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Fear of childbirth and duration of labour: a study of 2206 women with intended vaginal delivery

SS Adams,[a,b] M Eberhard-Gran,[a,c] A Eskild[c,d]

[a] Health Services Research Centre, Akershus University Hospital, Lørenskog, Norway [b] Institute of Clinical Medicine, Akershus University Hospital, University of Oslo, Oslo, Norway [c] Division of Mental Health, Norwegian Institute of Public Health, Oslo, Norway [d] Department of Obstetrics and Gynaecology, Akershus University Hospital, Lørenskog, Norway
Correspondence: SS Adams, Health Services Research Centre, Akershus University Hospital, 1478 Lørenskog, Norway.
Email samantha.s.adams@ahus.no

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Objective To assess the association between fear of childbirth and duration of labour.

Design A prospective study of women from 32 weeks of gestation through to delivery.

Setting Akershus University Hospital, Norway.

Population A total of 2206 pregnant women with a singleton pregnancy and intended vaginal delivery during the period 2008–10.

Methods Fear of childbirth was assessed by the Wijma Delivery Expectancy Questionnaire (W-DEQ) version A at 32 weeks of gestation, and defined as a W-DEQ sum score ≥85. Information on labour duration, use of epidural analgesia and mode of delivery was obtained from the maternal ward electronic birth records.

Main outcome measures Labour duration in hours: from 3–4 cm cervical dilatation and three uterine contractions per 10 minutes lasting ≥1 minute, until delivery of the child.

Results Fear of childbirth (W-DEQ sum score ≥85) was present in 7.5% (165) of women. Labour duration was significantly longer in women with fear of childbirth compared with women with no such fear using a linear regression model (crude unstandardised coefficient 1.54; 95% confidence interval 0.87–2.22, corresponding to a difference of 1 hour and 32 minutes). After adjustment for parity, counselling for pregnancy concern, epidural analgesia, labour induction, labour augmentation, emergency caesarean delivery, instrumental vaginal delivery, offspring birthweight and maternal age, the difference attenuated, but remained statistically significant (adjusted unstandardised coefficient 0.78; 95% confidence interval 0.20–1.35, corresponding to a 47-minute difference).

Conclusion Duration of labour was longer in women with fear of childbirth than in women without fear of childbirth.

Keywords Cohort studies, labour, obstetric, pregnant women, psychological stress.

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Introduction

Anatomical factors, offspring size and uterine contractility are known determinants of labour duration.[1–4] There is, however, large variation of labour duration, and the causes of this variation remain incompletely understood.[3,5] First-time vaginal delivery and the use of epidural analgesia have been associated with prolonged labour.[3,6] Prolonged first and second stages of labour are important causes of acute caesarean and instrumental vaginal delivery, respectively.[7,8] Prolonged labour has also been associated with offspring hypoxia.[5] To understand if obstetric interventions may be necessary, better knowledge of factors associated with labour duration is required.[3,5]

Fear of childbirth has gained growing attention. Between 5 and 20% of pregnant women fear childbirth.[9–12] Numerous factors have been associated with increased prevalence of fear of childbirth, including young maternal age, nulliparity, pre-existing psychological problems, lack of social support and a history of abuse or adverse obstetric events.[9,11–14] Anxiety and fear may increase plasma concentrations of catecholamines,[15–18] and high concentrations of catecholamines have been associated with both enervated uterine contractility and a prolonged second stage of

labour.[16–19] Longer duration of labour in women with fear of childbirth is therefore plausible. Fear of childbirth may complicate communication between the woman and the maternity staff, and poor communication may complicate clinical decisions and delay obstetric interventions.[16]

The association of fear of childbirth with labour duration has rarely been studied. An association between fear of childbirth and protracted labour has been reported;[20] however, in that study the fear of childbirth was determined by one single question and not by a validated questionnaire.[20]

We studied the association of fear of childbirth with labour duration in more than 2000 pregnant women with intended vaginal delivery. Fear of childbirth was measured by the Wijma Delivery Expectancy Questionnaire (W-DEQ) and adjustments were made for parity, counselling for pregnancy concern, epidural analgesia, labour induction, labour augmentation, emergency caesarean delivery, instrumental vaginal delivery, offspring birthweight and maternal age.[3,5]

Methods

The Akershus Birth Cohort Study targeted all women scheduled to give birth at Akershus University Hospital, Norway, from November 2008 to April 2010. The hospital is located near Oslo, the capital of Norway, and serves a population of more than 400 000 individuals living in both urban and rural surroundings. On average, 3500 women gave birth at the hospital each year during our study period.

In Norway, antenatal and obstetric health care is provided free of charge as part of the public healthcare system. Antenatal care is provided in primary health care, and women are referred to specialised health care if complications in the pregnancy are suspected. Women were recruited at the routine fetal ultrasound examination at 18 weeks of gestation, in which almost all pregnant women (98%) take part.[21] Pregnant women who were able to complete a questionnaire in Norwegian were eligible and there were no other exclusion criteria.

Data were obtained by a self-administered questionnaire, completed at 32 weeks of gestation and returned by mail. Information on the duration of labour was obtained by linkage to the electronic birth records at the maternity ward. The birth records include information on the pregnancy, labour, delivery and newborn infant, and are completed by the attending doctor or midwife shortly after the delivery.

Of the eligible women, 63.0% (n = 2936) answered the questionnaire. Of these 2936 women, 4.4% (130 women) gave birth at a different hospital, leaving a study population of 2806 women. We excluded women with multiple pregnancy (n = 29), non-cephalic presentation at delivery (n = 123), preterm delivery (before 37 weeks of gestation; n = 141) and elective caesarean delivery (n = 155). We further excluded women with missing information on labour duration (n = 347), the W-DEQ (n = 53), birthweight (n = 4), length of gestation at delivery (n = 10) or labour augmentation (n = 74), resulting in a study sample of 2206 women (some women had missing information on several variables).

Labour duration, in hours, was the outcome variable used in this study. Labour duration was defined from start of the active phase of labour; 3–4 cm cervical dilatation and three uterine contractions per 10 minutes lasting ≥1 minute, until delivery of the child.[5] Some women arrived at the hospital after commencement of the active phase of labour. For these women, the recorded start time of the active labour phase was based on maternal report of duration and frequency of uterine contractions before admission to hospital.

Fear of childbirth was assessed by the 33 items in the W-DEQ version A as completed at 32 weeks of gestation.[22] Responses were rated on a six-point Likert scale, ranging from 0 to 5. Sum scores ranged from 0 to 165, with higher scores reflecting a greater degree of fear of childbirth. Fear of childbirth was defined as a W-DEQ sum score ≥ 85.[16] The original validation study of the W-DEQ showed that the instrument had good internal consistency with a Cronbach's α coefficient of 0.93.[22] In our study sample, the Cronbach's α coefficient was 0.92. The health personnel responsible for care during pregnancy and delivery had no information about the women's W-DEQ score.

Information on parity was reported in the questionnaire and coded 'para 0' and 'para ≥1'. Women were also asked whether they had been to counselling because of pregnancy concern at the Department of Obstetrics at our hospital (yes/no).

Such counselling was led by a midwife or an obstetrician. The counselling largely depended on the concerns expressed by the woman, and a plan for the delivery was sometimes made. No standard procedures for diagnosing pregnancy concern or for treatment of pregnancy concern were established. Both general practitioners and community midwives could refer women. Also, the pregnant women herself could request counselling. The number of counselling sessions varied between women.

All other data used in this study were obtained from the maternal ward electronic birth records. Use of epidural analgesia during labour, which was given as continuous infusion with the possibility of top-ups, was coded 'yes' or 'no', and included epidural analgesia started at any time during labour. Induction of labour (yes/no) included amniotomy, endocervical placement of a Foley catheter and oxytocin or prostaglandin administration. Labour augmentation (yes/no) included amniotomy, oxytocin

administration, breast stimulation or acupuncture. Offspring birthweight (kg) and maternal age (years) at delivery were included as continuous variables. Mode of delivery was coded: vaginal, instrumental vaginal (vacuum or forceps-assisted delivery) or acute caesarean delivery.

Differences in the distribution of categorical study factors according to presence of fear of childbirth were tested with chi-square tests and differences according to labour duration were tested using Student's *t* test (independent-samples *t* test). We estimated the association of fear of childbirth with labour duration (in hours) as crude and adjusted unstandardised regression coefficients (B) with 95% confidence intervals (CI) using linear regression analysis. Adjustments were made for the study factors presented above. The unstandardised regression coefficient (B) was interpreted as the expected change in labour duration (in hours) for a one-unit change in the independent variable. Standard residual diagnostic tests were applied. Additionally, the above analyses were performed separately for women with and without epidural analgesia during labour, and also separately for nulliparous and parous women. We constructed separate flow charts for women with and without fear of childbirth to illustrate mean labour duration according to use of epidural analgesia and mode of delivery, and according to parity and mode of delivery. The statistical package SPSS version 15.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analyses.

The study was granted ethical approval from the Regional Committees for Medical and Health Research Ethics (S-080113a, 12 February 2008), and all participants signed an informed consent form.

Results

Mean maternal age at delivery was 30.9 years (range 17.7–45.4 years; standard deviation [SD] 4.7 years) and 50.5% (1113 women) were first-time mothers. Mean W-DEQ sum score was 56.66 (range 5–145; SD 19.49) and 7.5% (165) of women had fear of childbirth (W-DEQ sum score ≥ 85) (Table 1). Mean labour duration was 8.22 hours (range 0.53–23.93 hours; SD 4.36 hours) for nulliparous women, and 4.91 hours (range 0.52–22.65 hours; SD 3.47 hours) for parous women.

Table 1. The distribution of each study factor according to fear of childbirth (measured by the Wijma Delivery Expectancy Questionnaire, W-DEQ) among 2206 women with intended vaginal delivery in the Akershus Birth Cohort Study

	n (%)	W-DEQ		*P* value
		<85 (*n* = 2041) (%)	≥85 (*n* = 165) (%)	
Parity				
0	1113 (50.5)	1013 (49.6)	100 (60.6)	0.009
≥1	1093 (49.5)	1028 (50.4)	65 (39.4)	
Counselling for pregnancy concern				
No	2109 (95.6)	1969 (96.5)	140 (84.8)	<0.001
Yes	97 (4.4)	72 (3.5)	25 (15.2)	
Epidural analgesia				
No	1586 (71.9)	1495 (73.2)	91 (55.2)	<0.001
Yes	620 (28.1)	546 (26.8)	74 (44.8)	
Labour induction				
No	1846 (83.7)	1717 (84.1)	129 (78.2)	0.060
Yes	360 (16.3)	324 (15.9)	36 (21.8)	
Labour augmentation				
No	1169 (53.0)	1108 (54.3)	61 (37.0)	<0.001
Yes	1037 (47.0)	933 (45.7)	104 (63.0)	
Emergency caesarean delivery				
No	2049 (92.9)	1902 (93.2)	147 (89.1)	0.070
Yes	157 (7.1)	139 (6.8)	18 (10.9)	
Instrumental vaginal delivery				
No	1962 (88.9)	1825 (89.4)	137 (83.0)	0.017
Yes	244 (11.1)	216 (10.6)	28 (17.0)	
Offspring birthweight (kg)	3.634 (mean)	3.635 (mean)	3.615 (mean)	0.588
Maternal age at delivery (years)	30.87 (mean)	30.84 (mean)	31.28 (mean)	0.254

All *P*-values are two-sided.

The mean labour duration was longer in women with fear of childbirth (8.00 hours; SD 4.91 hours) compared with women without fear of childbirth (6.46 hours; SD 4.20 hours), $P < 0.05$. The crude unstandardised regression coefficient for the association of fear of childbirth with labour duration was 1.54 (95% CI 0.87–2.22) (Table 2). This corresponds to a labour 1 hour and 32 minutes longer for women with fear of childbirth compared with women without fear of childbirth.

Nulliparity, use of epidural analgesia, labour augmentation and instrumental vaginal delivery were more common in women with fear of childbirth and these factors were also associated with longer duration of labour (Tables 1 and 2). After adjustment for these factors as well as other factors associated with labour duration, the association of fear of childbirth with duration of labour was attenuated, but remained statistically significant. The adjusted unstandardised regression coefficient was 0.78 (95% CI 0.20–1.35), which corresponds to a labour 47 minutes longer in women with fear of childbirth compared with women without such fear (Table 2). There was weak evidence that counselling for pregnancy concern was associated with reduced duration of labour (Table 2). Standard residual tests of normality, homoscedasticity, linearity and independence of errors showed that the linear regression model fitted the data well.[23]

Use of epidural analgesia and parity were the two most important confounding factors (Tables 1 and 2). After adjustment for epidural analgesia and parity only, the unstandardised regression coefficient for the association of fear of childbirth with labour duration was 0.75 (95% CI 0.15–1.35). Both in women with ($n = 620$) and without ($n = 1586$) epidural analgesia, the mean duration of labour was longer in women with fear of childbirth (Table 3). In women with epidural analgesia, fear of childbirth remained positively associated with labour duration after adjustment

Table 2. The association between each study factor and labour duration (hours) among 2206 women with intended vaginal delivery in the Akershus Birth Cohort Study

	n (%)	Labour duration (hours)	*P* value	Labour duration (hours)			
				Crude coeff.	95% CI	Adj. coeff.	95% CI
W-DEQ							
<85	2041 (92.5)	6.46	<0.001	0.00		0.00	
≥85	165 (7.5)	8.00		1.54***	0.87–2.22	0.78**	0.20–1.35
Parity							
0	1113 (50.5)	8.22	<0.001	0.00		0.00	
≥1	1093 (49.5)	4.91		−3.31***	−3.64 to 2.98	−1.84***	−2.21 to −1.48
Counselling for pregnancy concern							
No	2109 (95.6)	6.61	0.095	0.00		0.00	
Yes	97 (4.4)	5.87		−0.74	−1.61 to 0.13	−0.70	−1.44 to 0.03
Epidural analgesia							
No	1586 (71.9)	5.51	<0.001	0.00		0.00	
Yes	620 (28.1)	9.31		3.80***	3.43, 4.16	1.84***	1.43–2.24
Labour induction							
No	1846 (83.7)	6.73	<0.001	0.00		0.00	
Yes	360 (16.3)	5.79		−0.95***	−1.43 to −0.46	−2.03***	−2.44 to −1.62
Labour augmentation							
No	1169 (53.0)	4.91	<0.001	0.00		0.00	
Yes	1037 (47.0)	8.46		3.56***	3.23–3.88	1.68***	1.31–2.06
Emergency caesarean delivery							
No	2049 (92.9)	6.32	<0.001	0.00		0.00	
Yes	157 (7.1)	9.88		3.55***	2.88–4.23	1.99***	1.37–2.61
Instrumental vaginal delivery							
No	1962 (88.9)	6.26	<0.001	0.00		0.00	
Yes	244 (11.1)	9.09		2.83***	2.27–3.39	1.39***	0.89–1.89
Offspring birthweight (kg)				0.57**	0.19–0.96	0.68***	0.35–1.01
Maternal age at delivery (years)				−0.13***	−0.17 to −0.10	−0.03	−0.06 to 0.01

Associations are presented as unstandardised coefficients as estimated by linear regression analyses: Adj. coeff., adjusted unstandardised coefficient; 95% CI, 95% confidence interval; Crude coeff., crude unstandardised coefficient.
*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$. All *P*-values are two-sided.

Table 3. The association between fear of childbirth (measured by the Wijma Delivery Expectancy Questionnaire, W-DEQ) and labour duration (hours) among 1586 women without epidural analgesia during delivery and 620 women with epidural analgesia during delivery in the Akershus Birth Cohort Study

Epidural analgesia	*n*	W-DEQ	*n* (%)	Labour duration (hours)	*P*	Labour duration (hours)			
						Crude unstandardised coefficient	95% CI	Adjusted unstandardised coefficient**	95% CI
No	1586	<85	1495 (94.3)	5.47	0.114	0.00		0.00	
		≥85	91 (5.7)	6.10		0.63	−0.15 to 1.41	0.48	−0.24 to 1.19
Yes	620	<85	546 (88.1)	9.17	0.033	0.00		0.00	
		≥85	74 (11.9)	10.34		1.17*	0.10–2.25	1.31*	0.32–2.31

Associations are presented as unstandardised coefficients as estimated by linear regression analyses: Adj. coeff., adjusted unstandardised coefficient; 95% CI, 95% confidence interval; Crude coeff., crude unstandardised coefficient.
*$P < 0.05$; all *P*-values are two-sided.
**Adjusted coefficients are adjusted for parity, counselling for pregnancy concern, labour induction, labour augmentation, emergency caesarean section, instrumental vaginal delivery, offspring birthweight and maternal age at delivery.

for the other study factors (Table 3). No interactive effect between fear of childbirth and epidural analgesia on labour duration could be estimated ($P > 0.05$).

In both nulliparous ($n = 1113$) and parous ($n = 1093$) women, the women with fear of childbirth had longer labour duration than those without fear (Table 4). After adjustment for the other study factors, the association between fear of childbirth and labour duration remained statistically significant in nulliparous women only (Table 4). There was no interactive effect between fear of childbirth and parity on labour duration in the study sample as a whole ($P > 0.05$).

Women with fear of childbirth more often had an instrumental vaginal delivery (17.0% versus 10.6%, $P = 0.02$) or emergency caesarean delivery (10.9% versus 6.8%, $P > 0.05$) compared with women without fear of childbirth (Table 1). Within each mode of delivery group, independent of epidural analgesia and parity, the estimated mean labour duration was longer in women with fear of childbirth than in women without fear of childbirth (Figures 1 and 2). However, statistical significance was not reached for these differences ($P > 0.05$).

In total, 25.5% (42 women) of women with fear of childbirth and 44.4% (906 women) of women without fear of childbirth had a vaginal delivery without any obstetric interventions (i.e. epidural analgesia, induction of labour, labour augmentation, emergency caesarean delivery or instrumental vaginal delivery) ($P < 0.05$). A vaginal delivery was achieved by 89.1% (147 women) of women with fear of childbirth and 93.2% (1902 women) of women without fear of childbirth ($P > 0.05$), and corresponding figures for an operative delivery (instrumental vaginal or caesarean delivery) were 27.9% (46 women) and 17.4% (355 women), respectively ($P < 0.05$). Prolonged labour (defined as being

Table 4. The association between fear of childbirth (measured by the Wijma Delivery Expectancy Questionnaire, W-DEQ) and labour duration (hours) among 1113 nulliparous women and 1093 parous women in the Akershus Birth Cohort Study

Parity	*n*	W-DEQ	*n* (%)	Labour duration (hours)	*P*	Labour duration (hours)			
						Crude unstandardised coefficient	95% CI	Adjusted unstandardised coefficient***	95% CI
0	1113	<85	1013 (91.0)	8.09	0.010	0.00		0.00	
		≥85	100 (9.0)	9.46		1.36**	0.47–2.26	0.98*	0.17–1.79
≥1	1093	<85	1028 (94.1)	4.85	0.038	0.00		0.00	
		≥85	65 (5.9%)	5.77		0.92*	0.05–1.79	0.39	−0.42 to 1.20

Associations are presented as unstandardised coefficients as estimated by linear regression analyses. CI, confidence interval.
*$P < 0.05$, **$P < 0.01$. All *P*-values are two-sided.
***Adjusted coefficients are adjusted for counselling for pregnancy concern, epidural analgesia, labour induction, labour augmentation, emergency caesarean section, instrumental vaginal delivery, offspring birthweight and maternal age at delivery.

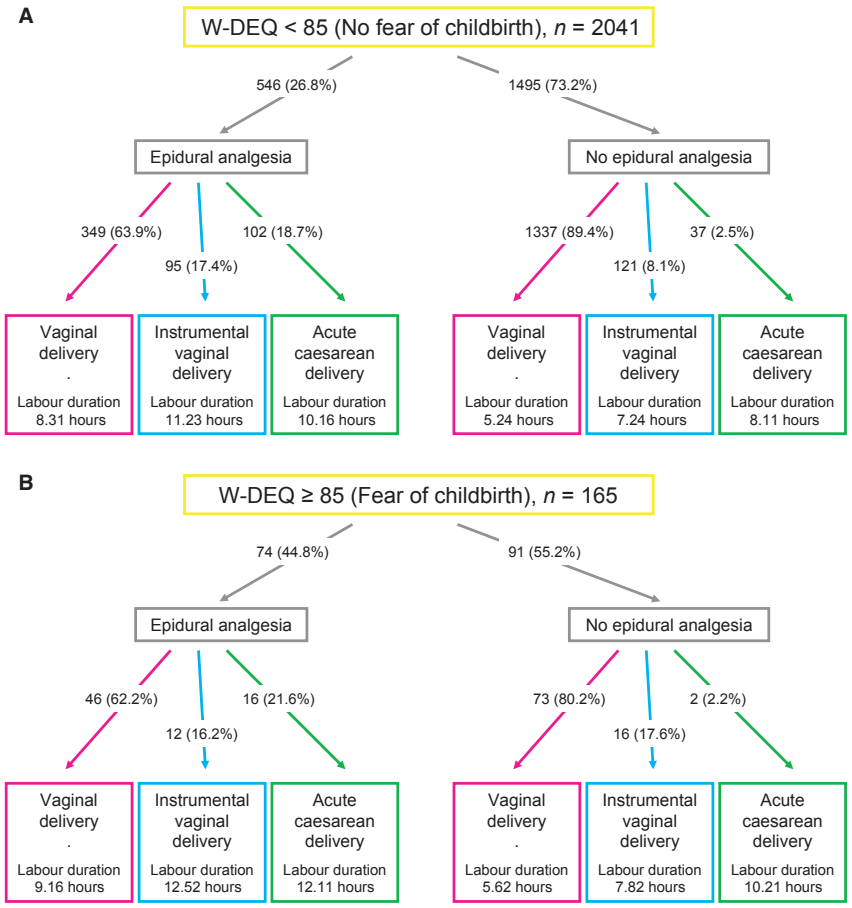

Figure 1. (A) Mean labour duration according to use of epidural analgesia and mode of delivery among 2041 women without fear of childbirth and intended vaginal delivery in the Akershus Birth Cohort Study. (B) Mean labour duration according to use of epidural analgesia and mode of delivery among 165 women with fear of childbirth and intended vaginal delivery in the Akershus Birth Cohort Study.

above the 90th centile of labour duration in nulliparous or parous women) was associated with emergency caesarean delivery, instrumental vaginal delivery and labour augmentation ($P < 0.05$, chi-square test).

Discussion

In this study of 2206 women with intended vaginal delivery, women with fear of childbirth spent 1.54 hours (1 hour and 32 minutes) longer in labour than women with no such fear. After adjustment for other factors associated with labour duration, the difference was attenuated to 0.78 hours (47 minutes), but the duration of labour remained significantly longer in women with fear of childbirth.

Fear of childbirth was measured using the W-DEQ version A, which is a validated psychometric instrument designed to measure fear of childbirth.[22] The threshold of 85 used in this study is commonly used to distinguish women with fear of childbirth from women without fear of childbirth.[16,22,24] There is, however, no reference standard for fear of childbirth. As the health personnel responsible for care during pregnancy and delivery had no information about the women's W-DEQ score, such information could not have influenced obstetric care or communication.

Associations between fear of childbirth and obstetric interventions have been reported in previous studies.[16] Fear of childbirth may also be associated with previous birth experience.[9] We therefore made adjustment for obstetric interventions and parity, as an indicator of having had previous birth experience. The longer labour duration in women with fear of childbirth, however, remained. Information on counselling for pregnancy concern was available to the obstetric staff and may have influenced obstetric care. Only a small proportion of women received counselling (15.2% of women with and 3.5% of women without fear of childbirth). Hence, adjustment for participation in counselling for pregnancy concern did not alter the association of fear of childbirth with labour duration.

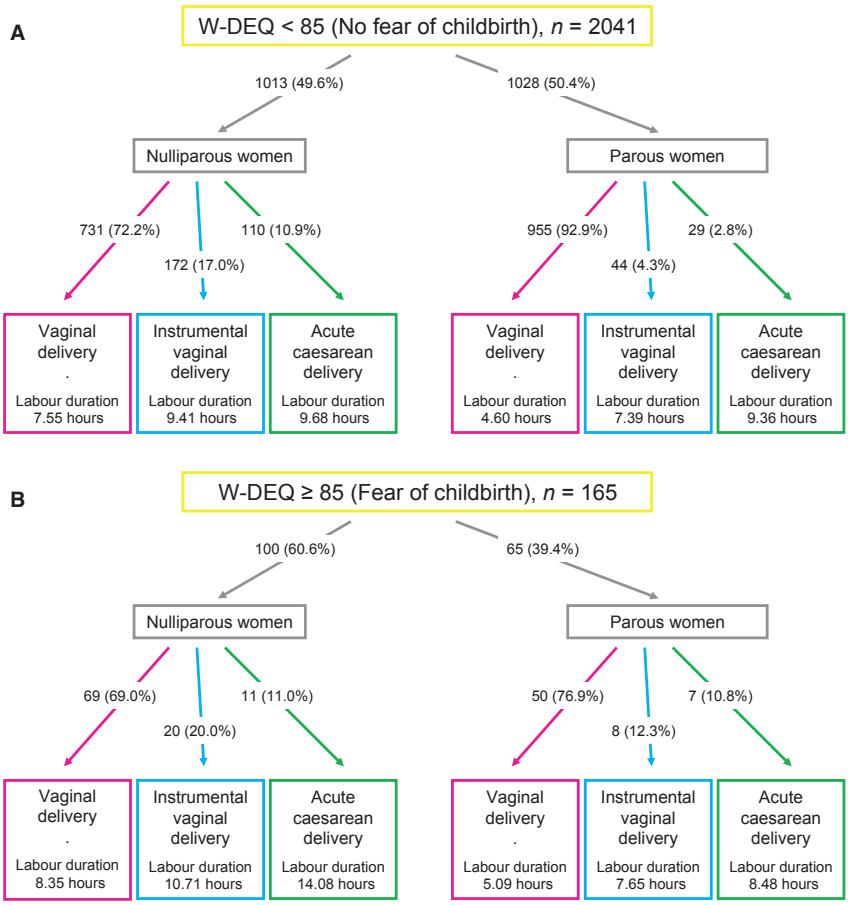

Figure 2. (A) Mean labour duration according to parity and mode of delivery among 2041 women without fear of childbirth and intended vaginal delivery in the Akershus Birth Cohort Study. (B) Mean labour duration according to parity and mode of delivery among 165 women with fear of childbirth and intended vaginal delivery in the Akershus Birth Cohort Study.

Fear of childbirth was associated with longer labour duration in women with and without epidural analgesia and in women with or without a prior delivery. However, after adjustment for the other study factors, the associations were significant only in women with epidural analgesia and in nulliparous women. We estimated no statistically significant interactions, but lack of significance could possibly be explained by limited statistical power.

For women who arrived in the maternity ward after commencement of the active phase of labour (46.5%), we used maternal recall of the start time of regular contractions to define the start of labour. For these women the estimated labour duration was longer than in women who could be followed from start of the active phase at the maternity ward (6.67 hours versus 6.04 hours). There was, however, no association between late arrival to the maternity ward and fear of childbirth. Hence, inaccurate determination of labour duration for women with late arrival to the maternity ward is not likely to have biased our main findings.

Only women who were able to complete a questionnaire in Norwegian could be included in the study, and 63.0% of the eligible women completed the questionnaire. We have no information on the prevalence of fear of childbirth in the non-participating women. However, there was no difference in the use of epidural analgesia in our study population compared with all women in Norway with intended vaginal delivery (28.1% versus 27.2%). The prevalence of the different modes of delivery was also similar (The Medical Birth Registry of Norway, www.mfr.no). Although our study sample may be skewed with regard to the prevalence of fear of childbirth, it is unlikely that the directions of our estimated associations are erroneous.

We are aware of only one other study on fear of childbirth and labour duration. That study reported a positive association between fear of childbirth and labour dystocia/protracted labour that remained after adjustment for confounding factors.[20] In that study, labour dystocia/protracted labour, as defined by the International

Classification of Diseases version 10, was a dichotomous variable. Fear of childbirth was assessed by a single question: 'Are you anxious about the course of the upcoming delivery?' Women who answered 'Yes, a lot' were defined as having fear of childbirth.[20] A study in Sweden found fear of childbirth to be associated with an increased risk of emergency caesarean delivery.[16] However, neither a previous Norwegian nor a previous British study was able to confirm such an association.[12,17]

Fear of childbirth, as measured by the W-DEQ, has previously been shown to correlate with anxiety and depression.[22,25] The longer duration of labour in women with fear of childbirth may therefore be explained by anxiety or depression.[18] Fear of childbirth seems to persist from pregnancy through labour, and women with fear have elevated levels of plasma catecholamines.[18,19,26] Such high levels may weaken uterine contractility, possibly by increasing uterine artery resistance and thereby prolonging labour in women with fear.[16,18,19]

Also, fear of childbirth may be associated with poor communication. Poor communication with health personnel may delay obstetric interventions and thereby prolong labour.[16] Women who received counselling for pregnancy concern may have already had or may have developed better communication skills. In our study counselling for pregnancy concern was associated with shorter duration of labour, although not significantly. In Sweden and Finland, similar treatment has been shown to reduce pregnancy-related and birth-related anxiety.[27–29] Hence, such counselling may be beneficial for women who fear childbirth.

The large variation in labour duration is well known, and our findings may contribute to the understanding of this variation. For many women long labour duration may be acceptable and will not necessitate obstetric intervention. Generally, long labour duration is likely to increase the risk of obstetric complications, and prolonged labour was associated with labour augmentation and operative delivery in our study.

Although fear of childbirth increased labour duration, we found that a large proportion of women in our study achieved a vaginal delivery independent of fear of childbirth (89.1% of women with and 93.2% of women without fear of childbirth). Hence, elective caesarean delivery in women with fear of childbirth should not be routinely recommended to prevent emergency caesarean delivery. There was, however, a difference in the proportions of women with a vaginal delivery without any obstetric interventions (i.e. epidural analgesia, induction of labour, labour augmentation, emergency caesarean delivery or instrumental vaginal delivery) in women with and without fear of childbirth in our study sample (25.5% versus 44.4%). When we included women in the Akershus Birth Cohort Study with elective caesarean delivery in the analyses, the proportions with a vaginal delivery without any obstetric interventions were 19.1% and 35.8%, respectively.

In our study, epidural analgesia was associated with longer duration of labour. This may have been because epidural analgesia prolonged labour or because epidural analgesia was more often used when labour was prolonged. Previous studies suggest that epidural analgesia prolongs labour, but this finding has been challenged.[3,6–8] Pain relief may be important for a positive birth experience, in particular in women who fear childbirth.

Fear of childbirth seems to be an increasingly important issue in obstetric care, but the knowledge of obstetric complications associated with fear of childbirth is still limited. Despite our limited knowledge of the causes and consequences of fear of childbirth, it is significant because it might result in obstetric interventions. Our finding of longer duration of labour in women who fear childbirth is a new piece in the puzzle within this intersection between psychology and obstetrics. However, the clinical implication of this finding is uncertain. More research is needed to provide evidence-based health care to women who fear childbirth.

In conclusion, in this cohort study of 2206 pregnant women with intended vaginal delivery, women with fear of childbirth had longer duration of labour than women without fear of childbirth. The association remained after adjustment for parity, counselling for pregnancy concern, epidural analgesia, labour induction, labour augmentation, emergency caesarean delivery, instrumental vaginal delivery, offspring birthweight and maternal age.

Disclosure of interest

The authors had no conflicts of interest to declare.

Contribution to authorship

SSA was the main author of the paper and undertook the initial drafting and performed the data analyses. All other authors contributed significantly to the design of the study, the assessment of data and development of the manuscript, including approval of the final version.

Details of ethics approval

The Akershus Birth Cohort Study was approved by the Regional Committees for Medical and Health Research Ethics in Norway (S-080113a, Feb 12, 2008). All participants signed an informed consent form.

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References

1 Bergsjo P, Bakketeig L, Eikhom SN. Duration of labour with spontaneous onset. *Acta Obstet Gynecol Scand* 1979;58:129–34.
2 Friedman EA. Primigravid labor; a graphicostatistical analysis. *Obstet Gynecol* 1955;6:567–89.
3 Liao JB, Buhimschi CS, Norwitz ER. Normal labor: mechanism and duration. *Obstet Gynecol Clin North Am* 2005;32:145–64.
4 Pitkin RM. Friedman EA. Primigravid labor: a graphicostatistical analysis. *Obstet Gynecol* 2003;101:216.
5 Blix E, Kumle M, Oian P. [What is the duration of normal labour?]. [Norwegian]. *Tidsskr Nor Laegeforen* 2008;128:686–9.
6 Lieberman E, O'donoghue C. Unintended effects of epidural analgesia during labor: a systematic review. *Am J Obstet Gynecol* 2002;186 (Suppl):31–68.
7 Kolas T, Hofoss D, Daltveit AK, Nilsen ST, Henriksen T, Hager R, et al. Indications for cesarean deliveries in Norway. *Am J Obstet Gynecol* 2003;188:864–70.
8 van Alten D, Eskes M, Treffers PE. Midwifery in The Netherlands. The Wormerveer study; selection, mode of delivery, perinatal mortality and infant morbidity. *Br J Obstet Gynaecol* 1989;96: 656–62.
9 Saisto T, Halmesmaki E. Fear of childbirth: a neglected dilemma. *Acta Obstet Gynecol Scand* 2003;82:201–8.
10 Waldenstrom U, Hildingsson I, Ryding EL. Antenatal fear of childbirth and its association with subsequent caesarean section and experience of childbirth. *BJOG* 2006;113:638–46.
11 Rouhe H, Salmela-Aro K, Halmesmaki E, Saisto T. Fear of childbirth according to parity, gestational age, and obstetric history. *BJOG* 2009;116:67–73.
12 Heimstad R, Dahloe R, Laache I, Skogvoll E, Schei B. Fear of childbirth and history of abuse: implications for pregnancy and delivery. *Acta Obstet Gynecol Scand* 2006;85:435–40.
13 Hofberg K, Ward MR. Fear of pregnancy and childbirth. *Postgrad Med J* 2003;79:505–10.
14 Rouhe H, Salmela-Aro K, Gissler M, Halmesmaki E, Saisto T. Mental health problems common in women with fear of childbirth. *BJOG* 2011;118:1104–11.
15 Wadhwa PD, Dunkel-Schetter C, Chicz-DeMet A, Porto M, Sandman CA. Prenatal psychosocial factors and the neuroendocrine axis in human pregnancy. *Psychosom Med* 1996;58:432–46.
16 Ryding EL, Wijma B, Wijma K, Rydhstrom H. Fear of childbirth during pregnancy may increase the risk of emergency cesarean section. *Acta Obstet Gynecol Scand* 1998;77:542–7.
17 Johnson R, Slade P. Does fear of childbirth during pregnancy predict emergency caesarean section? *BJOG* 2002;109:1213–21.
18 Johnson RC, Slade P. Obstetric complications and anxiety during pregnancy: is there a relationship? *J Psychosom Obstet Gynaecol* 2003;24:1–14.
19 Lederman RP, Lederman E, Work BA Jr, McCann DS. The relationship of maternal anxiety, plasma catecholamines, and plasma cortisol to progress in labor. *Am J Obstet Gynecol* 1978;132:495–500.
20 Laursen M, Johansen C, Hedegaard M. Fear of childbirth and risk for birth complications in nulliparous women in the Danish National Birth Cohort. *BJOG* 2009;116:1350–5.
21 Ministry of Health and Care Services [Internet]. Fosterdiagnostikk [updated 2002] [Norwegian]. [http://www.regjeringen.no/nb/dep/hod/dok/regpubl/stmeld/20012002/stmeld-nr-14-2001-2002-/5.html?id=195458]. Accessed 23 March 2012.
22 Wijma K, Wijma B, Zar M. Psychometric aspects of the W-DEQ; a new questionnaire for the measurement of fear of childbirth. *J Psychosom Obstet Gynecol* 1998;19:84–97.
23 Altman DG. Relation between two continuous variables. In: *Practical Statistics for Medical Research*. London: Chapman & Hall/CRC; 1991. pp. 303–6.
24 Spice K, Jones SL, Hadjistavropoulos HD, Kowalyk K, Stewart SH. Prenatal fear of childbirth and anxiety sensitivity. *J Psychosom Obstet Gynecol* 2009;30:168–74.
25 Størksen HT, Eberhard-Gran M, Garthus-Niegel S, Eskild A. Fear of childbirth; the relation to anxiety and depression. *Acta Obstet Gynecol Scand* 2012;91:237–42.
26 Alehagen S, Wijma B, Wijma K. Fear of childbirth before, during, and after childbirth. *Acta Obstet Gynecol Scand* 2006;85:56–62.
27 Saisto T, Salmela-Aro K, Nurmi JE, Kononen T, Halmesmaki E. A randomized controlled trial of intervention in fear of childbirth. *Obstet Gynecol* 2001;98:820–6.
28 Saisto T, Toivanen R, Salmela-Aro K, Halmesmaki E. Therapeutic group psychoeducation and relaxation in treating fear of childbirth. *Acta Obstet Gynecol Scand* 2006;85:1315–19.
29 Sjogren B, Thomassen P. Obstetric outcome in 100 women with severe anxiety over childbirth. *Acta Obstet Gynecol Scand* 1997;76: 948–52.

