

1 Title: Determining the psychological impact of delivery mode prediction using ultrasound  
2 and clinical assessment.

3 Parental anxiety surrounding childbirth often stems from uncertainties in the labor process and can  
4 significantly impact subsequent parent-child bonding, the postnatal psychological state, and physical  
5 recovery. A woman's first labor experience profoundly shapes her views and future childbirth  
6 decisions.<sup>1</sup> Adverse birth experiences can lead to psychological responses ranging from low mood to  
7 severe post-traumatic stress disorder (PTSD), and are key predictors for fear of childbirth (FOC).<sup>2</sup>  
8 Postpartum depression and anxiety adversely affect mother-child bonding.<sup>3</sup> A meta-analysis has  
9 linked the unpredictability of childbirth to increased fear.<sup>4</sup> A predictive model for vaginal birth,  
10 integrating intrapartum ultrasound with clinical examination,<sup>5</sup> is available as an application using a  
11 traffic light system to categorize the predicted probability of a vaginal birth<sup>6,7</sup> (Figure 1). Our  
12 objective was to investigate how predictive information affects the birthing experiences of women.  
13 We used validated questionnaires to evaluate depression and anxiety, aiming to understand both the  
14 immediate and long-term psychological impacts.

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16 Nulliparous women  $\geq 35$  weeks of gestation with a singleton fetus in cephalic presentation were  
17 recruited antenatally at an inner-city maternity unit. Participants were asked to complete the Fear of  
18 Birth Scale (FOBS), Wijma-Delivery Expectancy/Experience Questionnaire (W-DEQ), and  
19 Depression, Anxiety, and Stress Scale (DASS) to assess mental health parameters prior to labor.  
20 Participants attending the delivery suite in active labor were re-evaluated for eligibility to undergo an  
21 ultrasound assessment. Clinical data were entered by a researcher into the intrapartum application  
22 alongside ultrasound findings to generate a vaginal birth prediction score. Approximately  $8 \pm 2$  weeks  
23 postpartum, participants were asked to complete the psychometric assessment measures. Data were  
24 analyzed using the Wilcoxon signed-ranks and the Mann-Whitney u-tests.

25 24 participants completed antenatal measures, 12 (50%) participants completed all study measures.  
26 6/24 (25%) participants received intrapartum ultrasound and prediction information. 4/12 (33%)

27 received predictive data while 8/12 (67%) did not (Table 1), forming two groups: Group 1 (with  
28 predictive information) and Group 2 (without predictive information).

29 Prenatally, both groups had high childbirth fear levels evidenced from FOBS and W-DEQ (Table 1).  
30 Group 1 showed greater change in the DASS scores from ante- to postnatal, except in the Anxiety  
31 subscale, with decreases in total DASS ( $P = 0.008$ ), Depression ( $P = 0.004$ ), and Stress ( $P = 0.048$ )  
32 scores. Group 2 exhibited a postnatal increase in all DASS subscales except Anxiety, with changes in  
33 total DASS ( $P = 0.012$ ), Depression ( $P = 0.012$ ), and the Stress ( $P = 0.017$ ) scores (Table 1).

34 This study reports the psychological impact of receiving birth prediction information during labor by  
35 investigating participants who received this information and those who did not. Information on birth  
36 prediction, regardless of its accuracy, is associated with lower postnatal depression, stress, and anxiety  
37 compared to antenatal scores. These results, while based on a small sample size should be considered  
38 preliminary but highlight the possibility that addressing unpredictability of labor outcome from  
39 prediction data could improve birth experience and postpartum mental health.

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53 **References**

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78 **Table 1:** Ultrasound prediction of delivery mode. Psychometric outcomes of the 12 participants who  
 79 completed all study measures (antenatal and postnatal questionnaires)

	Had predictive information and completed all measures 4/12 (33%)	Did not have predictive information but completed all measures 8/12 (67%)
<b>Birth Plan</b>		
Had birth plan (%)	3/4 (75.0%)	4/8 (50.0%)
<b>Measures</b>		
<b>W-DEQ</b>		
W-DEQ-A		
Median (Range)	98.50 (89-116)	99 (64-122)
N above cutoff of 85 (%)	100.0%	75.0%
W-DEQ-B		
Median (Range)	102.50 (71-141)	108.5 (73-134)
<b>FOBS</b>		
Worry		
Median (Range)	65.5 (30-70)	61 (20-91)
Fear		
Median (Range)	65.5 (60-80)	68.5 (20-93)
<b>DASS</b>		
Total		
Pre		
Median (Range)	13.5 (6-23)	9.00 (0-19)
Post		
Median (Range)	↓ 5 (3-23)	↑ 21.5 (3-48)
Anxiety		
Pre		
Median (Range)	5.5 (0-8)	2 (0-10)
Post		
Median (Range)	↓ 0.5 (0-9)	↑ 3.5 (0-13)
Depression		
Pre		
Median (Range)	3.00 (0-5)	1 (0-3)
Post		
Median (Range)	↓ 0 (0-4)	↑ 5 (1-13)
Stress		
Pre		
Median (Range)	6.5 (3-10)	4.5 (0-8)
Post		
Median (Range)	↓ 4.5 (3-8)	↑ 10.5 (2-20)
<b>Mode of delivery</b>		
Type of birth		
Vaginal (%)	4 (100.0%)	4 (50.0%)
Caesarean (%)	0	4 (50.0%)
Prediction information		
Highly likely	3 (75.0%)	-
Neutral	1 (25.0%)	-
Anxiety in labor		
Median (Range)	45 (10-100)	73.5 (45-100)
Confidence in coping during labor		
Median (Range)	45.5 (0-87)	63.5 (30-95)

Birth differed from plan?		
Yes (%)	3 (75.0%)	6 (75.0%)
How upset about differing?		
Median (Range)	32 (15-50)	54.5 (0-100)
No (%)	0 (0.0%)	2 (25.0%)
Prefer not to say (%)	1 (25.0%)	0 (0.0%)
Recommends/would have liked prediction info (%)	2 (50.0%)	6 (75.0%)
<b>How helpful was...</b>		
Having prediction info? (0-100)		
Median (Range)	54.5 (19-80)	-
Not having prediction info? (0-100)		
Median (Range)	-	24 (0-50)

\*DASS: Depression, Anxiety, and Stress Scale; FOBS: Fear of Birth Scale; W-DEQ: Wijma Delivery Expectancy/ Experience Questionnaire.

\*W-DEQ-A is the original antenatal version. W-DEQ-B is the adapted postnatal version.

\*Increasing W-DEQ and FOBS scores indicate a greater fear of childbirth, while higher DASS scores denote increasing levels of depression, anxiety, and stress.

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