



Childbirth experience questionnaire 2 – Icelandic translation and validation

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ABSTRACT

Objective: The aim of this study was to translate the Childbirth Experience Questionnaire (CEQ2) to Icelandic and assess its psychometric characteristics.

Methods: The CEQ2 was translated to Icelandic using forward-to-back translation and tested for face-validity (n = 10). Then data was collected in an online survey to test validation in terms of reliability and construct validity (n = 1125). Reliability was assessed by calculating Cronbach's alpha for the total scale and subscales. Cronbach's alpha > 0.7 was regarded as satisfactory. Construct validity was measured using known-groups validation with data collected on women's birth outcomes known to be associated with more positive birth experiences. A comparison was made of CEQ2 subscale scores and total CEQ2 score for country of origin, social complications, parity, pregnancy complications, birthplace, mode of birth, maternal autonomy and decision making (MADM), and mothers on respect index (MORI). Mann Whitney U and Kruskal Wallis H tests were used to compare scale scores between the groups. Principal components analysis with varimax rotation was chosen to determine whether the Icelandic version of the CEQ had similar psychometric properties as the original version.

Results: The face validity and internal consistency reliability (Cronbach's alpha > 0.85 for the total scale and all subscales) of the Icelandic version of CEQ2 was good. Our findings indicate that two of the items in the 'own capacity' domain were not sufficiently related to other items of the scale to warrant inclusion.

Conclusions: The Icelandic CEQ2 is a valid and reliable measure of childbirth experience but further work is needed to determine the optimal number of items and domains of the Icelandic CEQ2.

Background

The most recent recommendations for intrapartum care published by The World Health Organization (WHO) emphasize the importance of a positive birth experience [1]. However, measuring childbirth experience can be challenging, as the influencing factors are multifaceted. For example, caregivers' support during pregnancy [2], labour and birth [2–4], minimal intervention [3,4], birth preparation [3], positive feelings about the approaching birth [4], emotional strength [5] feeling in control [4], perception of safety [5] and early mother-newborn contact [6] are all factors that are associated with a positive birth experience. On the other hand, operative births [2,7,8], intrapartum complications [7], maternal complications during pregnancy [9] and prolonged labour [2,9] are associated with negative birth experience as well as fear of childbirth [8], prior negative birth experience [2,8], feelings of not being in control or powerlessness during birth [7] and history of mental health problems [10,11].

Childbirth experiences can significantly affect women's wellbeing, parent-infant bonding [12], the relationship between mother, baby and partner [10] and future family planning [13]. Postpartum psychological

trauma has been associated with women's negative birth experience, with 1–6% of them developing post-traumatic stress disorder (PTSD) related to childbirth [14]. Moreover, a higher risk of developing fear of childbirth and an increased preference for elective caesarean section have been found in women reporting negative birth experience [13].

The Childbirth Experience Questionnaire (CEQ) is a robust tool to measure various aspects of women's childbirth experience. The original CEQ includes 22 statements assessing four domains: *own capacity*, *perceived safety*, *professional support*, and *participation*. It was developed in Sweden in 2010 and validated with 920 first-time mothers [15]. The CEQ was revised in 2020 and tested in a sample of 682 women. While the revised version (CEQ2) still includes the same four domains, eight of 22 items were revised to reflect a more woman-centred approach to care provision during childbirth [16]. The original CEQ has been translated into multiple languages and was found to be a valid and reliable measure of childbirth experience. The CEQ2 has also been validated in various languages [16–18].

Evaluating and quantifying women's childbirth experiences, using a multidimensional tool like CEQ2 is beneficial for clinical practice and research. The aim of this study was to translate, pretest and validate the

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Icelandic version of the CEQ2 (Fig. 1) for: (a) face validity, (b) internal consistency (reliability) and (c) construct validity in the Icelandic population.

Methods

Participants

Participants were Icelandic speaking women, 18 years or older who had given birth in Iceland between 2015 and 2021 (N = 1125). An online survey, Maternity care in Iceland (MCI), including the CEQ2 instrument, was developed and then promoted through social media (Facebook and Instagram) in groups that are commonly used by child-bearing people in Iceland [19]. According to a recent survey on social media use in Iceland 89–94% of women ages 18–44 years use Facebook and 59–63% use Instagram (Gallup, 2019). In addition, midwives working in antenatal, intrapartum and postpartum services advertised the survey. Data collection took place between October 23rd, 2020, until April 30th, 2021.

Instrument

The CEQ2 has 22 items assessing four domains of childbirth experience (Fig. 1). For 19 statements the response format is a 4-point Likert Scale: 4 (totally agree), 3 (mostly agree), 2 (mostly disagree), 1 (totally disagree). Negatively worded statements are reversed scored. Questions about labour pain, sense of security and control (items 20–22) are assessed with visual analogue scales (VAS). The VAS-scales scores are transformed to categorical values as follows: 0–40 coded as 1, 41–60 coded as 2, 61–80 coded as 3, 81–100 coded as 4. Item ratings are aggregated to scale scores by adding the coded values of the items in each domain and dividing by the number of items in that scale, which results in the mean score. Higher scores indicate better childbirth experience, with the highest possible score being 4 points and the lowest possible score being 1 point. Total CEQ2 scale scores are computed for participants who complete all items by adding all four subscale scores and dividing by 4.

Translation process

The CEQ2 was translated into Icelandic using a standard forward and backward translation process [20]. First, two native Icelandic speakers

1. Fæðingin fór eins og ég hafði búist við.
2. Mér fannst ég sterk í fæðingunni.
3. Ég varð hrædd í fæðingunni.
4. Ég hafði trú á eigin getu í fæðingunni.
5. Ég var þreytt í fæðingunni.
6. Ég var hamingjusöm í fæðingunni.
7. Mér fannst ég ráða vel við aðstæður.
8. Ég vildi óska að starfsfólkið hefði hlustað meira á mig í fæðingunni.
9. Ég tók þátt í ákvörðunum um umönnun mína og meðferð eins mikið og ég vildi.
10. Það var komið fram við mig og maka minn af hlýju og virðingu.
11. Ég fékk þær upplýsingar sem ég þurfti á meðan á fæðingu stóð.
12. Ég hefði viljað að ljósmóðirin hefði verið meira til staðar í fæðingunni.
13. Ég hefði viljað fá meiri hvatningu frá ljósmóðurinni.
14. Ljósmóðirin skapaði rólegt andrúmsloft.
15. Ljósmóðirin hjálpaði mér að finna minn innri styrk.
16. Mér fannst þekking og færni heilbrigðisstarfsfólks veita mér öryggisfinningu.
17. Ég á margar jákvæðar minningar frá fæðingunni.
18. Ég á margar neikvæðar minningar frá fæðingunni.
19. Sumar minningar mínar frá fæðingunni eru þess eðlis að ég finn fyrir þunglyndi.
20. Á heildina litið, hversu sársaukafull fannst þér fæðingin vera?
Enginn sársauki ----- Versti sársauki sem ég get ímyndað mér
21. Á heildina litið, hversu mikla stjórn fannst þér þú hafa í fæðingunni?
Enga stjórn ----- Algjöra stjórn
22. Á heildina litið, hversu örugg fannst þér þú vera í fæðingunni?
Alls ekki örugg ----- Alveg örugg

Fig. 1. The Icelandic translation of the CEQ2 consists of 22 questions. The first 19 questions were on a 4-point Likert scale (Totally agree, mostly agree, mostly disagree, totally disagree). The subdomains were own capacity (questions 1, 2, 4–7, 20–21), professional support (questions 10, 12–15), perceived safety (questions 3, 16–19, 22) and participation (questions 8, 9 and 11).

familiar with childbirth care translated the English version of the CEQ2 into Icelandic. Next, a group of experts compared the two versions and combined them into one. Then, a native English speaker translated the Icelandic version back to English. The translated English version was then compared to the original and any inconsistencies discussed among the expert group. Each item from this forward–backward translation was contrasted with the original one, and all differences were reported to the original Swedish authors of the CEQ2 and then resolved. When the terminology used in the questionnaire required clarification (i.e. differences between delivery and birth), the first author of the original Swedish questionnaire was consulted. The expert group made suggestions and then agreed on the final Icelandic version. The MADM and MORi instruments described below had been translated previously, using the same method [21].

Background variables and other instruments

The following background variables were included in the survey: Age categories (<25, 25–29, 30–34, ≥35); country of origin (native-born, foreign-born); relationship status (single, married/living with partner); highest level of education completed (university education, other); monthly income in Icelandic kronur (ISK) for the entire household before taxes (<300.000 ISK, 300.000–499.999, 500.000–699.999, 700.000–900.000, >900.000); social complications (One or more of the following: housing problems, financial difficulties, lack of support from friends and family, difficulty accessing health care, physical abuse, mental abuse, anxiety, depression); parity (primiparous, multiparous); place of birth (mixed-risk hospital setting, other); pregnancy complications (One or more of the following: spotting/bleeding for more than a few days, anaemia, high blood pressure, gestational diabetes, placenta problems, infection, GBS positive, problems with the baby's growth/amniotic fluid, problems with the baby's position, twins or more, premature labour); and type of birth (vaginal, caesarean section). The types of social complications that were asked about in this survey were determined by consulting an experienced researcher who had developed the original survey in Canada [22,23]. For place of birth, "other" settings included homebirth and midwifery-led birth centres. Also, for the group of women who gave birth vaginally, this included both normal and instrumental birth. For the group of women who gave birth via caesarean section, this included emergency as well elective surgery.

To assess a woman's sense of autonomy during pregnancy and birth, the Mothers' Autonomy in Decision Making Scale (MADM) instrument was included. It consists of 7 items with response options on a 6-point Likert scale ranging from 1 (completely disagree) to 6 (completely agree), resulting in summarized score ranging from 7 to 42. A higher score indicates higher perceived autonomy and ability to participate in decisions about care. The psychometric properties of the MADM instrument have been evaluated with childbearing people in Canada [22].

To assess a woman's experience of respect from maternity care providers, the Mothers on Respect index (MORi) was also included. It consists of 14 items with response options on a 6-point Likert scale ranging from 1 (completely disagree) to 6 (completely agree), resulting in a summarized score ranging from 14 to 84. The psychometric properties of the MORi have been evaluated based on women's experiences of respect in maternity care [23].

Data analysis

Face validity: The data were collected and managed using REDCap electronic data capture tools [24]. To validate the questionnaire in terms of face validity, we first tested the Icelandic CEQ2 among ten women who had given birth [25]. This was a convenience sample; however, participants were women who reflected the target group, i.e. women of childbearing age who had given birth to at least one child. They were asked to complete the questionnaire and then asked questions about whether the questionnaire was easy to understand, easy to complete and

acceptable to them. This first step was also used to make sure that the online survey was easily accessible and that all technical aspects would work on computers as well as smartphones. Specifically, the aim of pretesting was to evaluate: (1) the functionality and format of the online survey; (2) comprehension of the survey items; (3) comprehensive answer options; and (4) the length of time required to complete the survey. The written evaluation included questions that were based on cognitive methods of pretesting survey instruments developed by Collins [26].

Internal reliability: Next, internal consistency reliability of the CEQ2 were assessed, using analysis of Cronbach's alpha and corrected item to total correlations (CITC). Based on previous studies validating the CEQ2 [17], the planned sample size was 475 participants. A value of Cronbach's alpha > 0.7 was regarded as satisfactory. Low CITC values help identify items that are not highly correlated with the sum of other items.

Construct validity: Construct validity was measured by using the method of known-groups validations. Known-groups validation assesses the ability of the instrument to distinguish between subgroups known to differ on key sociodemographic or clinical variables. A comparison was made of CEQ2 subscale scores and total CEQ2 score for country of origin (Icelandic/other), social complications (none/any), parity (multipara/primipara), pregnancy complications (none/any), birthplace, type of birth (vaginal/caesarean), maternal autonomy and decision making (MADM) [22], and respectful care (MORi) [23]. These were chosen as previous research has shown that they can have a negative impact on birth experience. As the scale scores were not normally distributed, a Mann Whitney *U* test was used to compare scale scores between two groups, and a Kruskal Wallis *H* test was used to compare scale scores among 3 or more groups.

We also performed factor analysis, to determine whether the Icelandic version of the CEQ has similar psychometric properties as the original version. Principal components analysis with varimax rotation was chosen, to align with the original factor analysis reported by Dencker et al. [16].

All analyses were done using SPSS version 28.01.01. Permission to conduct the study was obtained from the Icelandic Ethics committee (VSNb2020090017/03.01).

Results

A total of 1125 women completed the survey, including the Icelandic CEQ2, sociodemographic and maternity care questions. Characteristics of the study population are shown in Table 1. The majority of the women were aged 25–29 (44.0%), and the vast majority was native born (97.3%) and cohabiting or married (94.7%). About half of the study population reported at least one social complication (52.4%) and at least one pregnancy complication (66.9%). About one third of the study population was induced and 14.2% had a caesarean section.

Face validity

The face validity was tested by asking ten women to complete the CEQ2 and all of them found the questionnaire easy to understand and easy to complete online with a tablet or computer. All ten women found that the structure and instructions of the questionnaire were clear and reported that they would recommend the survey to friends and family. None of them made any suggestions for changes in language or structure.

Internal consistency

The Cronbach's alpha for the total scale was $\alpha = 0.95$ and subscales alphas (i.e. own capacity, perceived safety, professional support and participation) ranged from 0.86 to 0.90 (Table 2). Corrected item to total correlation (CITC) scores exceeded 0.6 for all but two items: I was tired during labour and birth (CITC: 0.3) and the categorized pain score

Table 1

Childbirth Experience Questionnaire, version 2 (CEQ2) differences in dimension scores and overall scores among different groups in an Icelandic population of mothers giving birth during the time period 2015–2021 (N = 1125).

Group	N = 1125 n (%)	Own capacity M (SD)	Perceived safety M (SD)	Professional support M (SD)	Participation M (SD)	Overall score M (SD)	MADM Med (IQR)	MORI Med (IQR)
Age (years)								
<25	194 (17.3)	2.56 (0.05)	3.13 (0.07)	3.24 (0.06)	3.14 (0.07)	3.02 (0.06)	33 (17)	73 (18)
25–29	495 (44.0)	2.67 (0.03)	3.30 (0.03)	3.34 (0.03)	3.33 (0.04)	3.16 (0.03)	33 (12)	76 (13)
30–34	285 (25.3)	2.76 (0.04)	3.42 (0.04)	3.44 (0.04)	3.44 (0.04)	3.26 (0.04)	33 (12)	77 (12)
≥35	151 (13.4)	2.70 (0.06)	3.41 (0.06)	3.50 (0.06)	3.41 (0.06)	3.25 (0.05)	35 (13)	79 (12)
P-value*		0.05	0.005	0.004	0.15	0.007	0.06	0.004
Country of origin								
Native-born	1095 (97.3)	2.67 (0.02)	3.31 (0.02)	3.37 (0.02)	3.34 (0.03)	3.17 (0.02)	34 (12)	76 (13)
Immigrant	30 (2.7)	2.83 (0.10)	3.36 (0.11)	3.33 (0.12)	3.22 (0.15)	3.18 (0.10)	28.5 (9.25)	67 (16.5)
P-value**		0.342	0.763	0.280	0.370	0.688	0.23	0.053
Marital status								
Single	60 (5.3)	2.59 (0.09)	3.02 (0.11)	3.19 (0.11)	3.13 (0.12)	2.98 (0.10)	32 (18.5)	73 (20)
Married/cohabitation	1065 (94.7)	2.67 (0.02)	3.33 (0.02)	3.38 (0.02)	3.34 (0.03)	3.18 (0.02)	34 (12)	76 (13)
P-value**		0.250	0.003	0.072	0.141	0.045	0.36	0.24
Educational level								
University	677 (60.2)	2.73 (0.03)	3.39 (0.03)	3.41 (0.03)	3.41 (0.03)	3.23 (0.02)	34 (12)	77 (12)
Other	448 (39.8)	2.59 (0.04)	3.21 (0.04)	3.30 (0.04)	3.21 (0.04)	3.08 (0.03)	33 (14)	74 (16.5)
P-value**		<0.001	<0.001	0.106	0.002	0.002	0.43	0.004
Monthly income (ISK)								
<300.000	99 (8.8)	2.47 (0.07)	2.98 (0.09)	3.13 (0.10)	3.06 (0.10)	2.91 (0.08)	31.5 (15.25)	72.5 (19.5)
300.000–499.999	210 (18.7)	2.58 (0.05)	3.19 (0.06)	3.32 (0.05)	3.26 (0.06)	3.09 (0.05)	34 (13.5)	76 (14)
500.000–699.999	308 (27.4)	2.66 (0.04)	3.30 (0.05)	3.33 (0.04)	3.34 (0.05)	3.16 (0.04)	33 (12)	75 (14)
700.000–899.999	229 (20.3)	2.73 (0.05)	3.42 (0.05)	3.45 (0.05)	3.42 (0.05)	3.25 (0.04)	34 (12.5)	77 (12)
≥900.000	279 (24.8)	2.78 (0.04)	3.44 (0.04)	3.48 (0.04)	3.42 (0.05)	3.28 (0.04)	34 (11)	78 (12)
P-value*		<0.001	<0.001	<0.001	0.004	<0.001	0.13	0.012
Social complications								
None	535 (47.6)	2.85 (0.03)	3.54 (0.03)	3.52 (0.03)	3.51 (0.03)	3.36 (0.02)	35 (11)	79 (11)
At least one	590 (52.4)	2.51 (0.03)	3.10 (0.03)	3.23 (0.03)	3.17 (0.04)	3.00 (0.03)	32 (13.5)	73 (16)
P-value**		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Parity								
Primiparous	751 (66.8)	2.55 (0.03)	3.22 (0.03)	3.29 (0.03)	3.24 (0.03)	3.08 (0.03)	33 (13)	75 (14)
Multiparous	374 (33.2)	2.91 (0.03)	3.49 (0.03)	3.53 (0.03)	3.51 (0.04)	3.36 (0.03)	35 (13)	78 (12)
P-value**		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.03
Pregnancy complications								
None	372 (33.1)	2.78 (0.04)	3.43 (0.04)	3.43 (0.04)	3.45 (0.04)	3.27 (0.03)	35 (13)	78 (11)
At least one	753 (66.9)	2.62 (0.03)	3.25 (0.03)	3.34 (0.03)	3.28 (0.03)	3.12 (0.03)	33 (12)	75 (14)
P-value**		<0.001	<0.001	0.029	<0.001	<0.001	0.03	0.005
Birth place								
Hospital	1047 (93.1)	2.65 (0.02)	3.29 (0.02)	3.35 (0.02)	3.31 (0.03)	3.15 (0.02)	35 (13)	78 (11)
Other	78 (6.9)	3.01 (0.08)	3.60 (0.07)	3.63 (0.07)	3.66 (0.08)	3.48 (0.07)	33 (12)	75 (14)
P-value**		<0.001	<0.001	<0.001	<0.001	<0.001	0.006	0.008
Induction								
Yes	399 (35.5)	2.53 (0.04)	3.17 (0.04)	3.26 (0.04)	3.18 (0.04)	3.04 (0.04)	32 (13)	74 (16)
No	726 (64.5)	2.75 (0.03)	3.39 (0.03)	3.43 (0.03)	3.41 (0.03)	3.24 (0.02)	34 (11)	77 (12)
P-value**		<0.001	<0.001	<0.001	<0.001	<0.001	0.02	0.003
Type of Birth								
Vaginal	965 (85.8)	2.72 (0.02)	3.38 (0.02)	3.40 (0.02)	3.37 (0.03)	3.37 (0.03)	34 (12)	77 (13)
Cesarean section	160 (14.2)	2.36 (0.05)	2.90 (0.06)	3.21 (0.06)	3.09 (0.07)	3.09 (0.07)	33.5 (12)	72 (14)
P-value**		<0.001	<0.001	<0.001	<0.001	<0.001	0.86	0.006

* Kruskal-Wallis H test for significance, $p < 0.05$.

** Mann-Whitney U test for significance, $p < 0.05$.

Table 2

Cronbach's alpha for CEQ-2 subscale domains and for the overall scale.

Domain	Number of items	Cronbach's alpha	Mean (range)
Own capacity	8	0.855	2.673 (1.279)
Professional support	5	0.893	3.312 (0.666)
Perceived safety	6	0.904	3.369 (0.366)
Participation	3	0.868	3.332 (0.174)
Total scale	22	0.948	3.095 (1.599)

(CITC: 0.2).

Construct validity

In the study population the mean CEQ2 score was 3.10 (range: 1.00–4.00). The score was the lowest for own capacity (2.67) but similar

for professional support (3.31), perceived safety (3.37) and participation (3.33; Table 1).

The overall CEQ2 score increased with increasing age ($p < 0.05$) and women who were married or cohabiting were more likely to have higher CEQ2 scores compared to single women ($p < 0.05$, Table 2). Multiparous women were also more likely to have higher CEQ2 scores compared to primiparous women ($p < 0.001$). Women with university education were more likely to have higher CEQ2 scores compared to women with other education ($p < 0.02$). As monthly income increased, the CEQ2 score was higher, with 2.91 for the lowest income group and 3.28 for the highest income group ($p < 0.001$). In summary, birth experiences were significantly more positive for older, more affluent and more educated childbearing people.

Women with at least one social complication had lower mean scores compared to women with no social complication (CEQ = 3.00 compared to 3.36, respectively ($p < 0.001$)). Birthplace, induction of labour and

mode of birth were all factors significantly associated with birth experience and women giving birth vaginally, outside of the hospital had higher scores compared to women who gave birth in a hospital or via caesarean section. Similarly, women with induced labours had lower CEQ2 scores compared to women with spontaneous labours ($p < 0.001$) (Table 1).

Comparison of CEQ2 scores with the MADM and MORi scores showed significant and positive correlations meaning that those with more positive childbirth experiences also reported higher scores for respect, $r(1123) = 0.545$, $p < 0.001$, and autonomy, $r(1123) = 0.510$, $p < 0.001$.

Psychometric analysis indicated that the Icelandic CEQ2 version has three principal components, not four (based on the number of components with Eigenvalues > 1). For the first subscale (Own capacity), the principal components analysis suggests that six items belong to the original subscale and two items do not (Table 3). These two items also have low item to total correlations and are the only items that scored high on the third component, indicating that these two items present a separate component of childbirth experience. Our findings also show that many of the items in the perceived safety subscale scored high on the same component as the 'Own capacity' subscale, indicating that the Icelandic version has much more conceptual overlap between these two subscales than the original version. In this context, it must also be noted that 4 of 6 'Perceived safety' items exhibited high values on two components, making it difficult to assign an underlying domain to those items. The five professional support and three participation items had high values on component one, meaning that these two subscales measure the same underlying construct when using the CEQ2 in Iceland.

Discussion

Our study is the first to examine the psychometric properties of the Icelandic translation of the Childbirth Experience Questionnaire (CEQ2) and shows that CEQ2 is a reliable and valid tool for assessing childbirth experience in the Icelandic population. However, the Icelandic version of CEQ2 seems to have three domains rather than four as in the Swedish original version, with the domains professional support and participation measuring the same construct.

The sample in the study was representative of the Icelandic childbearing population in terms of age, educational level [27], birth outcomes and place of birth [28]. According to the National Statistical Institute of Iceland (2023), the average age of childbearing women is 30.5 years and approximately 51% of women have completed university-level education. In almost 95% of families, the parents are either married or cohabitating. In 2020, the rate of induction was approximately 30%, and the caesarean section rate was 16.1%. However, there are some differences in terms of the higher proportion of first-time mothers who participated compared to the population (66,8% vs 46% respectively) [29].

Face validity of the Icelandic CEQ2 was good and the questionnaire performed well in known-groups validation as women with known risk factors for negative experiences [2], consistently had lower scores and those expected to have better birth experiences scored higher on the CEQ2. Principal component analysis showed that the Icelandic version of the CEQ2 has two domains with a robust number of items and one domain with only two items. Subscales should have a minimum of three items. Considering this rule of thumb, in addition to the relatively poor performance of the items that measure fatigue and pain, more work is needed to determine whether the Icelandic version of the CEQ2 needs revision. The structure of the CEQ has been modified in some studies, due to cultural and linguistic as well as differences pertaining to birth practice [30,31]. In Iceland, the structure of society and hospital practices are very similar to those in Sweden and therefore the questionnaire was translated to Icelandic without changes to original working or structure of items [32].

Table 3

Results from confirmatory factor analysis of CEQ items.

	Components			Corrected Item to Total Correlations*
	1	2	3	
Domain: <i>Own capacity (8 items)</i>				
1 Labour and birth went as I had expected.	0.192	0.650	0.214	0.598
2 I felt strong during labour and birth.	0.202	0.788	0.009	0.666
4 I felt capable during labour and birth.	0.173	0.804	0.024	0.662
5 I was tired during labour and birth. (R) *	0.002	0.280	0.721	0.300
6 I felt happy during labour and birth.	0.320	0.794	0.121	0.778
7 I felt that I handled the situation well.	0.252	0.827	0.166	0.766
20 As a whole, how painful did you feel childbirth was? ** (R)	0.074	0.068	0.761	0.204
21 As a whole, how much control did you feel you had during childbirth? **	0.228	0.711	0.107	0.646
Domain: <i>Perceived safety (6 items)</i>				
3 I felt scared during labour and birth. (R)	0.281	0.682	0.219	0.683
16 My impression of the team's medical skills made me feel secure.	0.775	0.277	-0.056	0.671
17 I have many positive memories from childbirth.	0.535	0.673	0.042	0.820
18 I have many negative memories from childbirth. (R)	0.483	0.694	0.185	0.832
19 Some of my memories from childbirth make me feel depressed. (R)	0.428	0.552	0.057	0.654
22 As a whole, how secure did you feel during childbirth? **	0.467	0.580	0.068	0.707
Domain: <i>Professional support (5 items)</i>				
10 Both my partner and I were treated with warmth and respect.	0.800	0.237	-0.046	0.661
12 I would have preferred the midwife to be more present during labour and birth. (R)	0.765	0.175	0.267	0.654
13 I would have preferred more encouragement from the midwife. (R)	0.780	0.191	0.227	0.669
14 The midwife conveyed an atmosphere of calm.	0.825	0.225	-0.038	0.670
15 The midwife helped me to find my inner strength.	0.793	0.295	-0.013	0.705
Domain: <i>Participation (3 items)</i>				
8 I wish the staff had listened to me more during labour and birth. (R)	0.753	0.313	0.129	0.719
9 I took part in decisions regarding my care and treatment as much as I wanted.	0.656	0.476	-0.017	0.743
11 I received the information I needed during labour and birth.	0.721	0.424	0.050	0.765

* Item reversed in scoring.

** Visual analogue scale (VAS).

Internal consistency

Similar to recently published studies in Sweden, the UK, Germany and Netherlands [16–18,32], the internal consistency of the Icelandic CEQ2 was high, demonstrating it as a reliable tool to measure women's childbirth experience in the Icelandic context. Two items were not as

highly correlated with the sum of other items (feeling tired during labour and birth, and the categorized pain score), suggesting that these should not be included in a subscale that measures women's own capacity. One could argue that perceptions of labour pain and feeling tired should not be included in a subscale that measures women's own capacity, because these items are not phrased in a way that link to women's capacity. In other words: I felt tired (wording of CEQ2 item) is different from 'I believe I can overcome feelings of fatigue'. Similarly, a pain rating is not necessarily related to women's capacity. The Swedish authors recommend reverse scoring the pain VAS which implies that lower pain ratings are equated with higher capacity. This assumption might be justified; however, others might argue that perceptions of pain have less to do with women's capacity than how they cope with the pain.

Construct validity

Our findings show a difference between several subgroups based on maternal characteristics (e.g. age, parity), birthplace, and birth characteristics (e.g. birth onset, birth mode). This is consistent with prior research, which has found associations between negative birth experience and operative births [2,7,8], intrapartum complications [7] and maternal complications during pregnancy [9]. Furthermore, feelings of not being in control, and powerlessness during birth [7] have been associated with negative birth experiences as well as history of psychosocial health issues [10,11].

Strengths and limitations

The rigorous translation process and large sample size are strengths of the current study. The translation was done by a forward to back translation method which promotes a valid measurement of childbirth experience in the Icelandic context. Furthermore, one of the strengths lie in a large sample size, strengthening all statistical analysis. The known-groups validation revealed that the Icelandic CEQ2 was able to differentiate the birth experience among women who differed in their mode of birth, onset of labour, birthplace and perception of autonomy and respect during pregnancy.

There were some limitations. First, all data was self-reported and therefore a recall bias cannot be ruled out. Second, we used a convenience sample, however, the sample was mostly representative of the population with the exception of a higher proportion of first-time mothers than in the Icelandic population. Third, we did not have information on whether a caesarean section was elective or an emergency operation. It would have been interesting to stratify our analysis with this information as it is known that birth experience may be quite different among women with elective caesarean section compared to women experiencing an emergency caesarean section. Fourth, we had no information on how long ago the women gave birth. However, prior research shows that women's birth experiences are mostly consistent over time [2], and therefore, this is not likely to affect the psychometric evaluation of the CEQ2 instrument. Fifth, our analysis showed two items (feeling tired during labour and birth, and categorized pain score) that were not as highly correlated as all the others. Finally, the Icelandic version of the CEQ2 showed much more overlap between the professional support of midwives and women's sense of safety, which highlights the importance of midwives in making childbearing people feel safe, reducing fear and facilitating a positive childbirth experience.

Conclusion

The face validity and internal consistency reliability of the Icelandic version of CEQ2 was good. Our findings indicate that two of the items in the 'own capacity' domain were not sufficiently related to other items of the scale to warrant inclusion. Further work is needed to determine the optimal number of items and domains of the Icelandic CEQ2. As such, the tool can be used to evaluate both positive and negative aspects of

women's birth experience. The CEQ2 includes questions that might serve as a basis for discussing individual childbirth experiences in clinical practice and enhance quality of care. However, further research is needed before any conclusions about the CEQ2's clinical value can be made.

Ethical approval

Ethical approval for the study was obtained from the Icelandic National Bioethics Committee (VSNb2020090017/03.01). The participants in the study were provided by informed consent and participated voluntarily. Anonymity and confidentiality of respondents were respected.

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Author agreement

We hereby confirm that the article is the author's original work, has not received prior publication and is not under consideration for publication elsewhere. Preliminary findings of the study were introduced on a poster at the NJF midwifery conference in Helsinki, Finland 2022. We state that the article will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder.

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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