		3.13 (0.40)	
<i>Cohen's d</i>		0.56		0.44		0.56		0.87		0.43	
<b>Delivery outcome</b>											
Normal Vaginal	213 (70.7)	2.90 (0.54)	<b>&lt;.001</b>	3.77 (0.47)	0.05	3.35 (0.51)	<b>&lt;.001</b>	3.15 (0.83)	<b>&lt;.001</b>	3.25 (0.41)	<b>&lt;.001</b>
Instrumental	59 (19.6)	2.67 (0.57)		3.90 (0.23)		3.07 (0.49)		2.94 (0.84)		3.10 (0.32)	
Itinerant Caesarean	29 (9.6)	2.44(0.57)		3.69 (0.48)		2.69 (0.74)		2.47 (1.02)		2.80 (0.50)	
<i>Eta squared</i>		0.07		0.02		0.14		0.06		0.11	
<b>Professional attending delivery</b>											
Midwife	161 (53.5)	2.92 (0.53)	<b>≤.001</b>	3.78 (0.44)	0.62	3.38 (0.49)	<b>≤.001</b>	3.22 (0.78)	<b>≤.001</b>	3.28 (0.40)	<b>≤.001</b>
Obstetrician	140 (46.5)	2.67 (0.59)		3.80 (0.43)		3.06 (0.60)		2.83 (0.93)		3.05 (0.43)	
<i>Cohen's d</i>		0.56		0.44		0.54		0.85		0.41	
<b>Gestational Age</b>											
<37 weeks	37 (12.3)	2.88 (0.55)	0.36	3.73 (0.49)	0.41	2.95 (0.70)	<b>.001</b>	2.49 (0.99)	<b>≤.001</b>	3.04 (0.50)	<b>.04</b>
≥37 weeks	264 (87.7)	2.79 (0.57)		3.79 (0.42)		3.27 (0.54)		3.11 (0.83)		3.20 (0.41)	
<i>Cohen's d</i>		0.57		0.44		0.56		0.85		0.42	
<b>Apgar score 5 min<sup>a</sup></b>											
≥8	298 (99.0)	2.87 (2.50–3.25)	<b>&lt;.001</b>	4.00 (3.80–4.00)	0.68	3.33 (2.83–3.66)	<b>&lt;.001</b>	2.00 (1.50–2.66)	0.12	3.22 (2.95–3.50)	<b>&lt;.001</b>
≤7	3 (1.0)	1.25 (1.25–1.50)		4.00 (3.40–4.00)		1.83 (1.58–2.00)		3.00 (2.66–4.00)		2.31 (1.95–2.36)	
<i>Cohen's d</i>		0.16		0.02		0.17		0.1		0.16	
<b>Baby admission NICU<sup>a</sup></b>											
No	270 (89.7)	2.50 (2.00–2.87)	0.19	3.80 (3.20–4.00)	0.48	3.00 (2.50–3.33)	<b>&lt;.001</b>	2.66 (2.00–3.33)	<b>&lt;.001</b>	3.00 (2.59–3.27)	<b>&lt;.001</b>
Yes	31 (10.3)	2.37 (1.45–2.75)		3.60 (2.64–4.00)		2.33 (1.83–3.00)		1.66 (1.00–2.33)		2.54 (2.32–2.95)	
<i>Cohen's d</i>		0.07		0.04		0.3		0.25		0.20	

CEQ range results from 1 to 4. T-Student and ANOVA Test results in Mean (SD).

<sup>a</sup> Mann-Whitney *U* Test results Med (P25-P75). Significant results showed in bold. OC-CEQ-E (Own Capacity). PS-CEQ-E (Professional Support). S-CEQ-E (Perceived Safety). P-CEQ-E (Participation). Cohen's (*d*): small effect = 0.2, medium effect = 0.5, large effect = 0.8). Eta squared: small effect = 0.01, medium effect = 0.06, large effect = 0.14).

**Table 4**

Correlation between Childbirth Experience and number of intrapartum obstetric interventions (N = 301).

CEQ-E domains	Total	Number of interventions [2.10; DS 1.22]			p
		r	95 % CI		
			Lower	Upper	
<b>Overall score</b>	3.18 (0.43)	-0.275	-0.376	-0.167	<b>≤.001</b>
<b>CP-CEQ-E</b>	2.81(0.57)	-0.188	-0.294	-0.76	<b>.001</b>
<b>PS-CEQ-E</b>	3.79(0.44)	0.002	-0.111	0.115	0.974
<b>S-CEQ-E</b>	3.23(0.57)	-0.334	-0.431	-0.23	<b>≤.001</b>
<b>P-CEQ-E</b>	3.04(0.87)	-0.225	-0.33	-0.115	<b>≤.001</b>

Numeric variables expressed in Mean and Standard Deviation. Pearson's Correlation. Significant results showed in bold. OC-CEQ-E (Own Capacity). PS-CEQ-E (Professional Support). S-CEQ-E (Perceived Safety). P-CEQ-E (Participation). CEQ-E (overall Score).

regression results, are presented in Table 5 and illustrated in Fig. 2. The predictors identified as having a positive impact on the childbirth experience were: secondary maternal education, no NICU admission, >7 Apgar score, midwife attending the delivery, spontaneous onset of labour, not using epidural analgesia and not having an instrumental or caesarean delivery. Regarding the sense of professional support (PS-CEQ-E) no predictors were identified in the multivariate model.

#### 4. Discussion

The present study aimed to observe differences between variables related to childbirth outcomes identifying predictors that influence on the childbirth experience. It might give new perspectives on factors to be considered for improving maternal experience and promoting respectful maternity care, as some clinical variables have not been studied previously by the authors who used the CEQ, such as gestational age, pregnancy risk, the professional attending the delivery [9,11,14–16,18–23], and maternal predictors have been only identified for overall childbirth experience [11] but not for every domain (own capacity, safety, participation and professional support).

The main results indicated that most of the participants had a higher score on overall childbirth experience, being in line with other previous studies performed in the same population or using the same questionnaire [10,11].

The study identified predictors of positive childbirth experience through 5 prediction models based on different domains. Each model included sociodemographic and obstetric characteristics, finally resulting in 4 combined models.

With respect to sociodemographic variables, only higher maternal education status was identified as a predictor for lower scores in childbirth experience in the multivariate model. This result was also observed in other studies [24,25].

Regarding the type of delivery, having a caesarean birth had a negative impact in the overall childbirth experience (CEQ-E) and the participation (P-CEQ-E), as well as having an instrumental delivery reduced the perception of safety (S-CEQ-E). Several studies related spontaneous vaginal birth to higher scores in overall experience [9,14–16,19,26], and to higher safety scores [9,15,16,18,19,22,26] compared to instrumental deliveries. Other authors identified the caesarean section as a predictor of lower scores in overall experience [11]. In the same line, greater participation in spontaneous vaginal birth compared to instrumented births was observed in several studies [13,14,16,19].

In contrast, having a spontaneous onset of labour was identified as a predictor of better perception of women's own capacity (CP-CEQ-E) and greater safety (S-CEQ-E). Most childbirth experience studies with the CEQ also observed higher perceived safety scores in spontaneous vaginal deliveries compared to instrumented deliveries, and lower safety scores in induced deliveries [9,15,16,18,19,22,26]. However, other authors did not obtain any significant differences in this outcome when exploring women's own capacity [9,16,21].

In relation to the neonatal admission to the NICU and overall childbirth experience score, this study identified this variable had a negative impact in overall CEQ score and safety. Soriano-Vidal et al. [11] also observed lower overall CEQ scores when there was neonatal admission to the NICU. Our study also identified a good extrauterine adaptation with a higher Apgar score (<7) as a predictor of own maternal capacity (CP-CEQ-E) and safety (S-CEQ-E). These results might be related to the dissatisfaction associated with admission to NICU as being one of the admission criteria. Regarding the lower safety related to the new-born admission at the NICU, Cyr-Alves et al. [27] observed parents who experienced stress and symptoms of depression nearly for two months after the baby's admission. These results highlight the need to find new and effective solutions to avoid the maternal and baby separation after birth.

In this study epidural use was identified as a predictor for lower sense of participation. Similar evidence suggested that adopting upright positions when epidural is used was related to higher maternal satisfaction [28], and it also reduced the length of pushing during the second stage in normal births [29]. Capogna et al. [30] observed more probability of having a motor blockade in high dose epidurals. Lower participation observed might be explained as the epidural use increases the difficulty to adopt different maternal positions, decreasing women's empowerment and decision making in the labour process. In consequence, using epidural and the level of motor blockade should be studied in future research [31].

In the present study no predictors of better professional support (PS-CEQ-E) were identified in the multivariate model, even though significant greater own capability and overall CEQ score was reported in women attended by a midwife. In controversy, other authors obtained higher scores in the domain of professional support when women had a spontaneous vaginal birth compared to instrumented births [13,14,16,19], when using intrapartum oxytocin and with a short labour length (less than 12 h) [21]. Considering that

**Table 5**  
Multivariate model analysis of Childbirth Experience Predictors (N = 301).

Characteristics	Childbirth Experience Predictors (N = 301)															
	CP-CEQ-E (R <sup>2</sup> = 0.158)				S-CEQ-E (R <sup>2</sup> = 0.228)				P-CEQ-E (R <sup>2</sup> = 0.125)				CEQ-E overall score (R <sup>2</sup> = 0.188)			
	β	p	95 % CI of β		β	p	95 % CI of β		β	p	95 % CI of β		β	p	95 % CI of β	
			Lower	Upper			Lower	Upper			Lower	Upper			Lower	Upper
<b>Constant</b>																
<b>Maternal education</b> (Primary = 1/Higher = 2)	-0.15	<b>.004</b>	-0.19	-0.04									-0.11	<b>.03</b>	-0.12	-0.01
<b>Preterm Gestational Age</b>	-0.13	<b>.016</b>	-0.42	-0.04												
<b>NICU admission</b>					-0.11	<b>.04</b>	-0.41	-0.01	-0.24	<b>&lt;.001</b>	-1	-0.38				
<b>Apgar score</b> (<7 = 1/≥7 = 2)	0.24	<b>&lt;.001</b>	0.78	2.02	0.2	<b>&lt;.001</b>	0.51	1.72					0.22	<b>&lt;.001</b>	0.49	1.39
<b>Professional attending delivery</b> (Midwife = 1/ Obstetrician = 2)	-0.16	<b>.006</b>	-0.31	-0.05									-0.15	<b>.007</b>	-0.22	-0.03
<b>Spontaneous Onset</b>	0.16	<b>.003</b>	0.06	0.32	0.2	<b>&lt;.001</b>	0.12	0.37								
<b>Induction of Labour</b>													-0.19	<b>&lt;.001</b>	-0.27	-0.08
<b>Instrumental delivery</b>					-0.14	<b>.008</b>	-0.36	-0.05								
<b>Caesarean section</b>	-0.11	<b>.04</b>	-0.44	-0.004	-0.24	<b>&lt;.001</b>	-0.66	-0.25	-0.13	<b>.02</b>	-0.72	-0.07	-0.18	<b>.001</b>	-0.43	-0.11
<b>Epidural Analgesia</b>									-0.13	<b>.02</b>	-0.5	-0.05				

Linear Regression Multivariate Test. Significant results showed in bold. OC-CEQ-E (Own Capacity), PS-CEQ-E (Professional Support), S-CEQ-E (Perceived Safety), P-CEQ-E (Participation), CEQ-E (Overall Score).

∞



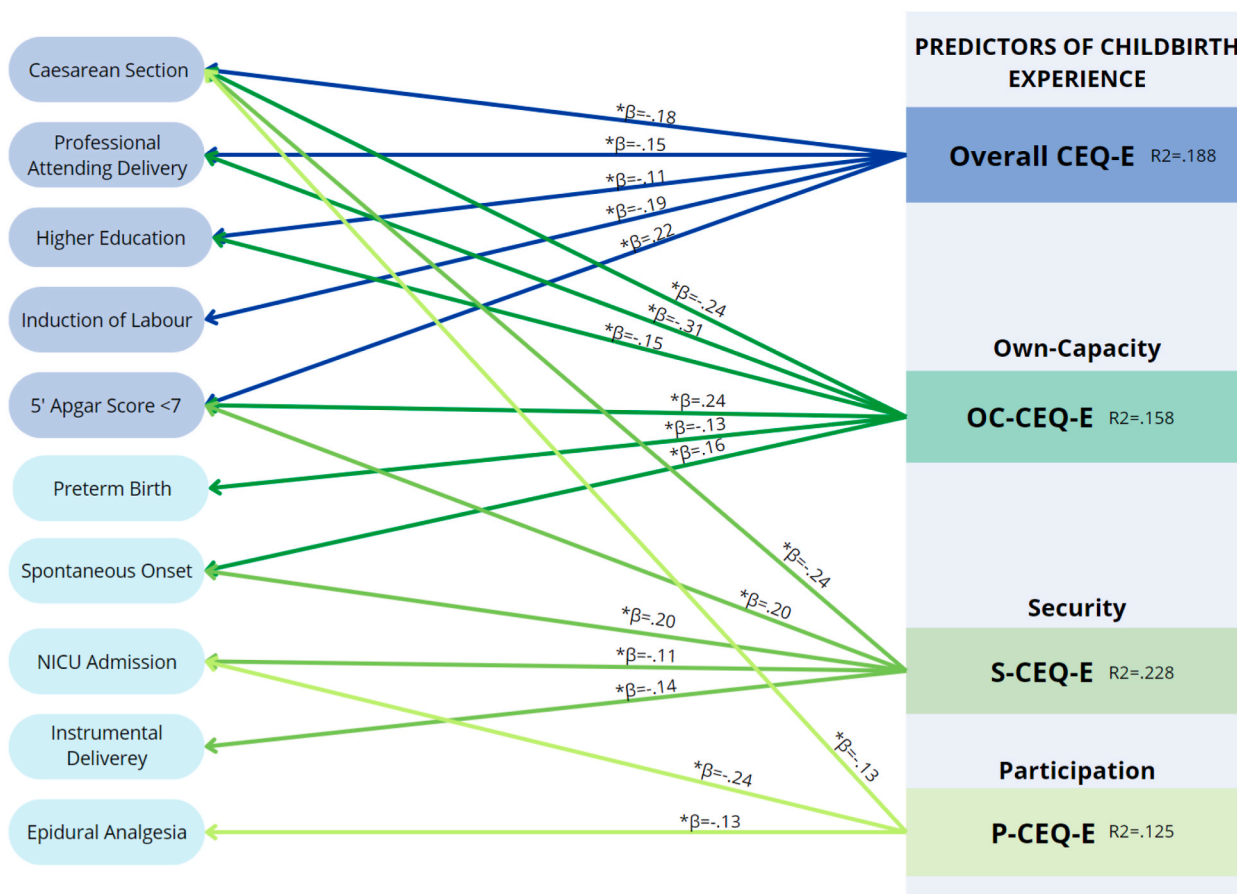


Fig. 2. Predictors of maternal satisfaction.

obstetricians attend most of the complicated deliveries like instrumental and caesareans, this result should be interpreted with caution as it would be appropriate to explore qualitatively the main reasons of these results to have a better understanding. Other questionnaires include specific domains regarding the birth attendant facilitating comparison of maternal satisfaction between different professionals [32], which should be considered as a specialized tool to evaluate this variable in future studies in combination with the CEQ-E.

Finally, some significant associations observed in the bivariate analysis were not found to be a predictor of positive childbirth experience, which might need further clarification. A greater safety was observed when using intrapartum oxytocin. Some authors did not obtain conclusive results on the oxytocin use effect on the feeling of safety [15,16,22,33], while others claimed that there was lower safety perceived [10,13,15,26]. This discrepancy in the results might suggest that other variables such as the time of initiating oxytocin, the cervix dilation and the progression of labour should be considered to have a better understanding of the phenomenon. Another outcome was the use of the cascade of obstetric intervention related to lower overall CEQ scores and having an inverse correlation to a greater number of intrapartum interventions applied. Other authors also studied the influence of interventionism related to childbirth experience [11,34], and lower rates of adverse events and interventions were identified in midwifery led-care homebirths [35]. However, these studies have not identified a decrease in overall childbirth experience or satisfaction when using more interventions and not exploring the same domains.

#### 4.1. Applicability and clinical relevance

This study highlighted the importance of the midwifery role to ensure respectful maternity care and achieve a positive childbirth experience when a midwife attended the delivery. In addition, NICU admission was identified as a barrier for a better childbirth experience. Therefore, avoiding maternal-infant separation even when baby’s admission is required should be a priority in patient centred care, offering alternatives such as intensive care units mixed with maternity wards. Moreover, implementing positive childbirth experience predictors as standardized outcome measures for ensuring a respectful maternity care should be a priority, as other authors also recommended [36].

## 4.2. Limitations

Regarding the limitations of this study, using a cross-sectional and descriptive design does not allow establishing the causality, and because of the non-probabilistic sampling, the results cannot be extrapolated to the general population. Since the childbirth experience questionnaire only allows the assessment of this item quantitatively, the different reasons for women's experience are not explored.

## 4.3. Future research

A multicentric approach should be conducted to explore differences in models of care, interventions applied, delivery outcomes and childbirth experience. Furthermore, maternal perceptions should be explored more in depth in a qualitative study to understand the reasons behind these results. Professional's point of view should be considered as well to improve quality of intrapartum care, and to increase participation and decision making among women.

## 5. Conclusion

The study revealed that overall women had a positive childbirth experience and value the professional support received. Higher maternal education, caesarean and instrumental deliveries, and neonatal intensive care unit admission influenced negatively on the overall birth experience. Spontaneous labour onset predicted better perceived maternal capacity and safety. Using an epidural was linked to a lower sense of participation. No predictors were found for better professional support, though midwife-attended births reported higher scores in overall experience and own capacity, emphasized the midwife's role in promoting a positive childbirth experience. Further qualitative research needs to be done to have a better understanding of the main factors influencing the childbirth experience, as well as establishing indicators of maternal respectful care.

### Ethical statement approval

Ethical approval for this study was obtained from Hospital of Girona Dr. Josep Trueta Ethics Committee (Project number 2017.044, 2017-04-28). An informed consent was obtained from the participant's prior study collection. All participants were informed that confidentiality, anonymity and right of withdraw were assured all times.

Institutional Review Board Statement: The study was conducted following the Declaration of Helsinki and approved by the management of the hospital.

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### Data availability statement

Data will be available on request to the corresponding author.

### Declaration of interest's statement

The authors report no conflict of interest.

### CRedit authorship contribution statement

**M. Roqueta-Vall-Iloera:** Writing – original draft, Methodology, Investigation, Data curation, Conceptualization. **D. Cámara-Liebana:** Writing – review & editing. **E. Serrat-Graboleda:** Writing – review & editing. **L. Salleras-Duran:** Writing – review & editing. **M. Buxó-Pujolràs:** Formal analysis. **C. Fuentes-Pumarola:** Writing – review & editing, Supervision. **D. Ballester-Ferrando:** Writing – review & editing, Supervision.

### 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.

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