Can a simple assessment of fear of childbirth in pregnant women predict requests and use of non-urgent obstetric interventions during labour? ☆

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ABSTRACT

Objective: To examine whether the Wijma Delivery Expectation Questionnaire (W-DEQ-A) and the one-item Fear of Childbirth-Postpartum-Visual Analogue Scale (FOCP-VAS) - measuring high FOC - are useful tools in predicting requested and received non-urgent obstetric interventions in pregnant women.

Design: A prospective cohort study.

Population and setting: Self-selected pregnant women from midwifery care settings (n=401).

Methods: W-DEQ-A and FOCP-VAS were assessed at two timepoints in pregnancy. Measures of non-urgent obstetric interventions which were derived from medical files were: induction of labour, epidural analgesia, augmentation with oxytocin due to failure to progress and self-requested caesarean section. Hierarchical logistics regression models were used.

Main outcome measures: The change in the Nagelkerke R^2 was examined for three models predicting two outcome measures: (1) explicitly requested non-urgent obstetric interventions during pregnancy and (2) received non-urgent obstetric interventions during labour. The first model only included participants' characteristics, the second model also included FOCP-VAS $\geq$5, and in the third model the W-DEQ-A $\geq$66 was added.

Results: High FOC measured with FOCP-VAS$\geq$5 predicted requested (pseudo-R^2=0.33, X^2=59.82, P<0.001) and received non-urgent obstetric interventions (pseudo-R^2=0.19, X^2=32.81, P<0.001) better than high FOC measured with W-DEQ-A$\geq$66.

Conclusion: This study is the first evaluating self-reported FOC and postpartum based on VAS (subjective outcome) in relation to actual pregnancy and childbirth outcomes derived from medical files (objective outcome). Non-urgent obstetric interventions could already be predicted in the first half of pregnancy by means of a simple FOC assessment with the one-item FOCP-VAS. Implementing this easy to use one-item screening tool in midwifery care is suggested.

Introduction

Fear of childbirth (FOC) is a complex concept covering different aspects of fear, anxiety and depression within, and external to the pregnancy itself (Rondung et al., 2016; Rouhe et al., 2011). FOC seems to be overlooked in clinical practice and often remains unrecognized and untreated (de Vries et al., 2020; Howard et al., 2014; Saisto and Halmesmäki, 2003; de Waal et al., 2010). However, one out of four pregnant women in Western societies experiences high FOC (Richens et al., 2018) as measured with the Wijma-Delivery Expectancy Questionnaire (W-DEQ-A≥66; Wijma et al., 1998). A large Australian study (n=1386) showed that high (W-DEQ-A ≥66-84) and severe FOC (W-DEQ-A ≥85) is strongly related to mental health problems in pregnant women and their inability to adapt to childbirth (Toohill et al., 2015). In addition, a Canadian study (n=650) reported a significant relationship between high FOC and anxiety, and between high FOC and fatigue in pregnant women (Hall et al., 2009).

The inability to adapt to childbirth is evident in the number of pregnant women's request and use of non-urgent obstetric interventions during labour such as epidural analgesia (EA) or self-requested

caesarean section (sCS) in order to avoid stress related to childbirth (Hildingsson, 2014; Räisänen et al., 2014). However, these obstetric interventions are associated with serious downsides. For example, EA is associated with assisted vaginal births and a lower Apgar score in newborns (Ravelli et al., 2020; Törnell et al., 2015). The risk of severe acute morbidity is five times higher with CS than with vaginal births (Zwart et al., 2008), and having had a previous CS increases the risk for morbidity in an ongoing pregnancy by three times (Van Dillen et al., 2010). In turn, obstetric interventions can generate a cascade of instrumental and operative deliveries (Rossignol et al., 2014), as well as traumatic experiences for labouring women (Hollander et al., 2017). In face of growing obstetric interventions in childbirth the World Health Organization (WHO) asks for actions to promote spontaneous childbirth which includes interventions for FOC (WHO, 2018) as unrecognized and untreated FOC also has negative consequences. That is, it may lead to trauma (Hollander et al., 2017) and postpartum depression in new mothers (Hymas and Girard, 2019), to disturbed mother-newborn bonding (Dubber et al., 2015), and to the neuro- and emotional maldevelopment of the newborn (Davis and Sandman, 2010; Dean et al., 2018) .

Despite recognition of harmful consequences of FOC and recommendations of the National Institute for Health and Care Excellence Guideline (National Institute for Health and Care Excellence, 2014), early detection of FOC seems to be impeded by limited utilization of questionnaires in midwifery practice (Larsson et al., 2016). The limited utilization of screening for FOC can be explained by time constraints during midwifery consultations (Larsson et al., 2016) and the length of the 33-item W-DEQ-A (Wijma et al., 1998). An approach to solve this problem would be the availability of a brief and easily accessible measurement tool, which can be administered preferably in early pregnancy.

The one-item FOC measure is based on the reliable and valid visual analogue scale (VAS; Ahearn, 1997) and could be such an instrument. Rouhe et al. (2009) have first used such a measure (e.g. 'How much do you fear childbirth?') showing high sensitivity in screening for clinical FOC (W-DEQ-A≥100) with a VAS threshold of 5.0. However, it is unknown whether the one-item VAS could predict actual non-urgent obstetric interventions in pregnant women. Furthermore, the recent reviews suggested measuring FOC from a broader timeline perspective including not only childbirth but also the postpartum period in order to increase the dimensionality of FOC (Bayrampour et al., 2016; Rondung et al., 2016). By combining childbirth and the postpartum period as one event, a broader interpretation of threat related to childbirth and its consequences over time for the transforming body and mind of pregnant women could be captured. That is, FOC may for some women include the process of childbirth while for others it is related to the consequences of childbirth (postpartum). From a psychological perspective fear and anxiety are always about the events in the future (Craske and Stein, 2016), and therefore including both fear of childbirth as well as fear for the postpartum period in FOC seems valid.

The aim of this study was to examine the predictive value of high FOC based on the W-DEQ-A and the one-item Fear of Childbirth-Postpartum-Visual Analogue Scale (FOCP-VAS) in identifying pregnant women who explicitly requested non-urgent obstetric interventions during pregnancy and/or received non-urgent obstetric interventions during labour.

Methods

Participants and procedure

A self-selected cohort of pregnant women (n=401) was recruited between April 2016 and December 2017 (see Fig. 1). Twelve primary midwife-led care practices participated which were evenly distributed over urban (n=6) and rural areas (n=6). Midwives invited all pregnant women who visited the midwifery practices during a three months period (n=526) to participate in a study on emotions about childbirth. In addition, 23 pregnant women applied via an advertisement on Facebook

and completed the measurements. Of those women, 485 (88.3%) agreed to be approached by the research team and 401 (73%%) completed the first measurement.

After digital informed consent was acquired, participants filled out the online questionnaires, using the Lotus program with a forced response. Being able to read Dutch sufficiently and being between the 16th and the 26th weeks of pregnancy at the first wave of data collection (T1; n=401) were inclusion criteria. The second wave of data collection (T2; n=356) took place ten weeks later, and data were collected from the medical records after birth at T3 (n=370; 92.3% of the T1 sample).

Measurements

Participants' characteristics – which are found to be related to non-urgent obstetric interventions – such as parity, age and educational level (Christiaens et al., 2010), born outside the Netherlands, attendance to antenatal classes (Veringa et al., 2011), the size of attended midwifery practices (Fontein, 2010), and received treatment for FOC or related emotions in the current pregnancy, were collected from medical files.

The one-item FOCP-VAS ('Please rate your current degree of fear of childbirth and the postpartum period?') was completed first. It was used to make a brief overall assessment of FOC and postpartum, and ranged from 0 (not fearful at all) to10 (very much fearful). Cronbach's α was not applicable as the measure consists of one item.

Next, the W-DEQ-A was completed. The W-DEQ-A is a 33-item scale assessing an anticipated emotional appraisal towards childbirth (e.g., 'How do you think you will feel in general during the labour and delivery'; Wijma et al., 1998). Answers are rated on a 6-point scale with the total scores ranging from 0-165 and cut-offs indicating high (≥66), severe (≥85), and clinical (≥100) FOC. In the present study Cronbach's α at T1 and T2 was 0.94.

In line with Offerhaus et al. (2013), non-urgent obstetric interventions were defined as interventions that did not require immediate investigation or treatment by obstetric care as they could be treated in midwifery care. However, these interventions were provided to support pregnant women to cope with the challenges of childbirth. The decision to use of non-urgent obstetric intervention was made by a pregnant/labouring woman and her midwife. Non-urgent obstetric interventions were divided in: (I) *explicitly requested during pregnancy*: induction of labour, EA or intravenous analgesia (IA; such as a Remifentanil intravenous pump) for anticipated labour, and sCS (as documented in the medical files by care providers), and (II) *received during labour*: augmentation with oxytocin (due to failure to progress), EA or IA, and sCS (as derived from the delivery reports in the medical files). The choice for these outcomes was based on a Dutch national data study evaluating the increasing numbers of referrals for non-urgent obstetric interventions during childbirth (Offerhaus et al., 2013).

Power analysis

A priori power analysis, with G*Power (3.9.1.2) indicated that a sample size of 378 would be sufficient to detect a significant small effect (Odds Ratio [OR]=1.4) of FOC predicting non-urgent obstetric interventions given the percentage of women (28%) requesting EA during labour (Veringa et al., 2011), assuming a power of 0.80 and an alpha of 0.05.

Statistical analyses

Statistical analyses were carried out using SPSS 25.0 (Statistical Package for Social Science for Windows, Chicago, IL, USA). Frequencies, Cronbach Alpha's, paired and one-sample *t*-test were used for continuous data and Chi-square was used for dichotomous data. Cohen's Kappa was used to assess the agreement between W-DEQ-A and FOCP-VAS. Skewness and kurtosis values of the dimensional W-DEQ-A and
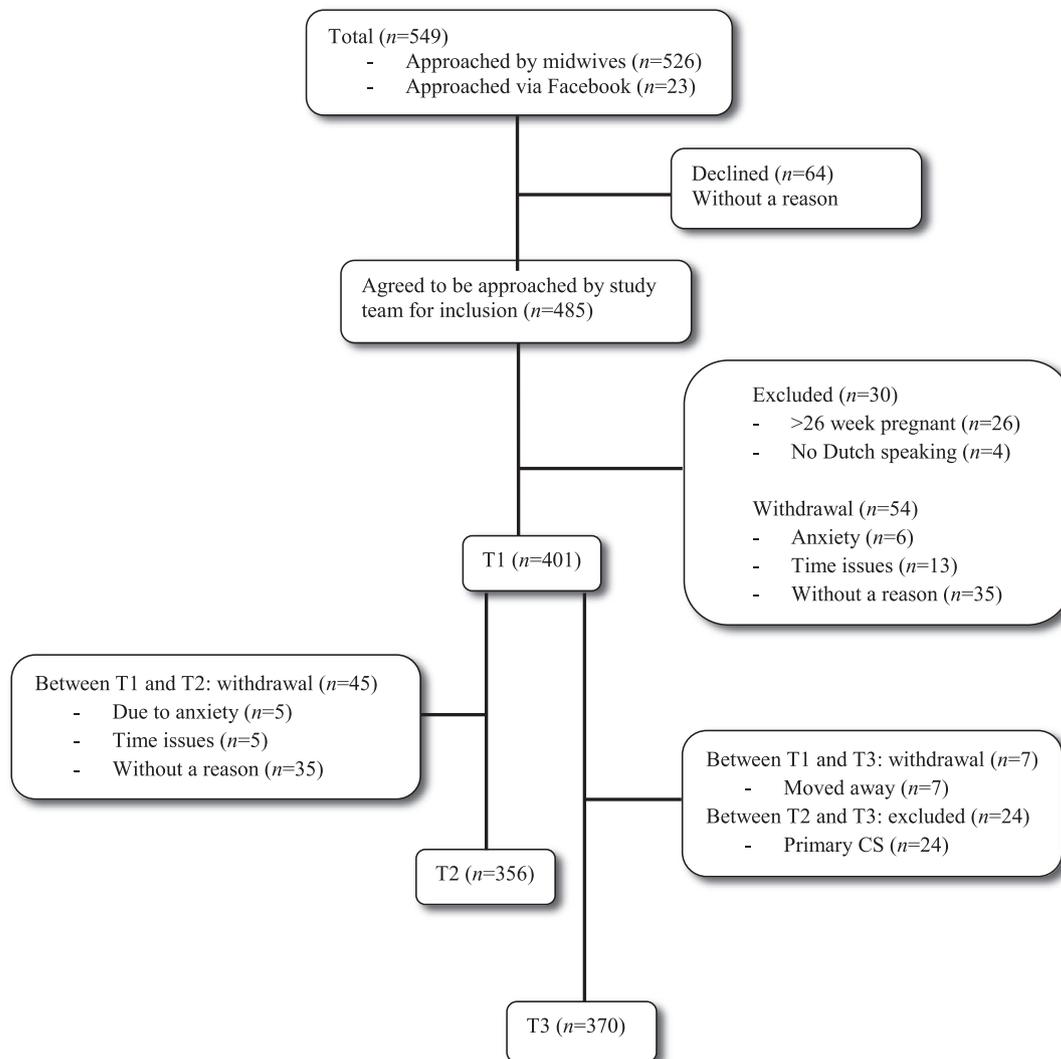
Total (*n*=549)
-   Approached by midwives (*n*=526)
-   Approached via Facebook (*n*=23)

Declined (*n*=64)
Without a reason

Agreed to be approached by study team for inclusion (*n*=485)

Excluded (*n*=30)
-   >26 week pregnant (*n*=26)
-   No Dutch speaking (*n*=4)

Withdrawal (*n*=54)
-   Anxiety (*n*=6)
-   Time issues (*n*=13)
-   Without a reason (*n*=35)

T1 (*n*=401)

Between T1 and T2: withdrawal (*n*=45)
-   Due to anxiety (*n*=5)
-   Time issues (*n*=5)
-   Without a reason (*n*=35)

Between T1 and T3: withdrawal (*n*=7)
-   Moved away (*n*=7)
Between T2 and T3: excluded (*n*=24)
-   Primary CS (*n*=24)

T2 (*n*=356)

T3 (*n*=370)

Fig. 1. Flowchart of Participants.
Note. CS = Caesarean Section; T1 = first measurement at circa 20 weeks of pregnancy; T2 = second measurement, ten weeks after T1; T3 = third measurement (information from medical records of childbirth), within two weeks after birth. Measurements of T1 and T2 were used for determining prevalence of FOC over time. Measurements of T3 were used for hierarchical logistic models analyses.

FOCP-VAS scores at T1 and T2 were within the boundary of -1.96 and 1.96.

In order to investigate which FOC measure (W-DEQ-A or FOCP-VAS) predicts non-urgent obstetric interventions best, two dichotomous dependent outcomes variables were computed: requested non-urgent obstetric interventions during pregnancy (*yes/no*) and received obstetric interventions during labour (*yes/no*). Hierarchical multiple logistic prediction models using *entry* method were used. For the two outcomes, three models per outcome were compared: the first model consisted of the participants' characteristics only; the second model consisted of the first model with the addition of the FOCP-VAS; the third model consisted of the second model with the addition of the W-DEQ-A. The third model examined whether the W-DEQ-A had additional significant value next to the FOCP-VAS in predicting non-urgent obstetric interventions. We have chosen the FOCP-VAS (entered in the second step) over the W-DEQ-A (entered in the third step) due to practicality: i.e., the FOCP-VAS is a one-item measure and more easy to administer and implement in midwifery practices than the W-DEQ-A. The change in the Nagelkerke R^2 was interpreted and *p*-values < 0.05 were considered significant. Nagelkerke R^2 (pseudo-R^2) does not summarize the proportion of variance in the dependent variable associated with the predictor (indepen-

dent) as R^2 does in linear models, and therefore we do not report or interpret the proportion of variance explained. Nagelkerke R^2 is used to compare competing models for the same data, independent of the sample size. It is a good compromise to evaluate the goodness of fit of the logistic regression model and to provide a gauge of the substantive significance of the model (Nagelkerke, 1991).

Results

Descriptives

The sample at T1 (*n*=401) consisted of 193 (48.1%) nulliparous and 208 (51.9%) multiparous women. Mean gestational age was 20 weeks (mean 19.9 ±3.01) at T1 and 32 weeks (mean 31.8 ±3.14) at T2. Their age varied between 20 and 43 years (mean 30.9 ±4.27). The majority of women were born in the Netherlands (93.5%; *n*=375). Their educational level was distributed as follows: low level - primary education and lower vocational education (9.5%; *n*=38), middle level - secondary and middle vocational education (25.4%; *n*=102), and high level - high vocational and university education (63.1%; *n*=253). About half of the participants attended antenatal classes (50.1%; *n*=201). The majority

Table 1

Dimensional W-DEQ-A and FOCP-VAS scores at T1 and T2, and parity.

	Total			Nullipara			Multipara		
	T1 M (SD)	T2 M (SD)	P^*	T1 M (SD)	T2 M (SD)	P^*	T1 M (SD)	T2 M (SD)	P^*
FOCP-VAS	3.26 (2.61)	3.33 (2.48)	0.23	3.36 (2.71)	3.44 (2.66)	0.65	3.01 (2.44)	3.21 (2.29)	0.22
W-DEQ-A	56.39 (23.37)	55.95 (23.52)	0.70	53.71 (24.93)	53.18 (24.68)	0.94	58.94 (22.44)	58.10 (22.51)	0.54

Table 2

Percentage of women with high and low levels of FOC on requested and received non-urgent obstetric interventions during labour.

	W-DEQ-A			FOCP-VAS		
	≥ 66 ($N = 126$)	< 66 ($N = 256$)	p-value	≥ 5 ($N = 91$)	< 5 ($N = 291$)	p-value
Non-urgent obstetric interventions requested[1] (yes)	($n = 37$) 29.4 %	($n = 36$) 14.1 %	0.002	($n = 46$) 50.5%	($n = 27$) 9.3 %	<0.0001
Non-urgent obstetric interventions received[2] (yes)	($n = 49$) 38.9 %	($n = 65$) 25.4 %	0.007	($n = 52$) 57.1 %	($n = 62$) 21.3 %	<0.0001

FOCP-VAS: Fear of Childbirth-Postpartum-Visual Analogue Scale; W-DEQ-A: Wijma-Delivery Expectancy Questionnaire.

[1] Induction of labour, epidural analgesia or intravenous analgesia for anticipated labour, induction of labour and epidural analgesia or intravenous analgesia for anticipated labour, and self-requested caesarian section.

[2] Augmentation with oxytocin due to failure to progress, epidural analgesia or intravenous analgesia, augmentation with oxytocin due to failure to progress and epidural analgesia or intravenous analgesia, and self-requested caesarian section.

(73%; $n=270$) came from small to middle practices (1 to 4 midwives), and 27% ($n=100$) from large sized midwifery practices (≥ 5 midwives).

At T1, 33.9% ($n=136$) of women reported high FOC (W-DEQ-A$\geq$66), 11.5% ($n=46$) severe FOC (W-DEQ-A$\geq$85), and 2.7% ($n=11$) reported clinical FOC (W-DEQ-A$\geq$100). Additionally, mean W-DEQ-A scores at T1 and T2 were not different, and showed high correlation ($r=0.72$, $P<0.001$), indicating stability of FOC over time. There were also no differences in mean scores between nulli- and multiparous participants (see Table 1). Notably, only 3% ($n=12$) of pregnant women received some kind of treatment specific for FOC and related emotions.

About 19% ($n=73/382$) of pregnant women explicitly requested non-urgent obstetric interventions during pregnancy: induction of labour ($n=11$), EA or IA for anticipated labour ($n=36$), induction of labour and EA or IA for anticipated labour ($n=14$), and sCS as a way of delivery ($n=12$). Almost 30% ($n=114/382$) received non-urgent obstetric interventions during labour: augmentation with oxytocin due to failure to progress ($n=14$), EA or IA ($n=40$), augmentation with oxytocin due to failure to progress and EA or IA ($n=48$), and sCS ($n=12$).

W-DEQ-A and FOCP-VAS agreement

The correlation between the W-DEQ-A and the FOCP-VAS dimensional scores was $r=0.51$, $P<0.001$. Pregnant women ($n=401$) who scored W-DEQ-A$\geq$66, scored an average score of 5 (mean 4.84 ±2.52) on the FOCP-VAS. Based on this result and in accordance with a previous study conducted by Rouhe et al., (2009), the FOCP-VAS cut-off score of 5 was used as the threshold for high FOCP. At T1 24.2% ($n=97/401$) of the pregnant women scored FOCP-VAS$\geq$5. Cohen's Kappa between the two FOC measures (WDEQ-A $\geq$66 and FOCP-VAS$\geq$5) was 0.30, demonstrating a fair correspondence (Landis and Koch, 1977).

Correlations between predictors and outcome measures

Table 2 summarizes the percentage of women with high versus low FOC on having requested/received non-urgent obstetric interventions. Being nulliparous, born outside the Netherlands, having a low educational level, and receiving care from midwifery practices of $\geq$5 mid-

wives were entered as the participants' characteristics, as these variables were found to be significantly related with one or two of the non-urgent obstetric intervention outcomes (see Table 3). The analyses also showed that high FOC based on W-DEQ-A$\geq$66 ($P<0.05$) and FOCP-VAS$\geq$5 ($P<0.01$) was significantly related to the two outcomes of non-urgent obstetric interventions. In addition, Table 2 summarizes the percentage of women with high versus low FOC on having requested/received non-urgent obstetric interventions.

Predicting non-urgent obstetric interventions

The results of the model fit parameters for both outcomes, as compared to the baseline model, are presented in Tables 4 and 5. Results of the hierarchical logistic models for explicitly requested non-urgent obstetric interventions in pregnancy showed that the first model including the participant's characteristics was significant (pseudo-R^2=0.09, X^2=20.24, $P<0.001$). The second model (adding FOCP-VAS$\geq$5) was significantly better in predicting non-urgent obstetric interventions requested during pregnancy (pseudo-R^2=0.33, X^2=59.82, $P<0.001$). The third model (adding W-DEQ-A$\geq$66) did not increase the predictive value any further (pseudo-R^2=0.33, X^2=0.93, $P=0.34$), indicating that W-DEQ-A$\geq$66 does not contribute to the prediction of this outcome variable over and above FOCP-VAS$\geq$5.

Non-urgent obstetric interventions received during labour was significantly explained by the participants' characteristics which were included in model 1 (pseudo-R^2=0.07, X^2=19.04, $P=0.001$). The second model (adding FOCP-VAS$\geq$5) was significantly better in predicting received non-urgent obstetric interventions during labour (pseudo-R^2=0.19, X^2=32.81, $P<0.001$). The third model (adding W-DEQ-A$\geq$66) was not significantly better in predicting non-urgent obstetric interventions received during labour than the second model (pseudo-R^2=0.19, X^2=0.02, $P=0.89$). This result (again) indicates that W-DEQ-A$\geq$66 does not contribute to the prediction of non-urgent obstetric interventions received during labour over and above FOCP-VAS$\geq$5.

Notably, when models were reversed (adding first W-DEQ-A$\geq$66 and then FOCP-VAS$\geq$5), FOCP-VAS$\geq$5 still significantly contributed to the prediction of requested and received non-urgent obstetric interventions

Table 3

Chi-square coefficients of dichotomized participants' characteristics and high FOC in relation with non-urgent obstetric interventions during labour.

	Non-urgent obstetric interventions					
Participants' characteristics	Requested Total	Received Total	Requested induction of labour	Requested EA or IA	Received augmentation with oxytocin	Received EA or IA
Nullipara (*yes*)	1.42	3.80	0.23	0.12	0.63	7.47**
Age > 35 years (*yes*)	1.20	1.44	0.05	0.68	1.12	2.05
Born outside the Netherlands (*yes*)	4.70*	3.04	0.38	7.59**	0.38	5.29*
Low educational level (*yes*)	4.16*	2.99	6.62*	0.55	3.87	3.81
No antenatal classes (*yes*)	0.05	0.03	0.14	0.01	2.66	0.16
Practice ≥5 midwives (*yes*)	20.41***	11.11**	1.32	22.10***	2.45	11.81**
FOCP-VAS ≥5 (*yes*)	83.29***	34.69***	32.00***	73.38***	36.45***	25.53***
W-DEQ-A ≥66 (*yes*)	11.80**	4.47*	0.81	14.72***	3.46	5.48*

EA: epidural analgesia; FOCP-VAS: Fear of Childbirth-Postpartum-Visual Analogue Scale; IA: intravenous analgesia (Remifentanil pump); W-DEQ-A: Wijma-Delivery Expectancy Questionnaire.

Note. * $p < 0.05$ (2-tailed), ** $p < 0.01$ (2-tailed), *** $p < 0.001$ (2-tailed).

Table 4

Result of hierarchical logistic models for non-urgent obstetric interventions requested during pregnancy.

	OR	95% CI	P	X^2	P	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
Model 1				20.24	<0.001	311.02	0.05	0.09
Constant	0.17	-	<0.001	-	-	-	-	-
Nullipara	1.14	0.64 - 2.02	0.66	-	-	-	-	-
Born outside the Netherlands	1.07	0.40 - 2.90	0.89	-	-	-	-	-
Low educational level	0.55	0.24 - 1.25	0.15	-	-	-	-	-
Practice ≥ 5 midwives	3.20	1.78 - 5.74	<0.001	-	-	-	-	-
Model 2				80.06	<0.001	251.20	0.20	0.33
Constant	0.05	-	<0.001	-	-	-	-	-
Nullipara	1.11	0.58 - 2.12	0.75	-	-	-	-	-
Born outside the Netherlands	0.66	0.21 - 2.15	0.49	-	-	-	-	-
Low educational level	0.71	0.28 - 1.80	0.47	-	-	-	-	-
Practice ≥5 midwives	4.81	2.41 - 9.61	<0.001	-	-	-	-	-
FOCP-VAS ≥ 5	12.35	6.26 - 24.36	<0.001	-	-	-	-	-
Model 3				80.99	<0.001	250.27	0.20	0.33
Constant	0.04	-	<0.001	-	-	-	-	-
Nullipara	1.16	0.61 - 2.24	0.65	-	-	-	-	-
Born outside the Netherlands	0.64	0.20 - 2.10	0.47	-	-	-	-	-
Low educational level	0.69	0.28 - 1.75	0.44	-	-	-	-	-
Practice ≥ 5 midwives	4.87	2.43 - 9.78	<0.001	-	-	-	-	-
FOCP-VAS ≥ 5	11.34	5.64 - 22.79	<0.001	-	-	-	-	-
W-DEQ-A ≥ 66	1.39	0.71 - 2.73	0.33	-	-	-	-	-

in pregnant women over and above W-DEQ-A ≥66. Moreover, in the reversed models, W-DEQ-A≥66 only significantly predicted requested (but not received) non-urgent obstetric interventions during pregnancy and only did so in the absence of FOCP-VAS≥5 (see Tables 6 and 7).

Women receiving (s)CS: exploratory analyses

We compared FOC scores of the 12 (50%) women who received sCS (while a vaginal birth would have been possible) to the 12 (50%) women for whom CS was medically indicated. The first group had significantly higher scores on the FOCP-VAS (mean 6.42 ±2.61; t[22]= -3.03, P=0.006) and the W-DEQ-A (mean 73.33 ±15.10; t[22]= -2.82, P=0.01) as compared to the second group (FOCP-VAS: mean 3.52 ±2.04; and W-DEQ-A: mean 49.75 ±24.77). Due to the small sample sizes, nonparametric tests were also conducted, which yielded similar results.

Discussion

Main findings

The aim of this study was to examine the predictive value of high FOC based on the W-DEQ-A next to the one-item FOCP-VAS in identifying pregnant women who explicitly requested non-urgent obstetric interventions during pregnancy and/or underwent non-urgent obstetric interventions during labour. We found that FOCP-VAS≥5 was the strongest predictor for requested and received non-urgent obstetric interventions. We found that W-DEQ-A≥66 did not contribute over and above FOCP-VAS≥5 to the prediction of non-urgent obstetric interventions. Contrary, when reversing the sequence of analysis, FOCP-VAS≥5 was still significantly predictive of non-urgent obstetric interventions during pregnancy and labour, over and above W-DEQ-A≥66.

Table 5

Results of hierarchical logistic models for non-urgent obstetric interventions received during labour.

	OR	95% CI	P	X^2	P	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
Model 1				19.04	0.001	416.69	0.05	0.07
Constant	0.57	-	0.18	-	-	-	-	-
Nullipara	0.58	0.36 - 0.94	0.03	-	-	-	-	-
Born outside the Netherlands	1.60	0.68 - 3.75	0.28	-	-	-	-	-
Low educational level	0.56	0.27 - 1.18	0.13	-	-	-	-	-
Practice ≥ 5 midwives	2.09	1.30 - 3.37	0.01	-	-	-	-	-
Model 2				51.85	<0.001	383.88	0.13	0.19
Constant	0.32	-	0.09	-	-	-	-	-
Nullipara	0.52	0.38 - 0.99	0.01	-	-	-	-	-
Born outside the Netherlands	1.37	0.66 - 3.66	0.50	-	-	-	-	-
Low educational level	0.68	0.27 - 1.19	0.33	-	-	-	-	-
Practice ≥5 midwives	2.35	1.29 - 3.35	<0.01	-	-	-	-	-
FOCP-VAS ≥ 5	4.87	2.81 - 8.44	<0.001	-	-	-	-	-
Model 3				51.87	<0.001	383.86	0.13	0.19
Constant	0.31	-	0.01	-	-	-	-	-
Nullipara	0.53	0.32 - 0.87	0.01	-	-	-	-	-
Born outside the Netherlands	1.37	0.55 - 3.42	0.50	-	-	-	-	-
Low educational level	0.68	0.31 - 1.49	0.33	-	-	-	-	-
Practice ≥ 5 midwives	2.35	1.42 - 3.90	<0.01	-	-	-	-	-
FOCP-VAS ≥ 5	4.82	2.72 - 8.54	<0.001	-	-	-	-	-
W-DEQ-A ≥ 66	1.04	0.61 - 1.78	0.89	-	-	-	-	-

Table 6

Results of hierarchical logistic models for non-urgent obstetric interventions requested during pregnancy.

	OR	95% CI	P	X^2	P	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
Model 1				20.24	<0.001	311.02	0.05	0.09
Constant	0.17	-	<0.001	-	-	-	-	-
Nullipara	1.14	0.64 - 2.02	0.66	-	-	-	-	-
Born outside the Netherlands	1.07	0.40 - 2.90	0.89	-	-	-	-	-
Low educational level	0.55	0.24 - 1.25	0.15	-	-	-	-	-
Practice ≥ 5 midwives	3.20	1.78 - 5.74	<0.001	-	-	-	-	-
Model 2				28.59	<0.001	302.67	0.07	0.13
Constant	0.12	-	<0.001	-	-	-	-	-
Nullipara	1.30	0.72 - 2.34	0.38	-	-	-	-	-
Born outside the Netherlands	0.98	0.35 - 2.72	0.97	-	-	-	-	-
Low educational level	0.53	0.23 - 1.23	0.14	-	-	-	-	-
Practice ≥5 midwives	3.27	1.80 - 5.92	<0.001	-	-	-	-	-
W-DEQ-A ≥ 66	2.39	1.33 - 4.32	<0.001	-	-	-	-	-
Model 3				80.99	<0.001	250.27	0.20	0.33
Constant	0.04	-	<0.001	-	-	-	-	-
Nullipara	1.16	0.61 - 2.24	0.65	-	-	-	-	-
Born outside the Netherlands	0.64	0.20 - 2.10	0.47	-	-	-	-	-
Low educational level	0.69	0.28 - 1.75	0.44	-	-	-	-	-
Practice ≥ 5 midwives	4.87	2.43 - 9.78	<0.001	-	-	-	-	-
W-DEQ-A ≥ 66	1.39	5.64 - 22.79	0.33	-	-	-	-	-
FOCP-VAS ≥ 5	11.34	0.71 - 2.73	<0.001	-	-	-	-	-

Note: The block-changes (i.e., additional value of the new model over the previous model) for model 2 (X^2=8.34, P<0.01) and for model 3 (X^2=52.40, P<0.001).

Strengths and limitations

This study is the first evaluating self-reported FOCP-VAS (subjective outcome) in relation to actual pregnancy and childbirth outcomes derived from medical files (objective outcome). Thereby, this study showed that requests and use of non-urgent obstetric interventions could already be predicted in the first half of pregnancy by means of a simple FOC assessment with the one-item FOCP-VAS. Another strength of this study is the order in which the FOC measures were collected; the one-item FOCP-VAS was completed first and before the W-DEQ-A, insuring an assessment of FOC without any bias of previous assessments.

However, the following limitations of this study have to be considered. Firstly, the sample mostly consisted of highly educated Caucasian women. Such a sample limits the evaluation of cultural influences on childbirth and possibly limits the generalisation of these findings to non-western populations. Second, the study sample was self-selected, which means that only women who were willing to report on their emotions concerning childbirth and were willing to share their childbirth outcomes participated in the study. This self-selection limits generalization of the study's results. Additionally, despite the high response rate (88%), we do not have data about 12% of the potential subject pool who did not provide informed consent. A third limitation is the relatively low occurrence of received non-urgent obstetric interventions during labour (30.8%) which is much lower compared to the Dutch national data (60%; Offerhaus et al., 2013; Perined, 2019). This discrepancy could be explained by selection bias since midwives participating in the study both recruited and took care of the pregnant women during childbirth. That is, the decision for use of non-urgent obstetric interventions was made by the pregnant woman together with the midwife. It is possible that the midwives have given the women more support during childbirth and/or advised them not to have non-urgent interventions due to their participation in the study. In addition, Offerhaus et al. (2015) suggested that - next to maternal characteristics – the characteristics of midwifery practices are related to referral rates, and evidence for this was also found in our study (women who came from small to middle sized practices received/requested less non-urgent interventions). As the vast

Table 7
Results of hierarchical logistic models for non-urgent obstetric interventions received during labour

	OR	95% CI	P	X^2	P	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
Model 1				19.04	0.001	416.69	0.05	0.07
Constant	0.57	-	0.18	-	-	-	-	-
Nullipara	0.58	0.36 - 0.94	0.03	-	-	-	-	-
Born outside the Netherlands	1.60	0.68 - 3.75	0.28	-	-	-	-	-
Low educational level	0.56	0.27 - 1.18	0.13	-	-	-	-	-
Practice ≥ 5 midwives	2.09	1.30 - 3.37	0.01	-	-	-	-	-
Model 2				21.94	0.001	413.78	0.06	0.08
Constant	0.48	-	0.09	-	-	-	-	-
Nullipara	0.61	0.38 - 0.99	0.05	-	-	-	-	-
Born outside the Netherlands	1.55	0.66 - 3.66	0.31	-	-	-	-	-
Low educational level	0.57	0.27 - 1.19	0.13	-	-	-	-	-
Practice ≥5 midwives	2.08	1.29 - 3.35	<0.01	-	-	-	-	-
W-DEQ-A ≥ 66	1.54	0.94 - 2.52	0.86	-	-	-	-	-
Model 3				51.87	<0.001	383.86	0.13	0.19
Constant	0.31	-	0.01	-	-	-	-	-
Nullipara	0.53	0.32 - 0.87	0.01	-	-	-	-	-
Born outside the Netherlands	1.37	0.55 - 3.42	0.50	-	-	-	-	-
Low educational level	0.68	0.31 - 1.49	0.33	-	-	-	-	-
Practice ≥ 5 midwives	2.35	1.42 - 3.90	<0.01	-	-	-	-	-
W-DEQ-A ≥ 66	1.04	0.61 - 1.78	0.89	-	-	-	-	-
FOCP-VAS ≥ 5	4.82	2.72 - 8.54	<0.001	-	-	-	-	-

Note: The block-changes (i.e., additional value of the new model over the previous model) for model 2 (X^2=2.90, P=0.09) and for model 3 (X^2=29.92, P<0.001).

majority of the women who participated in this study came from small to middle sized practices, this might have resulted in the lower number of non-urgent obstetric interventions in our study.

Interpretation

In our study, W-DEQ-A≥66 significantly predicted only explicitly requested non-urgent obstetric interventions during pregnancy, but only in the absence of FOCP-VAS≥5. The limited value of W-DEQ-A≥66 in predicting non-urgent obstetric interventions during labour is in accordance with the results of a smaller Dutch study (*n*=105), in which no relationship between the W-DEQ-A scores and actual obstetric interventions during childbirth was found (Sluijs et al., 2012). In contrast, two previous studies did report a strong relationship between W-DEQ-A≥66 and depression, and low self-efficacy, as well as anxiety, fatigue, preferences for use of EA and elective CS for the anticipated labour, or women's preferences for obstetric interventions in future pregnancies (Toohill et al., 2015; Hall et al., 2009). In addition, other research using W-DEQ-A≥85 showed a significant relationship with obstetric interventions in different populations of pregnant women (Richens et al., 2018; Størksen et al., 2015). Interestingly, the participants in this study who requested CS scored lower on the W-DEQ-A (>73) and FOCP-VAS (M=6.4) than in the study of Rouhe (W-DEQ-A >87; VAS [M=7.0]; 2009). The significant value of FOCP-VAS≥5 in predicting other requested non-urgent obstetric interventions during pregnancy in our study is in accordance with the results of a study by Rouhe (VAS>5; 2009).

The results indicate that the individual's idiosyncratic fear simply expressed in one number (FOCP-VAS) seems to be the most effective evaluation of fear in terms of anticipated maladaptation to childbirth and the postpartum period. The open question 'Please rate your current degree of fear of childbirth and the postpartum period?' may create space to integrate the unique appraisal of specific and unspecific components of FOC. In addition, the uncomplicated manner of assessment of FOC with the FOCP-VAS (by using one, easily formulated, question with a scale ranging from 0 to 10) may be more appealing and more easy to answer for pregnant women with lower oral- or reading capacities, or with a lower education level than for example the W-DEQ-A (consisting of 33 questions about anticipated emotions of FOC with inverted answer opportunities). This conclusion could be confirmed by the strong predictive value of the FOCP-VAS (as opposed to the W-DEQ-A scores)

in identifying pregnant women with explicit request for induction of labour; especially considering that the request for induction of labour was significantly correlated with low education level. This finding increases the practicality of this measure in midwifery practice.

The limited predictive value of the W-DEQ-A for non-urgent obstetric interventions in our study could be explained by explicit differences between the W-DEQ-A and the FOCP-VAS. First is the current (FOCP-VAS) versus the anticipated (W-DEQ-A) appraisal of FOC. Addressing the current appraisal of FOC might be the most efficient measurement as it could be difficult to appraise what emotions pregnant women might be having during future childbirth, and thus not assessing FOC in the moment. This possible limitation was already addressed by Wijma, the developer of the W-DEQ-A (Wijma et al., 1998). Second, as compared to the W-DEQ-A – which assesses the period before and during labour – the FOCP-VAS examines FOC from a broader scope by also including the postpartum period, as a continuum of childbirth. It may have elicited more reflection on childbirth in the pregnant women's appraisal about fear and may capture pregnant women who were more fearful about the postpartum period (recovering from childbirth or becoming mother) than about childbirth itself. Third, the cut-offs of FOCP-VAS in our study and the VAS proposed by Rouhe's et al. (2009) were the same and both studies found this cut-off to be effective in predicting preferences for non-urgent obstetric interventions during labour. This is in contrast to the studies using the W-DEQ-A showing inconsistent results for cut-offs of the W-DEQ-A in relation to preferences and use of obstetric interventions during labour (Richens et al., 2018; Størksen et al., 2015; Toohill et al., 2015). And thus, it is still unclear which cut-off of the W-DEQ-A should be used to identify pregnant women at risk for non-urgent obstetric interventions.

In light of psychological studies, pregnant women's requests for obstetric interventions can be seen as an avoidant coping strategy for FOC. Avoidant coping strategies may reduce distress in the short term, but unfortunately can maintain and even strengthen fear and anxiety in the next pregnancy and childbirth. Importantly, in accordance with psychological theories such as Cognitive Behavioural Theory (Beck, 1976) and Experiential Avoidance Theory (Hayes et al., 1999, 1996), it is not the actual distressful negative beliefs, emotions, and unpleasant sensations, but how one responds to them that is linked to a wide range of mental health issues. Therefore, early screening of FOC, identifying pregnant women with avoidant coping strategies and offering them adequate care for FOC, could not only improve the childbirth process but

also reduce FOC in the future. This also brings us to an important additional finding of the current study, namely that high FOC was quite prevalent among the pregnant women in our study (33.9%), while only 3% of these women received some treatment for their fears and related emotions. Based on this finding, it seems that FOC is still a largely unrecognised and untreated phenomena in Dutch midwifery care. This deserves attention, especially given the results of this study that high FOC strongly predicts (requested) non-urgent obstetric intervening, and that measuring FOC can be easily implemented when using the one item FOCP-VAS.

Preferences of pregnant women regarding perinatal care receive more attention of health-care policy makers nowadays and current healthcare models seem to prioritize requests for medical interventions as an important factor in the shared-decision-model (SDM; Härter et al., 2017). Given that preferences of pregnant women are fundamental in SDM, the detection of FOC - which seems to be related to requesting and receiving non-urgent or medically not needed interventions - should be taken into account much more prominently. For instance, an international Delphi study examined SDM in maternity care in which 45 quality criteria for SDM were defined (Nieuwenhuijze et al., 2014), but FOC was unfortunately not addressed. Measuring FOC by means of the FOCP-VAS in SDM could clarify the real needs of pregnant women and bring about more adequate participation in SDM and care for FOC. Open communication about difficult emotions may contribute to a trustful partnership (DeBaets, 2017). The systematic use of the FOCP-VAS could contribute to this open communication in SDM, as it may help to understand the impact of FOC on requests for and use of non-urgent obstetric interventions during childbirth.

Finally, the significant relationship between the number of midwives working in a midwifery practice and the use of requested and received non-urgent obstetric interventions is noteworthy. This finding is in line with previous Dutch research showing that a large number of midwives taking care of pregnant women is related to more non-urgent referrals during childbirth (Offerhaus et al., 2015; Fontein, 2010). This result may suggest that among pregnant women who already have difficulties coping with uncertainty of childbirth, the uncertainty caused by being cared for by many different midwives could be a compiling factor. In support, research has shown that the continuity of perinatal care is associated with more spontaneous childbirth (Sandall et al., 2016) and less FOC in pregnant women (Hildingsson et al., 2019). Midwifery-care systems are trying to identify pregnant women who could benefit the most from a continuity of perinatal care (i.e., care received from small midwifery practices) and the identification has largely been based on medical or socio-economic risk factors. However, FOC might be a 'hidden' psychological factor that deserves attention as well and the finding that small to middle sized practices are related to less non-urgent obstetric interventions might suggest that women suffering from FOC benefit from continuity of care.

Conclusion

This study demonstrated that highly prevalent FOC remains unrecognized and untreated in midwife-led practices. Our findings showed that the one-item assessment of current appraisal of fear related to childbirth and the postpartum period was the strongest identifier of non-urgent obstetric intervening in pregnant women. In addition, requests and use of non-urgent obstetric interventions were found to be related to large sized midwifery practices We recommend a replication study using the same FOC measures and corresponding cut-offs to confirm the predictive value of the one-item FOCP-VAS in other populations of pregnant women. Besides, we strongly recommend an implementation study on the FOCP-VAS as a first step in screening for FOC in midwife- and obstetrician-led practices and to study the relation between FOC, size of midwifery practice, and non-urgent obstetric interventions in pregnant women.

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