Childbirth Experience Questionnaire 2: Validating its Use in the United Kingdom

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Abstract

Objective

To validate the Childbirth Experience Questionnaire 2 (CEQ2) in the UK to see if it is an effective tool for evaluating labour experience.

Study Design

The CEQ2 and part of the Care Quality Commission Maternity Survey (2010) was sent to 475 women one month and six weeks after birth. It was tested for face validity among 25 postnatal mothers. Demographic data and delivery data was used to establish construct validity using the method of known-groups validation. The results of the scored CEQ2 sent out twice were used to measure test-retest reliability by calculating the quadratic weighted index of agreement between the two scores. Criterion validity was measured by calculating the Pearson correlation coefficient for the CEQ2 and Maternity Survey scores.

Results

Face validity of the CEQ2 in a UK population was demonstrated with all respondents stating it was easy to understand and complete. A statistically significantly higher CEQ2 score for subgroups of women known to report a better birth outcome demonstrated construct validity. A weighted kappa of 0.55 demonstrated test-retest reliability. A Pearson correlation co-efficient of 0.56 demonstrated a moderate correlation between the results of the CEQ2 and the results of the 'gold standard' assessment of childbirth experience in the UK: the Maternity Survey and hence criterion validity.

Conclusions

This study demonstrates that the Childbirth Experience Questionnaire version 2 (CEQ2) is a valid and reliable measure of childbirth experience in the UK population.

Introduction

Measuring the impact of an intervention on a woman's childbirth experience is arguably as important as measuring its impact on outcomes such as caesarean delivery and perinatal morbidity or mortality and yet surprisingly it is rarely done (1). Dissatisfaction with the childbirth experience has been associated with a negative impact on breast feeding and infant bonding and an increase in postpartum depression, post-traumatic stress disorders, future terminations of pregnancy and preference for caesarean delivery in future pregnancies (2).

The lack of a robust validated tool for evaluating labour experience in the UK is a topical issue in the UK at present. Indeed the National Institute for Health and Care Excellence (NICE) say 'A standardised method to measure and quantify women's psychological and emotional wellbeing and their birth experiences is urgently required to support any study investigating the effectiveness of interventions, techniques or strategies during birth' (3).

The Childbirth Experience Questionnaire (CEQ) was developed in Sweden in 2010 and validated in 920 primiparous women (4). It measures four main domains of the childbirth experience: *Own capacity, Professional support, Perceived safety and Participation*. The questionnaire was found to discriminate between groups of women known to differ in their childbirth experience for example those with a shorter duration of labour had a significantly higher score on all scales than those with a longer duration of labour.

When a health measurement tool is translated, it must be translated well linguistically but also adapted culturally to maintain its validity. The process of translation is well described (5). When a questionnaire has been translated it is important to establish if the content validity has been preserved in the new translation. We validated the English version of the CEQ in the United Kingdom (UK) in 2015 in collaboration with the instruments author Dencker (6).

A second version of the CEQ (CEQ2) has since been developed. This second version was created to address the high ceiling effects in two of the dimensions (professional support and participation). Items in these two domains were exchanged.

We used the CEQ in a national RCT (7) to measure birth experience and found that there was no difference between the two arms of the trial, this may be due to the high ceiling effects observed.

We therefore plan to validate the English version of the CEQ2 in the UK to see if it is an effective tool for evaluating labour experience.

Materials and Methods

Participants and setting

A prospective postnatal postal questionnaire study of 475 women who laboured and gave birth to their first baby at 37–41 completed weeks at Nottingham University Hospitals NHS Trust (NUH) between October 2017 and October 2018 was performed. The CEQ was tested for face validity on 25 postnatal mothers.

Women were identified in the postnatal period by their obstetrician or midwife on the postnatal ward and offered an information sheet and entry to the study. Those who agreed to join signed a written consent form. Women were sent two questionnaires in the post when they were one month postnatal: the CEQ2 and Part C of the Care Quality Commission Maternity Survey [8]. Women were also sent the CEQ2 two weeks later. Women were given the option of completing the questionnaire

via email or via an online survey tool instead of post. Reminders were sent after two weeks to those who had not replied to the original request.

Inclusion criteria were primiparity, a singleton live fetus, women that laboured (including women who required delivery by caesarean section during the latent phase of labour or for a failed induction of labour) at term (≥37+0 weeks) and women aged 18 years or older.

Exclusion criteria were women whose baby had died and women whose babies have been unexpectedly admitted to the Neonatal Intensive Care Unit or Special Care Baby Unit. Demographic data and basic data on their delivery outcome were collected from the hospital notes at hospital discharge.

Childbirth experience questionnaire version 2 (CEQ2)

The CEQ2 has 22 items assessing four domains of childbirth experience (Table 1) [1]. For 19 statements the response format is a 4-point Likert Scale. Questions about labour pain, sense of security and control (items 20-22) are assessed with visual analogue scales (VAS), see Table 1. 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. Higher scores indicate better childbirth experience. Ratings of negatively worded statements are reversed.

Two subscales (Own capacity and Perceived safety) are identical with the first CEQ. In order to improve the measurement properties (4) revised items were tested in the subscales Professional support and Participation. In a confirmatory analysis of Swedish CEQ2 data a CEQ2 version with 22 (out of 25) items showed good fit to the model (manuscript).

Care quality commission maternity survey

The Maternity Survey 2010 is the best available 'gold standard' for measuring birth experience in the UK as it has been tested for face validity using interviews with postnatal mothers and has been pilot tested and improvements based on removal of high non-response items and items with high floor/ceiling effects have been made with each subsequent use (extensive pilot testing 2006, nationwide use 2007).

Statistics and data analysis

The planned sample size was 475 women. This was based on the recommendation of a sample size of ten times the number of observed variables in the health measurement tool being evaluated [1]. The preliminary CEQ2 had 25 items therefore we needed 250 completed questionnaires. It is common to get missing values rendering a returned questionnaire uninterpretable, therefore we would aim to get 280 completed questionnaires to analyse. Assuming a 60% response rate (based on our previous CEQ validation study), we will need to send the questionnaire out to 475 women.

Our methods for determining internal consistency, construct validity, test retest reliability and criterion validity have been previously fully described (6).

All analyses were conducted using Stata Version 13. Permission to conduct the study was obtained from the West Midlands - Edgbaston Research Ethics Committee on 21st August 2017 (Reference 17/WM/0326).

Results

A total of 507 eligible women were identified and all agreed to join the study between October 2017 and October 2018 and were sent postnatal questionnaires. Reminders were sent after two weeks to those who had not replied to the original request. Completed questionnaires were returned by 263

women (52% response rate). Of those 263 women, all completed the CEQ and the Maternity Survey. All 263 women were sent the CEQ two weeks later and 138 women returned the 2nd CEQ (52% response rate).

Characteristics of the study population are shown in Table 2. In general there was very little missing data. The data for two participants with high numbers of missing items were excluded from the analyses.

Face validity
Twenty five women on the postnatal ward were asked to read the Childbirth Experience Questionnaire and were then asked questions about it. All women found the questionnaire easy to understand and complete. No respondents felt that any questions should be removed or found any of the questions were upsetting or offensive.

Internal consistency
Cronbach's alpha was ≥ 0.70 for all of the subscales (Own capacity 0.76, Perceived safety 0.80 and Professional support 0.79) except Participation (0.59) (Table 3). Cronbach's alpha for all of the subscales in the original Swedish study validating the CEQ in a Swedish population and in the study validating the CEQ in the UK are given for comparison.

Construct validity
Construct validity of the CEQ was measured using the methods of known-groups validation as shown in Table 4. Women with a shorter duration of labour were significantly more likely to have higher scores for subscales of the CEQ of Own capacity than women with a longer duration of labour. There was no statistically significant difference between scores for the other subscales or for the overall mean CEQ2 score. These results were very similar for women who required oxytocin augmentation versus no oxytocin augmentation: statistically significantly higher subscale scores for Own capacity, no statistically significant differences in other subscale scores or for the overall mean CEQ2 score.

Women who had a vaginal delivery were significantly more likely to have higher scores for Own capacity, Perceived safety and for the overall mean CEQ2 score.

Criterion validity
Criterion validity was measured by calculating the Pearson correlation coefficient for the CEQ2 and Maternity Survey scores as shown in Table 5. The correlation coefficient indicates the degree of linear relationship between two variables. A correlation coefficient value ≤ 0.35 is generally considered to represent a weak correlation, 0.36 to 0.67 to represent a moderate correlation and 0.68 to 1.0 to represent a strong correlation with coefficients ≥ 0.90 representing very strong correlations [15].

All subscales except Own capacity, had moderate correlations, Own capacity had a weak correlation with the Maternity Survey.

Test-retest reliability
There were 142 participants who completed both the first and second CEQ. Four women had incomplete data rendering one of the CEQ2s unusable. For the remaining 138 participants the quadratic weighted index of agreement (weighted Kappa) for each subscale of the CEQ and for the overall CEQ score was calculated and are presented in Table 6.

A value of weighted Kappa between 0.41 and 0.60 represents moderate agreement between the two scores [14]. All subscales of the CEQ2 were found to have moderate agreement between the scores

obtained at the completion of the CEQ at 4 weeks postnatal and its completion at 6 weeks postnatal. Overall the CEQ may be considered a very reliable instrument when used on separate occasions.

Comment

Face validity of the CEQ2 in a UK population was demonstrated with all respondents reporting that the questionnaire was easy to understand and complete. A statistically significant higher CEQ2 score for subgroups of women known to report a better birth outcome (shorter labour, no oxytocin augmentation) in 1 subscale and for vaginal delivery in 2 subscales demonstrated construct validity of the CEQ2. A weighted kappa of 0.55 for the full scale demonstrated test-retest reliability of the CEQ2. A Pearson correlation co-efficient of 0.56 demonstrated a moderate correlation between the results of the CEQ2 (total score) and the results of the 'gold standard' assessment of childbirth experience in the UK: the Maternity Survey and hence criterion validity of the CEQ2.

Due to a low response rate (52%) we extended recruitment to 507 women (intended 475) in order to ensure we would achieve 250 completed questionnaires for analysis, we achieved 263 of which 261 could be analysed.

The total score for the CEQ2 has not previously been used as an overall measure of childbirth experience but this study demonstrates that the total score has good test-retest reliability, good correlation with the 'gold standard' Maternity Survey and significant differences (though with small to moderate effect sizes) between groups known to differ in their childbirth experience.

As previously described, items in two of the domains of the CEQ (professional support and participation) have been exchanged in the CEQ2. The CEQ had 22 items, the CEQ2 also has 22 items. Two subscales (Own capacity and Perceived safety) are identical with the first CEQ. Overall the results of this validation study of the CEQ2 are very similar to our findings from validating the CEQ, however it appears that the original CEQ may perform slightly better than its successor (CEQ2).

The authors of the CEQ2 are performing further confirmatory analysis to try to improve the performance of the CEQ2.

Conclusions

This study has examined the validity and reliability of the CEQ in a UK population: by comparing its results to the nationally used childbirth survey, the Maternity Survey; by comparing the scores for women known to differ in their childbirth experience; by comparing the scores when the questionnaire is completed by the same participant on two separate occasions and by collecting the views of women who have completed the questionnaire under the watchful eye of a researcher.

This study demonstrates that the Childbirth Experience Questionnaire version 2 (CEQ2) is a valid and reliable measure of childbirth experience in the UK population.

Acknowledgements

Table 1: Childbirth Experience Questionnaire version 2 (CEQ2) domains and included items

Domain	Items
Own capacity	Labour and birth went as I had expected
	I felt strong during labour and birth
	I felt capable during labour and birth
	I was tired during labour and birth
	I felt happy during labour and birth
	I felt that I handled the situation well
	As a whole, how painful did you feel childbirth was?*
	As a whole, how much control did you feel you had during childbirth?*
Professional support	Both my partner and I were treated with warmth and respect
	I would have preferred the midwife to be more present during labour and birth
	I would have preferred more encouragement from the midwife
	The midwife conveyed an atmosphere of calm
	The midwife helped me to find my inner strength
Perceived safety	I felt scared during labour and birth
	My impression of the team's medical skills made me feel secure
	I have many positive memories from childbirth
	I have many negative memories from childbirth

Table 1: Childbirth Experience Questionnaire version 2 (CEQ2) domains and included items

	Some of my memories from childbirth make me feel depressed As a whole, how secure did you feel during childbirth?*
Participation	I wish the staff had listened to me more during labour and birth I took part in decisions regarding my care and treatment as much as I wanted I received the information I needed during labour and birth

* VAS-scale with anchors.

Table 2: Characteristics of the study population, n=507

	Study population
Maternal age, years, mean (SD)	29 (5.2)
Gestational age, weeks, mean (SD)	39 (1.2)
Spontaneous vaginal delivery, number (%)	224 (44)
Operative delivery, number (%)	
Instrumental delivery	*170 (34)*
Caesarean delivery	*113 (22)*
Onset of labour, number (%)	
Spontaneous	229 (46)
Induced	277 (54)
Labour duration more than 12 hours,* number (%)	105 (21)
Oxytocin augmentation during labour, number (%)	377 (74)
Neonatal Intensive Care Admission, number (%)	4 (0.8)
Method used to return questionnaire, number (%)	
Postal	*389 (77)*
Email	*118 (23)*

Table 3: Cronbach's alpha for the domains of the CEQ and for the overall scale

Domain	Number of items	Cronbach's alpha CEQ2	Cronbach's alpha CEQ1	Cronbach's alpha from original Swedish study
Own capacity	8	**0.76**	0.79	0.82
Professional support	5	**0.79**	0.94	0.88
Perceived safety	6	**0.80**	0.83	0.78
Participation	3	**0.59**	0.72	0.62
Total scale			0.90	

Table 4: Differences in subscale scores and overall score of the CEQ by different groups

	Own capacity	*Professional support*	*Perceived safety*	*Participation*	Mean CEQ score
Labour duration ≤ 12 hours	2.71 (0.77)	3.61 (0.47)	3.03 (0.65)	3.25 (0.58)	3.15 (0.47)
Labour duration > 12 hours	2.53 (0.56)	3.56 (0.48)	2.97 (0.62)	3.16 (0.59)	3.05 (0.47)
Unadjusted p-value	**0.05**	0.42	0.34	0.29	0.14
No oxytocin augmentation	2.83 (1.01)	3.55 (0.46)	3.07 (0.67)	3.26 (0.58)	3.18 (0.52)
Oxytocin augmentation	2.62 (0.56)	3.62 (0.48)	3.01 (0.62)	3.24 (0.57)	3.12 (0.45)
Unadjusted p-value	**0.07**	0.18	0.32	0.68	0.35
Spontaneous vaginal delivery	2.85 (0.56)	3.63 (0.42)	3.15 (0.62)	3.31 (0.56)	3.23 (0.44)
Operative delivery	2.55 (0.82)	3.58 (0.52)	2.93 (0.64)	3.19 (0.59)	3.06 (0.48)
Unadjusted p-value	**0.0012**	0.46	**0.006**	0.09	**0.004**

Data presented as mean (SD). Mann-Whitney U-test was used to compute p-values. Operative delivery includes instrumental vaginal and caesarean deliveries. Total score for the CEQ is the mean score of the 4 subscales. Numbers given to 2 significant figures.

Table 5: Correlation between CEQ subscale scores and overall Maternity Survey scores

CEQ subscale	Pearson correlation coefficient*
Own capacity	0.28
Professional support	0.52
Perceived safety	0.45
Participation	0.58
Overall mean CEQ score	R = 0.56

*Pearson correlation coefficient was calculated using Stata V11.

Table 6: Test-retest reliability for the CEQ2; the quadratic weighted index of agreement (weighted kappa) is given.

CEQ subscale	Observed Agreement	Expected agreement	Weighted kappa	P Value
Own capacity	86%	77%	0.40	< 0.001
Professional support	89%	77%	0.54	< 0.001
Perceived safety	88%	73%	0.54	< 0.001
Participation	87%	75%	0.46	< 0.001
Overall CEQ score	87%	70%	0.55	< 0.001

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