Development of the Childbirth Perception Scale (CPS) : perception of delivery and the first postpartum week

Citation for published version (APA):

Truijens, S., Wijnen, H. A., Pommer, A. M., Oei, G., & Pop, V. (2014). Development of the Childbirth Perception Scale (CPS) : perception of delivery and the first postpartum week. *Archives of Women's Mental Health*, 17, 411-421. <https://doi.org/10.1007/s00737-014-0420-0>

DOI:

[10.1007/s00737-014-0420-0](https://doi.org/10.1007/s00737-014-0420-0)

Document status and date:

Published: 01/01/2014

Document Version:

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.tue.nl/taverne

Take down policy

If you believe that this document breaches copyright please contact us at:

openaccess@tue.nl

providing details and we will investigate your claim.

Development of the Childbirth Perception Scale (CPS): perception of delivery and the first postpartum week

Sophie E. M. Truijens · Hennie A. Wijnen ·
Antoinette M. Pommer · S. Guid Oei · Victor J. M. Pop

Received: 14 September 2013 / Accepted: 2 March 2014 / Published online: 25 March 2014
© Springer-Verlag Wien 2014

Abstract Some caregivers suggest a more positive experience of childbirth when giving birth at home. Since properly developed instruments that assess women's perception of delivery and the early postpartum are missing, the aim of the current study is to develop a Childbirth Perception Scale (CPS). Three focus groups with caregivers, pregnant women, and women who recently gave birth were conducted. Psychometric properties of 23 candidate items derived from the interviews were tested with explorative factor analysis (EFA) ($N=495$). Confirmatory factor analysis (CFA) was performed in another sample of women ($N=483$) and confirmed a 12-item CPS. The EFA in sample I suggested a two-component solution: a subscale 'perception of delivery' (six items) and a subscale 'perception of the first postpartum week' (six items). The CFA in sample II confirmed an adequate model fit and a good internal consistency ($\alpha=.82$). Multivariate linear regression showed a positive effect of home delivery on perception of delivery in multiparous but not in primiparous women. The 12-item CPS with two dimensions (perception of delivery and perception of first postpartum week) has adequate psychometric properties. In multiparous women, home delivery showed to be independently related to more positive perception of delivery.

Keywords Perception · Childbirth experience · Delivery · Postpartum well-being

Introduction

Home or hospital delivery

The Netherlands (and other Western countries like Canada, New Zealand, Australia, and to a lesser extent the UK) have a unique obstetric care system, giving low-risk pregnant women the opportunity to plan a home or a short-stay hospital birth, supervised by their own community midwives. Management of most pregnant women starts in independent midwifery practices: if women develop risk factors during pregnancy (for example due to the development of gestational diabetes, intrauterine growth restriction or preeclampsia), complications during labour (such as meconium-stained amniotic fluid, failure to progress, or foetal hypoxia), or, in the first postpartum week (postpartum haemorrhage), they are referred to an obstetrician in a hospital. Recently published data showed that 17 % of all women gave birth at home, up to 12 % gave birth in hospital under supervision of the independent midwife, and 71 % of all women gave birth in hospital under supervision of an obstetrician (The Netherlands Perinatal Registry 2013). Most women who deliver in hospital return home within a few hours, where the first postpartum week is supervised by a midwife and a maternity nurse. Those who deliver by Caesarean section return home within 3 days with a similar supervision programme. Although the percentage of home deliveries decreased to 6–30 % (depending on rural or urban site), it is still possible to plan childbirth at home with midwife-led care. During the past few years, two important issues have been reported in the literature highly relevant to the obstetric care system in The Netherlands. *On one hand*, there is growing concern whether the Dutch obstetric system

S. E. M. Truijens · S. G. Oei
Department of Obstetrics and Gynaecology, Máxima Medical
Centre, Veldhoven, The Netherlands

A. M. Pommer · V. J. M. Pop (✉)
Department of Medical and Clinical Psychology, Tilburg University,
P.O. Box 90153, 5000 LE Tilburg, The Netherlands
e-mail: v.j.m.pop@uvt.nl

H. A. Wijnen
Department of Midwifery Science, Maastricht-ZUYD, Maastricht,
The Netherlands

meets the criteria of optimal obstetric care in Europe. In the last European review of birth outcome, our country had still one of the highest numbers of perinatal mortality (Euro-Peristat 2013). A substantial number of papers have been published since, discussing whether this could be related to the home delivery system of (low-risk) women (De Jonge et al. 2009, 2013; Hutton et al. 2009; Evers et al. 2010; Pop and Wijnen 2010). *On the other hand*, the European Court of Human Rights published an interesting verdict in December 2011, in the case of a Hungarian pregnant woman who intended to give birth at home, rather than in a hospital (European Court of Human Rights 2010). She alleged that she had not been able to do so because health professionals were effectively dissuaded by law from assisting her as they risked being convicted, a violation of Article 8 (right to respect for private and family life) of the European Convention on Human Rights, and the Court acknowledged her appeal. In this light, the recent but rather vigilant discussion in the *American Journal of Obstetrics & Gynecology* is interesting, where authors explain: “why obstetricians should not participate in or refer to randomized clinical trials of planned home versus planned hospital birth. We call on obstetricians, other concerned physicians, midwives and other obstetric providers, and their professional associations not to support planned home birth when there are safe and compassionate hospital-based alternatives and to advocate for a safe home-birth-like experience in the hospital” (Chervenak et al. 2013). Apart from obstetric or legal aspects of hospital or home delivery, it is surprising that literature on a possible benefit of home delivery is scarce. This is the more surprising because researchers have long known that prenatal stress, anxiety, and depression have an impact on perinatal and child outcomes (Dunkel Schetter 2011; Green 2012).

Development of the Childbirth Perception Scale

Although those who advocate home delivery often argue that childbirth at home contributes to a more positive perception of labour and the first postpartum week, there is very few evidence supporting this statement. This lack of evidence is mainly due to the absence of properly developed instruments that assess the woman's perception of labour and the first postpartum week. Rijnders et al. (2008) reported that even 3 years after delivery, up to 17 % of women had a negative perception of childbirth and that not having a home delivery was independently related to this poor perception. However, the response rate of their survey was only 44 %, and the authors did not correct for the woman's mental health at time of completing the questionnaire, which makes it difficult to rule out that especially depressed women did respond. Garthus-Niegel et al. (2013) used three single interview questions to measure subjective birth experience instead of a

validated questionnaire. Furthermore, due to the unique Dutch system, instruments from other countries such as the Wijma delivery experience questionnaire from Sweden (Wijma et al. 1998) are not easy to compare with.

Green (2012) underlined the relevance of women's views on childbearing. Garthus-Niegel et al. (2013) concluded that women's subjective birth experience is the most important factor in the development of post-traumatic stress symptoms following childbirth. Furthermore, it is relevant to know how women perceive childbirth and the first postpartum week as psychological distress during delivery, and the first postpartum week is found to contribute to the development of postpartum depression (Miller 2002; Tuohy and McVey 2008; Reck et al. 2009; O'Hara and McCabe 2013), the latter being associated with poor quality of life, not only for the mother and her partner but also for the developing newborn (Beck 1998; Murray and Cooper 2007; Chase-Brand 2008; Brand and Brennan 2009; Goodman et al. 2011; O'Hara and McCabe 2013).

To our knowledge, no questionnaire has yet been developed that evaluates perception of delivery and the first postpartum week, following a rigorous methodological protocol (including focus group interviews and explorative, reliability, and confirmatory factor analyses in samples with sufficient statistical power) (Kline 1993; De Vet et al. 2005).

The current study reports on the development and use of the Childbirth Perception Scale (CPS). Primary goal was to develop an instrument, with adequate psychometric properties, that assesses the perception of delivery and the first postpartum week. The secondary aim was to evaluate the differences in scores on this questionnaire regarding mode of delivery, also after adjustment for confounders (obstetric as well as psychological) that are known to interfere with a woman's perception of childbirth.

Materials and methods

Procedure

Three focus group interviews were conducted prior to construction of the CPS to discuss issues relevant to the perception of childbirth and the first postpartum week. The first group consisted of six midwives and six maternity nurses, the second group consisted of three primiparous and three multiparous pregnant women, and the third group of six women who had recently gave birth. All interviews occurred under supervision of a staff member from the medical psychology department of Tilburg University. The focus group interviews were recorded and evaluated by an expert panel. After eliminating double items and reaching panel's consensus, 23 candidate items were extracted for further pilot testing.

Items were formatted on a four-point scale, ranging from 0 ('totally agree') to 3 ('totally disagree'). Higher scores indicated a less positive perception. Together with some demographic and obstetric questions, this questionnaire was subsequently distributed by independent midwives and completed by women at 7 days postpartum. The study was approved by the Medical Ethics Committee of the Máxima Medical Centre Veldhoven.

Participants

A total of 1,347 first trimester pregnant women visiting their independent community midwife were invited to participate in the study. Exclusion criteria were not being Caucasian, not being able to read and understand Dutch sufficiently, preterm birth (<37 weeks of gestation), giving birth to a child with serious congenital abnormality (e.g. Down's syndrome) and postnatal hospitalization of the newborn. After delivery, 1,094 women still met the inclusion criteria and consented to participate, of whom 978 completed the questionnaires (89 %). These 978 participants were randomly divided into two subsamples. Data of sample I ($N=495$) were used to conduct an exploratory factor analysis (EFA) and reliability analysis, and sample II ($N=483$) was used to perform a confirmatory factor analysis (CFA). Both samples met the criteria of four to ten subjects per item with a minimum of 100 subjects to conduct factor analyses (Kline 1993; De Vet et al. 2005). Thereafter, data from sample I and II were merged to determine the concurrent and construct validity.

Measurements

The questionnaire comprised the first 23-item version of the CPS, the Dutch version of the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al. 1987; Pop et al. 1992), and several general questions regarding demographics (e.g. age, marital status, education), obstetric features (parity, mode and location of delivery), feeding of the newborn, and major life events in the first postpartum week.

EPDS

The Dutch version of the EPDS with ten items has been validated before among postpartum women and revealed appropriate psychometric characteristics with an alpha-coefficient of .82 (Pop et al. 1992). Total score ranged from 0 to 30, with higher scores indicating more depressive symptoms.

Statistical methods

Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS version 20, IBM, Chicago, IL, USA). The confirmatory factor analysis was done using AMOS (version 18, IBM, Chicago, IL, USA).

Factor analyses

EFA in sample I was performed on the full 23-item version of the CPS for testing the psychometric properties. A principal component analysis and a scree plot were used to select factors for retention. Factor loadings $>.40$ were considered important. Internal consistency analyses were conducted using Cronbach's alpha for the total scale and possible subscales derived from factor analysis. Cronbach's alpha reliability statistic of $\geq .70$ is considered as the minimum acceptable criterion of instrument internal reliability (Kline 1993). EFA was repeated in sample II to verify the factor structure found in sample I.

In sample II, CFA was then performed on the remaining items of the second CPS version. The CFA was used to test the model fit of the factor structures found with EFA, assessing the comparative fit index (CFI), normed fit index (NFI), Tucker-Lewis Index (TLI), and the root mean square error of approximation (RMSEA). Adequate model fit can be assumed with a CFI $\geq .80$, combined with a NFI $\geq .80$, TLI $\geq .80$, and a RMSEA $\leq .05$ for good and $\leq .08$ for adequate fit (Hu and Bentler 1999; Browne and Cudeck 1993).

Concurrent and construct validity

Concurrent validity of the CPS was tested by correlating the CPS and the EPDS, with both total scores and subscales (Pearson's r correlations, two-tailed). To test for differences between the two samples, χ^2 analyses were used for all dichotomous data. Differences in scores between groups were analysed using t test (two-tailed) and one-way analyses of variance (ANOVA) with Tukey post hoc analyses. Construct validity was examined by testing hypotheses according to perception of delivery and the first postpartum week, as explained in detail below.

Comparing home and hospital delivery using the CPS

Multivariate linear regression analyses were performed with scores on the subscales as dependent variable and mode of delivery as independent variable. Because it is well known that primiparous women have substantially more complicated delivery compared to multiparous women (e.g. duration of first and second stage of labour, rate of instrumental deliveries), we calculated the scores for primiparous and multiparous

women separately. Adjustments were made by entering factors as age, education level and EPDS scores into the regression.

Subsequently, we focused on the low-risk women who were able to choose their preferred birth location. We distinguished between women who choose to give birth at home and women who opt for short-stay hospital delivery, both supervised by their own independent midwife (primary care). Multiple linear regression analyses were performed in primiparous and multiparous women separately, with scores on the delivery perception scale as dependent variable and home delivery as independent variable, adjusted for confounders. In the first step, mode of delivery was entered into the regression. Subsequently, we entered the 'psychological' confounders: EPDS scores at the time of completing the delivery perception scale and the occurrence of a major life event in the first postpartum week. In the last step, we entered the demographic features age and educational level.

Similarly, a multivariate linear regression analysis was performed with perception of the first postpartum week as dependent variable and home delivery as independent variable after adjustment for several confounders. We entered the variable mode of delivery in step 1 of the model and entered quitting breastfeeding in step 2, as we hypothesized women who had to stop breastfeeding to report worse scores. In step 3, we entered the psychological confounders EPDS scores at the time of completing the delivery perception scale and of a major life event in the first postpartum week. In the last step, we entered the demographic features age and educational level.

Results

Development of the Childbirth Perception Scale

Women participating in samples I or II had similar characteristics (Table 1).

Skewness and kurtosis statistics in sample I showed that two items (items 6 and 14) were not normally distributed and were therefore eliminated. Based on face validity, redundancy, and high correlations, four items of the first concept questionnaire (items 3, 10, 12, and 22; Table 2) were eliminated prior to the EFA. The scree plot in sample I suggested a two-component solution: a factor 'perception of delivery' (eigenvalue 4.1) and a factor 'perception of the first postpartum week' (eigenvalue 2.3). Together, these two factors resulted in a 12-item CPS, explaining 38 % of the variance (Table 2).

Four items (numbers 4, 9, 16, and 20; Table 2) did not have a loading above .40 on either factor (sample I) and were therefore deleted from subsequent analyses. Furthermore, item 2 (Table 2) loaded on both factors with a marginal

difference was therefore eliminated. This resulted in a six-item subscale perception of delivery and a six-item subscale perception of the first postpartum week. Reliability analyses showed an alpha of .78 for the total CPS, .78 for the perception of delivery subscale, and .75 for the subscale perception of the first postpartum week. Subsequently, in sample II, an EFA was repeated ($n=483$) to verify the two-factor solution of sample I (eigenvalues, respectively, 4.2 and 2.0; total explained variance, 52 %). There were no items loading on both dimensions. Finally, CFA was performed on the two-factor structure of the 12-item CPS showing an excellent model fit ($CFI=.92$, $NFI=.90$, $TLI=.91$, and $RMSEA=.06$; lower bound=.05). Cronbach's alphas of the total scale ($\alpha=.82$) and its two subscales (perception of delivery $\alpha=.81$ and perception of the first postpartum week $\alpha=.79$) showed appropriate internal reliability.

For concurrent and construct analysis, the two samples were merged (total $N=978$) because they had similar characteristics (Table 1). We excluded women with a primary Caesarean section ($n=11$), as their perception of delivery differed from other deliveries, having had no natural onset of labour. The results of these analyses are explained below.

The EPDS scores (measuring postpartum depression) correlated highly and significantly with the total CPS scores ($r=.58$, $p<.001$) as well as with the scores on the perception of delivery subscale ($r=.37$, $p<.001$) and the perception of the first postpartum week subscale ($r=.61$, $p<.001$), representing medium to large effect sizes.

Comparing home and hospital delivery using the CPS

Of the 978 women in the total sample, 49 % gave birth at home. Of those 476 women with a home delivery, 66 % were multiparous.

The mean scores on the CPS and its subscales were stratified by mode of delivery, differentiated for primiparous and multiparous women. As can be seen in Table 3, the mean scores increased with more complicated delivery. Women who gave birth at home showed the lowest scores (implicating the most positive perception of both delivery and the first postpartum week). The most negative perception of childbirth occurred in women whose delivery was assisted with a forceps or vacuum. The most negative perception of the first postpartum week occurred in primiparous women who had had a (secondary) Caesarean section. Post hoc Tukey analyses in Table 3 showed that with regard to perception of childbirth, home delivery significantly differed from all other categories of hospital deliveries (spontaneous, induced, assisted, and secondary Caesarean section) in multiparous women. Within primiparous women, perception of childbirth was worse after instrumental delivery, but home deliveries did not significantly differ from induced labour or spontaneous deliveries in

Table 1 Characteristics of two samples of women who recently gave birth ($N=978$)

Characteristics	Sample I ($N=495$)				Sample II ($N=483$)			
	<i>n</i>	%	Mean (SD)	Range	<i>n</i>	%	Mean (SD)	Range
Demographics								
Age			30.0 (3.5)	21–40			30.3 (3.3)	18–40
Living with partner	484	98			475	98		
Educational level								
Low	108	22			103	21		
Medium	201	41			186	38		
High	186	38			209	43		
Depression earlier in life	86	19			93	19		
Major life event in first postpartum week	64	14			71	15		
Obstetric features								
Parity			1.8 (.6)	1–5			1.8 (.7)	1–5
Primiparous	214	43			206	43		
Multiparous	281	57			277	57		
Location of delivery								
Home delivery	248	50			228	47		
Hospital delivery	247	50			255	53		
Mode of delivery								
Spontaneous delivery	388	78			372	77		
Induced labour	53	11			51	11		
Vacuum-assisted delivery	34	7			21	4		
Forceps-assisted delivery	9	2			21	4		
Primary Caesarean section	3	1			8	2		
Secondary Caesarean section	8	2			10	2		
Feeding								
Breastfeeding	326	66			313	65		
Formula feeding	169	34			170	35		

hospital. When focusing on spontaneous deliveries in primiparous women ($n=282$), there was no significant difference in perception of childbirth between spontaneous hospital and home delivery ($t=1.22, p=.22$). Only in multiparous women, giving birth at home was significantly more positively perceived than spontaneous delivery in hospital ($n=478, t=4.84, p<.001$).

For the perception of the first postpartum week, post hoc Tukey analysis revealed that scores of women with home delivery significantly differed from all women with instrumental deliveries but not with those who had spontaneous delivery in hospital or induced labour.

Subsequently, we focused on the low-risk women who were able to choose their preferred birth location ($n=643$). We distinguished between women who choose to give birth at home ($n=445$) and women who opt for short-stay hospital delivery ($n=198$). Table 4 showed multiple linear regression models in primiparous and multiparous women separately, with scores on the delivery perception scale as dependent

variable and home delivery as independent variable, adjusted for confounders. As can be seen in Table 4, higher EPDS score ($p<.001$) and the occurrence of a major life event in the first days postpartum ($p<.001$) were significantly and independently related to delivery perception scores in primiparous women, explaining 18 % of the variance in scores (medium to large effect size of .23) (Cohen 1992). In multiparous women (Table 4), 12 % of variance was explained (medium effect size of .14) (Cohen 1992), with higher EPDS scores ($p<.001$) and home delivery ($p<.001$) being independently related to high delivery perception scores.

Similarly, in this subgroup of 643 women, a multivariate linear regression analysis was performed with perception of the first postpartum week as dependent variable and home delivery as independent variable after adjustment for several confounders (Table 5). In primiparous women, this model, presented in Table 5, explained 35 % of the variance (large effect size of .54) (Cohen 1992), with high EPDS scores

Table 2 Two-factor solution from factor analysis with oblimin rotation in 495 women who recently gave birth (sample I) and completed the 23-item CPS

	Factor I, perception of delivery	Factor II, perception of first week
Eigenvalue	4.1	2.3
Percentage of variance explained	24.2	13.5
1. Disappointing delivery	.61	
2. I felt insecure after giving birth		
3. Delivery as expected		
4. Aware of what happened while I was in labour		
5. I felt lonely after giving birth		.49
6. Difficult to share experience of giving birth		
7. I felt proud during my first postpartum week		.58
8. I felt safe during labour	.50	
9. Several bad nights after delivery		
10. Comfortable first postpartum week		
11. Felt guilty during my first postpartum week		.50
12. Delivery different from how I wanted it		
13. Did things wrong during labour	.70	
14. I felt very disappointed after giving birth		
15. Doubts during delivery	.74	
16. Wanted to arrange things myself after delivery		
17. I panicked during my labour	.77	
18. Enjoyed first postpartum week		.83
19. Postpartum period differed from how I wanted		.69
20. After giving birth, I cried frequently		
21. Able to relax well during labour	.67	
22. Giving birth was disappointing		
23. First postpartum week was pleasant		.82

A cutoff score of item loading of .40 was used and a minimum difference of .20 if an item had two loadings. Items 6 and 14 were not normally distributed (kurtosis >3) and therefore eliminated. For full text of items, see [Appendix](#), Table 6. Total explained variance is 38 %

($p < .001$) being significantly related to perception of the first postpartum week. In multiparous women, 27 % of the variance was explained (large effect size of .37) (Cohen 1992),

with higher EPDS scores ($p < .001$) and quitting breastfeeding ($p = .03$) independently being related to high postpartum perception scores (Table 5).

Table 3 Mean scores and ANOVA on the CPS and its two subscales stratified by mode of delivery ($N=967$). Higher scores indicated a less positive perception

Mode of delivery	Primiparous women ($n=413$)				Multiparous women ($n=554$)			
	n (%)	CPS total Mean (SD)	Perception of delivery Mean (SD)	Perception of first week Mean (SD)	n (%)	CPS total Mean (SD)	Perception of delivery Mean (SD)	Perception of first week Mean (SD)
Spontaneous at home	162 (39.2)	7.3 (4.5)	4.9 (3.6)	2.5 (2.4)	314 (56.7)	7.1 (4.5)	4.3 (3.1)	2.8 (2.5)
Spontaneous in hospital	120 (29.1)	8.6 (6.1)	5.4 (3.8)	3.2 (3.4)	164 (29.6)	9.1 (5.4)	5.9 (3.7)	3.2 (2.8)
Induced labour	46 (11.1)	10.0 (4.6)	6.1 (3.4)	3.9 (2.6)	58 (10.5)	9.5 (5.6)	6.4 (3.8)	3.1 (3.0)
Instrumentally assisted	68 (16.5)	11.6 (4.9)	7.2 (3.3)	4.5 (3.0)	17 (3.1)	14.5 (7.1)	9.6 (4.9)	4.9 (3.7)
Secondary C-section	17 (4.1)	15.5 (5.9)	7.9 (3.7)	7.6 (3.8)	1 (.2)	5.0 (–)	4.0 (–)	1.0 (–)
ANOVA ($df=4$)		$F=16.2$ $p < .001^{**}$	$F=7.4$ $p < .001^{**}$	$F=16.2$ $p < .001^{**}$		$F=13.1$ $p < .001^{**}$	$F=15.4$ $p < .001^{**}$	$F=3.1$ $p = .02^{*}$

$^{**}p = .01$, level of significance; $^{*}p = .05$, level of significance

Table 4 Multivariate linear regression analyses (enter method) in 643 low-risk women, with perception of delivery scores as dependent variable

Variables	Primiparous women (<i>n</i> =215)				Multiparous women (<i>n</i> =428)			
	<i>B</i>	SE <i>B</i>	β	<i>p</i>	<i>B</i>	SE <i>B</i>	β	<i>p</i>
Step 1								
Home delivery	-.74	.52	-.10	.16	-1.28	.35	-.18	<.001**
Step 2								
Home delivery	-.33	.48	-.04	.49	-1.18	.34	-.16	.001**
Higher EPDS score	.31	.07	.30	<.001**	.30	.05	.29	<.001**
Major life event in first week	2.52	.68	.24	<.001**	-.38	.45	-.04	.40
Step 3								
Home delivery	-.35	.50	-.05	.48	-1.18	.34	-.16	<.001**
Higher EPDS score	.31	.07	.29	<.001**	.31	.05	.30	<.001**
Major life event in first week	2.51	.68	.23	<.001**	-.34	.45	-.04	.45
Higher age	-.02	.07	-.02	.77	-.03	.05	-.03	.51
High education level	-.12	.16	-.05	.44	-.18	.11	-.08	.09

Model 1 (primiparous women): $R^2 = .01$ for step 1 ($p = .16$), ΔR^2 for step 2 = .17 ($p < .001$), ΔR^2 for step 3 = .003 ($p = .70$), total $R^2 = .18$, Cohen's $f^2 = .22$ (medium to large effect size); model 2 (multiparous women): $R^2 = .03$ for step 1 ($p < .001$), ΔR^2 for step 2 = .08 ($p < .001$), ΔR^2 for step 3 = .009 ($p = .12$), total $R^2 = .12$, Cohen's $f^2 = .14$ (medium effect size)

** $p = .01$, level of significance

Table 5 Multivariate linear regression analysis (enter method) in 643 low-risk women, with perception of first postpartum week as dependent variable

Variables	Primiparous women (<i>n</i> =215)				Multiparous women (<i>n</i> =428)			
	<i>B</i>	SE <i>B</i>	β	<i>p</i>	<i>B</i>	SE <i>B</i>	β	<i>p</i>
Step 1								
Home delivery	-.77	.39	-.13	.05	-.47	.27	-.09	.08
Step 2								
Home delivery	-.82	.39	-.14	.04*	-.47	.26	-.09	.08
Quit breastfeeding	1.58	.97	.11	.10	1.24	.62	.10	.05*
Step 3								
Home delivery	-.30	.33	-.05	.37	-.33	.23	-.06	.15
Quit breastfeeding	.46	.81	.03	.57	1.20	.54	.09	.03*
Higher EPDS score	.44	.05	.56	<.001**	.38	.03	.49	<.001**
Major life event in first week	.59	.46	.07	.20	.51	.31	.07	.10
Step 4								
Home delivery	-.23	.34	-.04	.50	-.34	.23	-.06	.14
Quit breastfeeding	.51	.81	.04	.53	1.23	.55	.10	.03*
Higher EPDS score	.45	.05	.57	<.001**	.37	.03	.48	<.001**
Major life event in first week	.58	.46	.07	.21	.52	.31	.07	.09
Higher age	.05	.05	.06	.32	-.03	.04	-.04	.37
High education level	.06	.11	.03	.57	.04	.07	.02	.62

Model 1 (primiparous women): $R^2 = .02$ for step 1 ($p = .05$), ΔR^2 for step 2 = .01 ($p = .10$), ΔR^2 for step 3 = .32 ($p < .001$), ΔR^2 for step 4 = .004 ($p = .50$), total $R^2 = .35$, Cohen's $f^2 = .54$ (large effect size); model 2 (multiparous women): $R^2 = .007$ for step 1 ($p = .08$), ΔR^2 for step 2 = .009 ($p = .05$), ΔR^2 for step 3 = .26 ($p < .001$), ΔR^2 for step 4 = .002 ($p = .64$), total $R^2 = .27$, Cohen's $f^2 = .37$ (large effect size)

** $p = .01$, level of significance, * $p = .05$, level of significance

Discussion

Development of the Childbirth Perception Scale

The current study shows that the CPS has good psychometric properties. The questionnaire consists of two subscales, perception of delivery and perception of the first postpartum week, both with six items. Appropriate reliability was determined as reflected in Cronbach's alpha all above .75 for both subscales as well as the total scale. Confirmative factor analysis revealed an excellent model fit for this two-factor structure with 12 items and an adequate explained variance of 52 %. Looking at the different items of the delivery perception subscale, an important dimension within this subscale refers to 'feelings of doubt', 'doing things wrong', and 'panicking' which were more or less summarized in item 1: 'delivery was a lot worse than I expected' (see [Appendix](#), Table 6). Two positive items were retained: 'feeling safe' and 'able to relax'. The validation process of the first postpartum week subscale revealed, apart from negative items as 'loneliness', 'guilt', and 'things went completely different', two positive items: 'proud' and 'pleasant'. Aspects of feeling safe during delivery have also been reported by others (Wijma et al. 1998; Bailham et al. 2004), but 'feelings of guilt' or 'doing things wrong' have not been reported before. It is important to notice that the way women think they perform is an issue and should encourage health care providers to positively approach women during labour, even when, or perhaps especially when different stages of labour are delayed.

The current questionnaire has been developed in a country with the highest numbers of home deliveries in the Western world. However, there are other countries, such as Canada, New Zealand, Australia, and to a lesser degree the UK, where home deliveries do occur on a regular base. In these countries, the findings of the current study could be used to consider the optimal place of childbirth, especially in multiparous women. The current study also adds valuable information for obstetric care in general. For example, in the Western world, the number of epidural analgesia during labour is rapidly increasing. It has clearly been shown that epidural analgesia is associated with an increased risk of instrumental delivery, as the second stage of labour prolongs and the need for additional oxytocin increases (Anim-Somuah et al. 2011). The current study shows that instrumental delivery has been associated with a much less positive perception of labour and the first postpartum week. As such, the CPS can also be used in countries without home deliveries to evaluate a woman's perception of childbirth according to the level of instrumental intervention during labour.

Comparing home and hospital delivery using the CPS

Results according to location of childbirth showed that in multiparous women, giving birth at home was better perceived than spontaneous delivery in hospital. This finding, in combination with studies showing that for low-risk women home birth is as safe as hospital birth (De Jonge et al. 2009, 2013; Van der Kooy et al. 2011), is in favour of offering low-risk multiparous women a home birth.

However, in primiparous women, there was no significant difference in perception of childbirth between spontaneous hospital and home delivery. Scores increased only when delivery became more complicated. Because it is well known that especially multiparous women have uncomplicated delivery (and in The Netherlands, 70 % of the women giving birth at home are multiparous (The Netherlands Perinatal Registry 2013)), it is important to correct for parity when looking at the possible impact of giving birth at home on the perception of delivery.

In multiparous women, higher EPDS score and home delivery were independently related to delivery perception scores. However, in primiparous women, higher EPDS score and the occurrence of a major life event in the first days postpartum were found to be independently related to perception of delivery, rather than home delivery. According to perception of the first postpartum week, EPDS score was significantly related to perception scores in primiparous women. In multiparous women, EPDS score and quitting breastfeeding were found to be independently related to perception of the first postpartum week. An explanation might be that women who had to quit breastfeeding felt sad about the failure, possible in the presence of a successful period of breastfeeding after previous deliveries (but this information was lacking). In conclusion, postpartum symptoms of depression are independently related to perception of both delivery and the first postpartum week. This is an important finding and means that—when evaluating the perception of an 'obstetric event' but probably true for evaluating the perception of all kinds of events—it is crucial to assess the woman's mood state at the same time in order to correct for depression and or anxiety. The current study clearly shows that depressed women report a more negative perception of perinatal events.

Strengths and limitations of the study

Parity distribution in this study was comparable with the general population: 43 % primiparae in this study and 46 % in the general Dutch population (The Netherlands Perinatal Registry 2013). However, there were more home deliveries (49 %) compared with recent Dutch registry data (6–30 %), but the area where the study was performed was semi-rural where in general higher rates of home deliveries are reported.

This study has several strengths. First, most of the (even rigorous) methodological rules of questionnaire development were met. A major strength of the study is the fact that there were several focus groups interviews conducted, in which pregnant women and women who recently gave birth were involved. In this way, it was possible to recognize women's views throughout their maternity experience (Green 2012). The 23 candidate items that were derived from the interviews were subsequently completed by a large sample of women who recently gave birth. The confirmative analysis was performed in another large sample of women with similar characteristics as the explorative sample. Secondly, the response rate of 89 % is very high. Thirdly, concurrent validity of this new instrument with a widely used and validated instrument, the EPDS, showed high correlation in the expected direction. Fourthly, when looking at a possible relation between perception of delivery and place of birth, we corrected for the co-occurrence of depressive symptoms. Subject's mood state could interfere with the perception of delivery which might influence the questionnaire results. Fifth, women reported about perception of delivery at day 7 postpartum which is rather close to the event but not too close in order to be influenced by dysphoric symptoms of 'blues' which occurs within 3 to 5 days postpartum (Buttner et al. 2012; O'Hara and McCabe 2013).

The fact that only Dutch-speaking Caucasian women were included might be regarded as a study limitation as the findings may not be generalizable to the whole population. The finding that depressive symptoms during the first postpartum week were related to perception of delivery does not give any information about causality. One can speculate that delivery itself is regarded as a real traumatic experience, resulting in depressed mood. Therefore, data of the woman's mood state during pregnancy are needed to elucidate on the possible direction of this association. A major limitation of not having data during pregnancy is that it might be hypothesized that especially depressed or anxious women during pregnancy made a choice for hospital delivery. Therefore, future research should take into account maternal mood during gestation. Also, there was no information about personality. A recent study of Johnston and Brown (2013) found stable maternal personality traits like neuroticism and extraversion to be significantly associated with birth experience. Furthermore, maternal anxiety during pregnancy and delivery is associated with an increased risk of interventions and negative birth experience (Ryding et al. 1998; Monk et al. 2000; Nieminen et al. 2009; Johnston and Brown 2013; Nilsson et al. 2012; Garthus-Niegel et al. 2013). Van Haaren-Ten et al. (2012) stated that women's choice for a home birth rather than in hospital is driven by a desire for greater

personal autonomy, whereas women's choice for a hospital birth is driven by a desire to feel safe and control risks. Further research regarding personality, anxiety, and depression during pregnancy in obstetrics might explain differences in the preferred location of childbirth within the Dutch obstetric system.

Conclusion

Development of the Childbirth Perception Scale

The current findings suggest that the 12-item CPS constitutes a valid and user-friendly instrument to assess perception of delivery and the first days postpartum in women who recently gave birth. The two subscales with each six items showed adequate psychometric properties.

Comparing home and hospital delivery using the CPS

Results according to the location of childbirth showed that in low-risk multiparous (but not in primiparous) women, home delivery is independently related to a more positive perception of childbirth. Furthermore, early postpartum depression symptoms are independently related to perception of both delivery and the first postpartum week.

Acknowledgments We are indebted to all the community midwives of the Eindhoven area for their contribution of inviting women to participate in the project. This study was made possible by a ZonMW-grant (dossier number 50-50200-98-007) and is part of the ZonMw-program 'Pregnancy and Childbirth' (in Dutch, Programma 'Zwangerschap en Geboorte').

Appendix

Beleving van bevalling en kraambed./Experience of childbirth and the first postpartum week.

Hieronder volgen enkele uitspraken die betrekking hebben op de manier waarop vrouwen de bevalling hebben beleefd. Dit geldt ook voor de daarop volgende kraambedperiode (dit is de periode tot aan de laatste controle van de verloskundige, vaak rond de 8^{ste}-10^e dag van het kraambed). Door het hokje aan te kruisen onder een antwoordmogelijkheid kunt u aangeven in hoeverre u het eens bent met een uitspraak. Kruis bij elke vraag slechts één hokje aan.

Below some statements related to how women have experienced childbirth and the first postpartum week (first 7 days after childbirth). Please indicate how much you agree with each statement by ticking the boxes. Please tick only one box per question.

Table 6 The Childbirth Perception Scale

	Helemaal eens <i>Fully agree</i>	Eens <i>Agree</i>	Oneens <i>Disagree</i>	Helemaal oneens <i>Completely disagree</i>
1. De bevalling is erg tegengevallen. <i>My labour was a lot worse than I expected.</i>	☐	☐	☐	☐
2. Na de bevalling heb ik mij eenzaam gevoeld. <i>After giving birth, I felt very lonely.</i>	☐	☐	☐	☐
3. In de kraambed-periode was ik erg trots. <i>During my first postpartum week I felt very proud.</i>	☐	☐	☐	☐
4. Tijdens de bevalling heb ik mij veilig gevoeld. <i>I felt safe during my labour.</i>	☐	☐	☐	☐
5. Ik had in het kraambed vaak schuldgevoelens. <i>I often felt guilty during my first postpartum week.</i>	☐	☐	☐	☐
6. Tijdens de bevalling heb ik veel dingen verkeerd gedaan. <i>When I was in labour I did many things wrong.</i>	☐	☐	☐	☐
7. Tijdens de bevalling twijfelde ik of ik het wel zou kunnen. <i>When I was in labour I doubted whether I would be able to do it.</i>	☐	☐	☐	☐
8. Tijdens de bevalling raakte ik in paniek. <i>I panicked during my labour.</i>	☐	☐	☐	☐
9. Ik heb genoten van mijn kraambed. <i>I truly enjoyed the first week after delivery.</i>	☐	☐	☐	☐
10. Na de bevalling is alles heel anders gelopen dan ik had gewild. <i>After giving birth, everything went completely different from how I wanted it.</i>	☐	☐	☐	☐
11. Tijdens de bevalling kon ik mij goed ontspannen. <i>I was able to relax during my labour.</i>	☐	☐	☐	☐
12. De kraambed-periode was erg gezellig. <i>My first postpartum week was very pleasant.</i>	☐	☐	☐	☐

References

- Anim-Somuah M, Smyth RMD, Jones L (2011) Epidural versus non-epidural or no analgesia in labour. Cochrane Database of Sys Rev 12, CD000331
- Bailham D, Slade P, Joseph S (2004) Principal components analysis of the Perceptions of Labour and Delivery Scale and revised scoring criteria. J Reprod Infant Psychol 22:157–165
- Beck CT (1998) The effects of postpartum depression on child development: a meta-analysis. Arch Psychiatr Nurs 12:12–20
- Brand SR, Brennan PA (2009) Impact of antenatal and postpartum maternal mental illness: how are the children? Clin Obstet Gynecol 52:441–455
- Browne M, Cudeck R (1993) Alternative ways of assessing model fit. In: Bollen K, Long J (eds) Testing structural equation models. Sage, Newbury Park, pp 136–162
- Buttner MM, O'Hara MW, Watson D (2012) The structure of women's mood in the early postpartum. Assessment 19:247–256
- Chase-Brand J (2008) Effects of maternal postpartum depression on the infant and older siblings. In: Stone SD, Menken AE (eds) Perinatal and postpartum mood disorders: perspectives and treatment guide for the healthcare practitioner. Springer Pub, New York, pp 41–47
- Chervenak FA, McCulloh LB, Brent RL, Levene MI, Arabin B (2013) Planned home birth: the professional responsibility response. Am J Obstet Gynecol 208:31–38
- Cohen J (1992) A power primer. Psychol Bull 112:155–159
- Cox JL, Holden JM, Sagovsky R (1987) Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. Br J Psychiatry 150:782–786
- De Jonge A, Van der Goes BY, Ravelli ACJ et al (2009) Perinatal mortality and morbidity in a nationwide cohort of 529 688 low-risk planned home and hospital births. BJOG 116:1177–1184
- De Jonge A, Mesman JAJM, Manniën J, Zwart JJ, Van Dillen J, Van Roosmalen J (2013) Severe adverse maternal outcomes among low risk women with planned home versus hospital births in the Netherlands: nationwide cohort study. BMJ 346:f3263
- De Vet HCW, Adèr HJ, Terwee CB, Pouwer F (2005) Are factor analytical techniques used appropriately in the validation of health status questionnaires? A systematic review on the quality of factor analysis of the SF-36. Qual Life Res 14:1203–1218
- Dunkel Schetter C (2011) Psychological science on pregnancy: stress processes, biopsychosocial models, and emerging research issues. Annu Rev Psychol 62:531–558
- European Court of Human Rights. Case of Ternovszky v. Hungary (Application no. 67545/09) Dec 14 2010
- Euro-Peristat Project with SCPE and EUROCAT 2013. European Perinatal Health Report: the health and care of pregnant women and their babies in 2010. www.europeristat.com. Accessed June 24 2013
- Evers AC, Brouwers HA, Hukkelhoven CW et al (2010) Perinatal mortality and severe morbidity in low and high risk term pregnancies in the Netherlands: prospective cohort study. BMJ 341:c5639
- Garthus-Niegel S, Von Soest T, Vollrath ME, Eberhard-Gran M (2013) The impact of subjective birth experiences on post-traumatic stress symptoms: a longitudinal study. Arch Womens Ment Health 16:1–10
- Goodman SH, Rouse MW, Connel AM, Broth MR, Hall CM, Heyward D (2011) Maternal depression and child psychopathology: a meta-analytic review. Clin Child Fam Psychol Rev 14:1–27
- Green JM (2012) Integrating women's view into maternity care research and practice. Birth 39:291–295

- Hu L, Bentler PM (1999) Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Modeling* 6:1–55
- Hutton EK, Reitsma AH, Kaufman K (2009) Outcomes associated with planned home and planned hospital births in low-risk women attended by midwives in Ontario, Canada, 2003–2006: a retrospective cohort study. *Birth* 36:180–189
- Johnston RG, Brown AE (2013) Maternal trait personality and childbirth: the role of extraversion and neuroticism. *Midwifery* 29: 1244–1250
- Kline P (1993) *The handbook of psychological testing*. Routledge, London
- Miller LJ (2002) Postpartum depression. *JAMA* 287:762–765
- Monk C, Fifer WP, Myers MM, Sloan RP, Trien L, Hurtado A (2000) Maternal stress responses and anxiety during pregnancy: effects on fetal heart rate. *Dev Psychobiol* 36:67–77
- Murray L, Cooper PJ (2007) *Postpartum depression and child development*. Guilford Press, New York
- Nieminen K, Stephansson O, Ryding EL (2009) Women's fear of childbirth and preference for caesarean section—a cross-sectional study at various stages of pregnancy in Sweden. *Acta Obstet Gynecol Scand* 88:807–813
- Nilsson C, Lundgren I, Karlström A, Hildingsson I (2012) Self reported fear of childbirth and its association with women's birth experience and mode of delivery: a longitudinal population-based study. *Women Birth* 25:114–121
- O'Hara MW, McCabe JE (2013) Postpartum depression: current status and future directions. *Ann Rev Clin Psychol* 9:379–407
- Pop VJ, Wijnen HA (2010) Results don't seem generalisable. *BMJ* 341: c7020
- Pop VJ, Komprou IH, Van Son MJ (1992) Characteristics of the Edinburgh Post Natal Depression Scale in The Netherlands. *J Affect Disord* 26:105–110
- Reck C, Stehle E, Reinig K, Mundt C (2009) Maternity blues as predictor of DSM-IV depression and anxiety disorders in the first three months postpartum. *J Affect Disord* 113:77–87
- Rijnders M, Baston H, Schönbeck Y, Van der Pal K, Prins M, Green J, Buitendijk S (2008) Perinatal factors related to negative or positive recall of birth experience in women 3 years postpartum in the Netherlands. *Birth* 35:107–116
- Ryding E, Wijma B, Wijma K, Rydhström E (1998) Fear of childbirth during pregnancy may increase the risk of emergency caesarean section. *Acta Obstet Gynecol Scand* 77:542–547
- The Netherlands Perinatal Registry [Stichting Perinatale Registratie Nederland] (2013) *Perinatal care in the Netherlands 2010 [Perinatale Zorg in Nederland 2010]* Stichting Perinatale Registratie Nederland, Utrecht
- Tuohy A, McVey C (2008) Experience of pregnancy and delivery as predictor of postpartum depression. *Psychol Health Med* 13:43–47
- Van der Kooy J, Poeran J, De Graaf JP, Birnie E, Denktass S, Steegers EA, Bonsel GJ (2011) Planned home compared with planned hospital births in the Netherlands: intrapartum and early neonatal death in low-risk pregnancies. *Obstet Gynecol* 118:1037–1046
- Van Haaren-Ten HT, Hendrix M, Nieuwenhuijze M, Budé L, De Vries R, Nijhuis J (2012) Preferred place of birth: characteristics and motives of low-risk nulliparous women in the Netherlands. *Midwifery* 28: 609–618
- Wijma K, Wijma B, Zar M (1998) Psychometric aspects of the W-DEQ: a new questionnaire for the measurement of fear of childbirth. *J Psychosom Obstet Gynecol* 19:84–97