

Latent Profile and Influencing Factor Analysis of Childbirth Readiness Among Women in Their Third Trimester of Pregnancy: A Cross-Sectional Study

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Objective: This study aimed to assess the childbirth readiness of women in their third trimester of pregnancy and to identify distinct readiness profiles using latent profile analysis (LPA). Additionally, it explored the factors influencing childbirth readiness in order to guide targeted interventions for improved maternal and neonatal outcomes.

Methods: A cross-sectional study was conducted among women in their third trimester of pregnancy between May and November 2024. Eligible participants completed a general information questionnaire, the Childbirth Readiness Scale (CRS), the Childbirth Attitude Questionnaire (CAQ), and the Perceived Social Support Scale (PSSS).

Results: LPA identified three groups with distinct childbirth readiness levels: “Low Readiness – Childbirth Knowledge Deficit” (37.9%), “Moderate Readiness – Good Lifestyle Habits” (47.9%), and “High Readiness – Rich Health Knowledge” (14.2%). In addition, gestational age, previous childbirth history, adverse pregnancy outcomes, childbirth attitudes, and social support had different influences on women in different latent profiles of childbirth readiness.

Conclusion: There was significant heterogeneity in childbirth readiness among women in their third trimester. Women with lower readiness—especially in childbirth knowledge—would greatly benefit from targeted educational programs, whereas those with moderate readiness levels would find enhanced emotional and psychological support most advantageous. These findings support the implementation of profile-based, personalized prenatal care strategies to improve childbirth preparedness and optimize maternal and neonatal outcomes.

Keywords: childbirth readiness, pregnant women, latent profile analysis, influencing factors, pregnancy outcomes

Introduction

Maternal mortality remains a significant public health challenge globally. The World Health Organization reports that over 800 women die every day from preventable pregnancy-related complications.¹ Adequate prenatal preparation contributes to better childbirth readiness by increasing the timely use of skilled birth attendants, comprehensive prenatal counseling, and prompt recognition and response to potential complications, thereby decreasing perinatal complications and improving maternal and neonatal outcomes.^{2–4} Childbirth readiness refers to a pregnant woman's preparedness for birth across multiple domains, including material preparations, knowledge acquisition, psychological readiness, planning, and coping skills. It serves as an indicator of the ability of a woman to manage the childbirth process.⁵ Although similar to the concepts such as birth preparedness and antenatal education, childbirth readiness represents a unique, broader, multidimensional construct that integrates behavioral, informational, psychological, and decisional aspects of preparation,⁶ rather than focusing solely on preparatory actions or education exposure.⁷ Sufficient childbirth readiness is associated with lower risks of maternal and neonatal complications and a better childbirth experience.² However, studies have shown that childbirth readiness among pregnant women in their third trimester remains suboptimal in many countries, with significant variations by region, socioeconomic status, and access to prenatal care.^{8–10} In China, with the

recent change in birth control policy and a persistently high cesarean section rate, childbirth readiness has been reported to be inadequate for many women in their third trimester, with notable gaps in birth confidence, preparation, and access to high-quality education and care.¹¹ Most existing studies have examined childbirth readiness using variable-centered approaches, focusing on isolated dimensions, leaving heterogeneity in readiness patterns and subgroup characteristics insufficiently explored. Therefore, there is an urgent need to identify factors influencing childbirth readiness in order to develop targeted, effective, and personalized interventions.

Pregnant women form a heterogeneous population, with widely varying levels of medical knowledge, previous childbirth experience, and preferences regarding delivery method. Latent profile analysis (LPA) is a statistical technique used to identify unobserved (latent) subgroups within a population. This method has been used in behavioral medicine, psychiatry, neurology, and other fields to characterize patient heterogeneity and guide personalized intervention strategies.¹² As a person-centered approach, LPA identifies subgroups based on overall patterns across multiple dimensions, carrying advantages over traditional variable-centered methods when examining complex, multidimensional constructs such as childbirth readiness.¹³ Although LPA has been applied in perinatal research to identify psychological and behavioral profiles among pregnant women,¹⁴ its application to childbirth readiness remains limited, it has rarely been used to develop personalized strategies to improve childbirth preparedness and outcomes in these women. Importantly, previous research has rarely used LPA to translate subgroup identification into actionable, tailored interventions, highlighting a gap in using LPA results to guide personalized care strategies.

Therefore, in this cross-sectional study we assessed the current status of childbirth readiness among pregnant women in their third trimester. We used latent profile analysis (LPA) to classify women into distinct childbirth readiness profiles and to explore factors influencing their level of readiness. In addition, this study aimed to identify specific areas within each profile that could benefit from personalized interventions, providing a blueprint for designing targeted strategies to improve childbirth preparedness.

Materials and Methods

Study Design and Participant Selection

This study employed a cross-sectional design with a convenience sampling method in the Obstetrics Department and Outpatient Clinic of a tertiary hospital in Dalian, China, between May and November 2024. Eligible participants were approached consecutively during routine antenatal visits and were invited to participate voluntarily into this study. The study protocol was approved by the Ethics Committee of the Second Hospital of Dalian Medical University (the ethical approval number: KY2024-020-01). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All study participants signed the informed consent.

Inclusion criteria were: women ≥ 18 years old, in the third trimester of pregnancy (≥ 28 weeks), who were able to communicate and complete the survey independently. Women with severe medical conditions or psychiatric disorders were excluded.

Data Collection

Questionnaires were administered in person by trained research assistants during routine antenatal visits. The participants completed a general information questionnaire, the Childbirth Readiness Scale (CRS), the Childbirth Attitude Questionnaire (CAQ), and the Perceived Social Support Scale (PSSS). Incomplete responses to questionnaires were excluded prior to data analysis.

The CRS was developed in Chinese by Shi et al⁵ and is a validated instrument designed to comprehensively assess the readiness of pregnant women for childbirth, particularly during the third trimester. It comprises six dimensions: lifestyle habits, psychological status, antenatal health knowledge, childbirth knowledge, coping ability, and anticipatory support, with a total of 29 items. Each item is rated on an 11-point scale ranging from 0 to 10, where 0 indicates “not at all” and 10 indicates “completely.” The total score ranges from 0 to 290, with a higher score reflecting a greater level of childbirth

preparedness. The CRS has demonstrated strong reliability and validity, with a total Cronbach's alpha value of 0.935.¹⁵ A higher CRS score suggests that a woman is well prepared for childbirth.

The CAQ is a self-reported instrument for assessing a pregnant woman's attitudes and fears regarding childbirth, with a particular focus on fear of childbirth. It was originally developed and validated by Lowe et al¹⁶ based on previous research, and was later translated and revised into Chinese by Wei et al.¹⁷ It has shown good reliability and validity in diverse populations with a Cronbach's α coefficient of 0.940, including Chinese women.¹⁸ The questionnaire consists of 16 items across four dimensions: fetal health, medical care, self-control, and pain/injury during childbirth. It employs a 4-point Likert scale, with responses ranging from 1 (none) to 4 (severe), yielding a total score between 16 and 64. A higher CAQ score indicates greater fear or a more negative attitude toward childbirth.

The PSSS is a psychometric scale that measures an individual's perceived social support from family, friends, and others. The scale was originally developed by Zimet et al¹⁹ and later translated and revised into Chinese by Jiang et al.²⁰ It has robust psychometric properties in the Chinese population (eg, internal consistency Cronbach's $\alpha > 0.90$). It comprises 12 items across three dimensions: family support, friend support, and support from significant others. The scale uses a 7-point Likert scoring method, with responses ranging from 1 (strongly disagree) to 7 (strongly agree). Total scores range from 12 to 84, with a higher score indicating a higher level of perceived social support.²¹ The original scale demonstrated good internal consistency, with a Cronbach's α coefficient of 0.85.

Statistical Analysis

Data were analyzed using SPSS 25.0 (IBM, Armonk, NY, USA) and Mplus 8.0. Continuous data are presented as mean $\pm$ standard deviation or median with interquartile range, as appropriate. Categorical data are presented as numbers and percentages. LPA was conducted to identify distinct subgroups of participants based on their childbirth readiness scores. Differences between profiles in participant characteristics were evaluated using Chi-square test or one-way ANOVA when appropriate. Factors associated with profile membership were analyzed with multi-category logistic regression. A p value < 0.05 was considered statistically significant. Missing data were minimal and were handled using complete-case analysis. Prior to multinomial logistic regression, multicollinearity among independent variables was assessed using variance inflation factors (VIFs), with a VIF value < 2.0 indicating no evidence of problematic multicollinearity. In addition, linearity with the logit was assessed for all independent continuous variables.

Results

A total of 360 questionnaires were distributed, with 351 valid responses, resulting in an effective response rate of 97.5%. Among these 351 women, the mean age was 32.1 ± 2.6 years, with the mean gestational age of 35.1 ± 3.0 weeks. The proportion of missing values for all variables was low, not exceeding the commonly accepted threshold for exclusion. Therefore, all variables collected were entered into the further analyses.

LPA Results of Childbirth Readiness

We employed a stepwise validation approach to determine the optimal latent class model. Using a single-class model as the baseline, five latent profile models with varying class numbers were systematically constructed and compared. Model fit indices indicated that the information criterion values (Akaike information criterion, Bayesian information criterion, and adjusted Bayesian information criterion) decreased as the number of classes increased, while entropy values remained greater than 0.8 across all models, suggesting high classification accuracy (Table 1). Notably, although the Lo-Mendell-Rubin likelihood ratio (LMR) test for Models 4 and 5 did not reach statistical significance ($p > 0.05$), the LMR and bootstrap likelihood ratio test statistics for Model 3 showed significant differences ($p < 0.05$). Further analysis of the posterior probability matrix revealed that the classification probability for each profile exceeded 90%, confirming the high reliability of the three-profile model (Table 2). Based on these statistical findings, we identified the three-profile model as the optimal solution.

Table 1 Fit Indices for Latent Profile Analysis of Childbirth Readiness Among Women in Their Third Trimester of Pregnancy

Model	AIC	BIC	aBIC	Entropy	p-value		Group Size (%)
					LMR	BLRT	
1C	43902.492	44,126.418	43,942.420	-	-	-	-
2C	40443.371	40,783.120	40,503.952	0.965	0.0000	0.0000	44.729/55.271
3C	39610.689	40,066.262	39,691.922	0.956	0.0027	0.0000	37.892/47.863/14.245
4C	39142.463	39,713.859	39,244.348	0.953	0.0405	0.0000	26.781/40.741/19.943/12.536
5C	38928.528	39,615.748	39,051.066	0.947	0.5922	0.0000	9.687/14.245/23.362/40.171/12.536

Abbreviations: aBIC, adjusted Bayesian information criterion; AIC, Akaike information criterion; BIC, Bayesian information criterion; BLRT, bootstrap likelihood ratio test; LMR, Lo-Mendell-Rubin likelihood ratio.

Table 2 Probability Matrix for the Three Latent Profile Groups (Percentage, %)

Latent Profile	Probability of Latent Profile Groups		
	C1	C2	C3
C1	0.985	0.015	0.000
C2	0.007	0.984	0.009
C3	0.000	0.030	0.970

Abbreviations: C1, Low Readiness – Childbirth Knowledge Deficit Type; C2, Moderate Readiness – Good Lifestyle Habits Type; C3, High Readiness – Rich Health Knowledge Type.

Childbirth Readiness Scores

The total CRS scores ranged from 0 to 290, with a mean total score of 204.13 ± 40.56 . The average item score was 7.04 ± 1.40 (Table 3). Among the six dimensions, the lowest mean score was in the “childbirth knowledge” dimension (6.25 ± 1.90), followed by psychological state (6.78 ± 1.94), coping ability (6.91 ± 1.70), anticipated support (7.37 ± 1.73), and lifestyle habits (7.43 ± 1.51). The highest mean score was recorded in the prenatal health knowledge dimension (7.44 ± 1.52).

Latent Profile Characteristics and Classification of Childbirth Readiness

Three distinct latent profiles of childbirth readiness were identified (Figure 1). These profiles were named according to their characteristic features. The C1 group, comprising 133 women (37.9%, Table 4), had particularly low scores across

Table 3 Childbirth Readiness Scale (CRS) Among Women in Their Third Trimester of Pregnancy

Childbirth Readiness	Score Range	Total Score ($\bar{x} \pm s$)	Mean Score ($\bar{x} \pm s$)
Childbirth readiness	0–290	204.13±40.56	7.04±1.40
Dimensions			
Prenatal health knowledge	0–70	52.07±10.65	7.44±1.52
Lifestyle habits	0–50	37.14±7.54	7.43±1.51
Anticipated support	0–40	29.47±6.94	7.37±1.73
Coping ability	0–40	27.64±6.81	6.91±1.70
Psychological state	0–30	20.34±5.83	6.78±1.94
Childbirth knowledge	0–60	37.48±11.41	6.25±1.90

Notes: Values are presented as the mean $\pm$ standard deviation ($\bar{x} \pm s$).

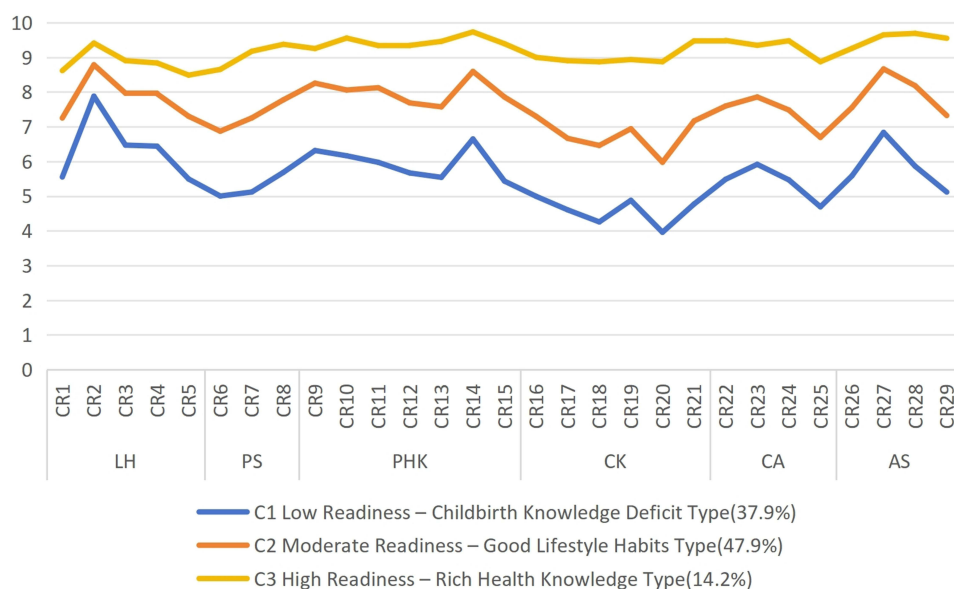


Figure 1 Schematic diagram of the latent profiles of childbirth readiness among women in their third trimester of pregnancy.

Abbreviations: C1, Low Readiness – Childbirth Knowledge Deficit Type (37.9%); C2, Moderate Readiness – Good Lifestyle Habits Type (47.9%); C3, High Readiness – Rich Health Knowledge Type (14.2%). AS, anticipated support; CA, coping ability; CK, childbirth knowledge; LH, lifestyle habits; PHK, prenatal health knowledge; PS, psychological state.

all items—especially a low average score for childbirth knowledge (6.25 ± 1.90 , Table 3). Therefore, C1 was labeled as the Low Readiness – Childbirth Knowledge Deficit type. The C2 group ($n = 168$, 47.9%, Table 4) had relatively higher scores in the lifestyle habits dimension (average 7.43 ± 1.51 , Table 3). It was labeled as the Moderate Readiness – Good Lifestyle Habits type. The C3 group ($n = 50$, 14.2%, Table 4) showed consistently high scores on all dimensions (eg, a prenatal health knowledge score of 7.44 ± 1.52 , Table 3) and was labeled as the High Readiness – Rich Health Knowledge type. A comparison of the CRS scores confirmed that the three profiles differed significantly in total score and in all six dimensions (all $p < 0.001$, Table 4), validating the distinctness of these latent groups.

Characteristics Associated with Women with Different Latent Profiles of Childbirth Readiness

Univariate analysis showed that education level, monthly household income, current gestational age, history of previous deliveries, history of adverse pregnancy and birth outcomes, childbirth attitude, and perceived social support differed among women in different latent profiles, with statistically significant differences ($p < 0.05$, Tables 5–7).

Table 4 Comparison of Childbirth Readiness Scores Among Different Latent Profiles

Potential Profile	Number	LH $\bar{x} \pm s$	PS $\bar{x} \pm s$	PHK $\bar{x} \pm s$	CK $\bar{x} \pm s$	CA $\bar{x} \pm s$	AS $\bar{x} \pm s$	Total Childbirth Preparedness Score $\bar{x} \pm s$
C1	133	31.77 ± 6.58	15.74 ± 4.11	41.71 ± 7.57	27.42 ± 7.37	21.55 ± 4.81	23.35 ± 5.26	161.54 ± 19.32
C2	168	39.29 ± 5.54	21.93 ± 4.65	56.08 ± 5.11	40.52 ± 6.94	29.57 ± 3.87	31.71 ± 4.42	219.09 ± 15.29
C3	50	44.20 ± 6.36	27.20 ± 3.01	66.18 ± 4.19	54.00 ± 5.95	37.34 ± 2.99	38.24 ± 2.28	267.16 ± 14.29
F		96.326	154.961	366.384	294.410	298.020	235.068	845.220
P		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Abbreviations: AS, anticipated support; C1, Low Readiness – Childbirth Knowledge Deficit Type; C2, Moderate Readiness – Good Lifestyle Habits Type; C3, High Readiness – Rich Health Knowledge Type; CA, coping ability; CK, childbirth knowledge; LH, lifestyle habits; PHK, prenatal health knowledge; PS, psychological state.

Table 5 Characteristic Comparisons of Women with Different Latent Profiles of Childbirth Readiness

Characteristics	Classification	Latent Profile Category, n (%)			X ²	p
		C1 (n=133)	C2 (n=168)	C3 (n=50)		
Age (years)	≤30	46 (38.0)	58 (47.9)	17 (14.0)	0.006	0.997
	>30	87 (37.8)	110 (47.8)	33 (14.3)		
Residence	Urban	128 (37.4)	166 (48.5)	48 (14.0)	2.442	0.295
	Non-urban	5 (55.6)	2 (22.2)	2 (22.2)		
Marital status	Unmarried and others	1 (100.0)	0 (0.0)	0 (0.0)	1.644	0.440
	Married	132 (37.7)	168 (48.0)	50 (14.3)		
Education level	High school or lower	18 (62.1)	7 (24.1)	4 (13.8)	14.425	0.006
	Associate degree	17 (35.4)	19 (39.6)	12 (25.0)		
	Bachelor's degree or above	98 (35.8)	142 (51.8)	34 (12.4)		
Occupation	Students and self-employed	29 (41.4)	32 (45.7)	9 (12.9)	7.015	0.1356
	Staff	78 (33.6)	118 (50.9)	36 (15.5)		
	Unemployed and others	26 (53.1)	18 (36.7)	5 (10.2)		
Ethnicity	Han	116 (37.1)	152 (48.6)	45 (14.4)	0.857	0.651
	Minority	17 (44.7)	16 (42.1)	5 (13.2)		
Religious	Yes	1 (25.0)	1 (25.0)	2 (50.0)	4.251	0.119
	No	132 (38.0)	167 (48.1)	48 (13.8)		
Medical payment method	Self-payment	11.0 (42.3)	10 (38.5)	5 (19.2)	2.214	0.696
	Insurance	122 (37.7)	157 (48.5)	45 (13.9)		
	Others	0 (0.0)	1 (100.0)	0 (0.0)		
Monthly household income (Chinese Yuan)	<3,000	7 (50.0)	6 (42.9)	1 (7.1)	18.409	0.005
	3,000–6,000	33 (56.9)	19 (32.8)	6 (10.3)		
	6,001–9,000	34 (44.2)	35 (45.5)	8 (10.4)		
	>9,000	59 (29.2)	108 (53.5)	35 (17.3)		
Only-child Status	Yes	76 (38.8)	93 (47.4)	27 (13.8)	0.176	0.916
	No	57 (36.8)	75 (48.8)	23 (14.8)		
Living arrangement	Living alone	27 (41.5)	27 (41.5)	11 (16.9)	1.348	0.510
	With family or relatives	106 (37.1)	141 (49.3)	39 (13.6)		
Gestational Age (Weeks)	28-31	38 (69.1)	16 (29.1)	1 (1.8)	29.084	< 0.001
	32-35	33 (32.4)	54 (52.9)	15 (14.7)		
	≥36	62 (32.0)	98 (50.5)	34 (17.5)		
Previous childbirth history	Yes	34 (25.2)	59 (43.7)	42 (31.1)	53.949	< 0.001
	No	99 (45.8)	109 (50.5)	8 (3.7)		
History of adverse pregnancy outcomes	Yes	43 (56.6)	25 (32.9)	8(10.5)	14.422	0.001
	No	90 (32.7)	143 (52.0)	42 (15.3)		
Previous delivery mode	No	87 (40.3)	101 (46.8)	28 (13.0)	2.434	0.656
	Vaginal delivery	38 (35.5)	51 (47.7)	18 (16.8)		
	Cesarean delivery	8 (28.6)	16 (57.1)	4 (14.3)		

(Continued)

Table 5 (Continued).

Characteristics	Classification	Latent Profile Category, n (%)			χ^2	p
		C1 (n=133)	C2 (n=168)	C3 (n=50)		
Number of prenatal visits	<8 8-11 >11	7 (30.4) 57 (45.2) 69 (34.2)	11 (47.8) 55 (43.7) 102 (50.5)	5 (21.7) 14 (11.1) 31 (15.3)	5.582	0.233
Multiple pregnancy	Yes No	0 (0.0) 133 (38.1)	1 (50.0) 167 (47.9)	1 (50.0) 49 (14.0)	2.569	0.277
Preexisting conditions and pregnancy complications	Yes No	29 (36.7) 104 (38.2)	37 (46.8) 131 (48.2)	13 (16.5) 37 (13.6)	0.410	0.815

Table 6 Comparisons in Attitudes Toward Childbirth Among Women with Different Latent Profiles of Childbirth Readiness

Dimension	C1	C2	C3	F	p
Fetal health	2.66±0.67	2.94±0.66	2.08±0.66	18.022	<0.001
Loss of self-control	2.39±0.60	2.01±0.61	1.77±0.62	24.486	<0.001
Labor pain and injury	2.30±0.62	1.98±0.62	1.70±0.52	20.927	<0.001
Medical care	1.81±0.58	1.57±0.55	1.35±0.43	15.212	<0.001
Childbirth attitude	2.34±0.53	2.01±0.53	1.77±0.50	26.800	<0.001

Abbreviations: C1, Low Readiness – Childbirth Knowledge Deficit Type; C2, Moderate Readiness – Good Lifestyle Habits Type; C3, High Readiness – Rich Health Knowledge Type.

Table 7 Comparisons of Social Supports Among Women with Different Latent Profiles of Childbirth Readiness

Dimension	C1	C2	C3	F	p
Family support	5.41±1.22	6.08±0.97	6.36±1.10	20.186	<0.001
Friend support	5.04±1.28	5.58±0.95	6.17±1.13	20.455	<0.001
Other support	4.91±1.24	5.52±0.96	6.10±1.13	24.479	<0.001
Perceive social support	5.12±1.16	5.73±0.85	6.21±1.08	25.238	<0.001

Abbreviations: C1, Low Readiness – Childbirth Knowledge Deficit Type; C2, Moderate Readiness – Good Lifestyle Habits Type; C3, High Readiness – Rich Health Knowledge Type.

Multi-Factor Analysis of Latent Profiles of Childbirth Readiness

All independent variables had a VIF < 2.0, indicating no problematic multicollinearity. Furthermore, all independent continuous variables also showed linear distributions. Regarding sample size adequacy, the final sample of 351 participants was considered sufficient for multinomial logistic regression, as the smallest latent profile included more than 50 individuals, allowing stable estimation given the number of predictors included.

The multi-factor logistic regression analysis was then performed and showed that current gestational age, history of previous deliveries, history of adverse pregnancy and birth outcomes, childbirth attitude, and perceived social support were influencing factors of different latent profiles of childbirth readiness among women in their third trimester of pregnancy ($p < 0.05$, Table 8).

Table 8 Multi-Factor Analysis of Women with Different Latent Profiles of Childbirth Readiness

Characteristic	Classification	C1 vs C3 ^a				C2 vs C3 ^a				C1 vs C2 ^b			
		B	p	OR	95% CI	B	p	OR	95% CI	B	p	OR	95% CI
Education level	High school or lower	0.443	0.625	1.558	(0.263–9.212)	−0.439	0.586	0.645	(0.133–3.134)	0.882	0.136	2.416	(0.757–7.712)
	Associate degree	−1.203	0.058	0.300	(0.087–1.040)	−1.116	0.037	0.327	(0.115–0.933)	−0.086	0.842	0.917	(0.392–2.145)
	Bachelor's degree or above												
Monthly household income (Chinese Yuan)	<3,000	0.798	0.562	2.220	(0.150–32.841)	0.408	0.750	1.504	(0.122–18.592)	0.390	0.580	1.476	(0.371–5.871)
	3,000–6,000	0.327	0.644	1.386	(0.342–5.620)	−0.223	0.731	0.800	(0.224–2.859)	0.550	0.183	1.733	(0.772–3.890)
	6,001–9,000	0.756	0.213	2.129	(0.647–7.004)	0.385	0.481	1.470	(0.504–4.287)	0.371	0.273	1.449	(0.747–2.812)
	>9,000												
Gestational age(Weeks)	28~31	3.739	0.001	50.249	(4.305–410.712)	2.200	0.049	9.024	(1.008–80.783)	1.539	<0.001	4.660	(2.084–10.421)
	32~35	0.290	0.560	1.336	(0.504–3.540)	0.268	0.531	1.308	(0.565–3.025)	0.022	0.945	1.022	(0.555–1.880)
	≥36												
Childbirth history	Yes	−4.519	<0.001	0.011	(0.003–0.038)	−2.573	<0.001	0.076	(0.031–0.190)	−1.947	<0.001	0.143	(0.055–0.367)
	No												
History of adverse pregnancy outcomes	Yes	3.162	<0.001	23.628	(6.160–90.635)	1.069	0.044	2.912	(1.030–8.234)	2.094	<0.001	8.114	(2.976–22.122)
	No												
Childbirth attitude		1.320	0.003	3.743	(1.590–8.815)	0.408	0.291	1.504	(0.705–3.209)	0.912	0.001	2.489	(1.484–4.175)
Social support		−1.242	<0.001	0.289	(0.171–0.487)	−0.697	0.004	0.498	(0.309–0.804)	−0.545	<0.001	0.580	(0.447–0.752)

Notes: ^aC3 was used as the reference category; ^bC2 was used as the reference category. C1: Low Readiness – Childbirth Knowledge Deficit Type; C2: Moderate Readiness – Good Lifestyle Habits Type; C3: High Readiness – Rich Health Knowledge Type.

In multivariable logistic regression, several factors emerged as independent predictors of profile membership ($p < 0.05$, Table 8). Specifically, women at 28–31 weeks' gestation had much higher odds of being in the low-readiness group (C1) compared to the high-readiness group (C3) (OR = 50.249, $p = 0.001$). They were also more likely to be in C1 than in C2 (OR = 4.660, $p < 0.001$), and more likely to be in C2 than in C3 (OR = 9.024, $p = 0.049$). Regarding childbirth experience, women with a previous delivery were far less likely to be in C1 vs C3 (OR = 0.011, $p < 0.001$) or in C1 vs C2 (OR = 0.143, $p < 0.001$); similarly, having previous childbirth experience made C2 membership less likely than C3 (OR = 0.076, $p < 0.001$). A history of adverse pregnancy outcomes increased the likelihood of being in C1 versus C3 (OR = 23.628, $p < 0.001$) and C1 versus C2 (OR = 8.114, $p < 0.001$), and also made C2 more likely than C3 (OR = 2.912, $p = 0.044$). A higher fear of childbirth (negative childbirth attitude) was associated with higher odds of being in the low-readiness profile: higher fear scores increased the likelihood of C1 membership compared to C3 (OR = 3.743, $p = 0.003$) and compared to C2 (OR = 2.489, $p = 0.001$). Conversely, stronger social support had a protective effect: higher social support scores were associated with lower odds of being in C1 vs C3 (OR = 0.289, $p < 0.001$) and C2 vs C3 (OR = 0.498, $p = 0.004$), as well as lower odds of C1 vs C2 (OR = 0.580, $p < 0.001$).

Discussion

Our study identified three distinct profiles of childbirth readiness among third-trimester pregnant women, underscoring the heterogeneous nature of childbirth preparedness in this population. Approximately 38%, 48%, and 14% women were classified as low, moderate, and high readiness, respectively. These findings highlighted the requirement for tailored interventions to improve maternal preparation and ultimately health outcomes in each group of women.

Importantly, the differences in readiness observed across women can be interpreted through the lens of Meleis's Transition Theory.^{11,12} Pregnancy and childbirth represent a major developmental transition, during which women undergo changes in their roles, relationships, and expectations. According to this theory, the degree of support and personal resources available during a transition affects how well an individual adapts to the change.¹¹ Women in the low-readiness profile (C1) may be struggling with this transition—perhaps due to insufficient knowledge, confidence, or support—making it harder for them to assume the maternal role. In contrast, women in the high-readiness profile (C3) appear to have navigated the transition more successfully, likely aided by rich knowledge, strong self-efficacy, and robust support networks. This theoretical perspective suggests that improving childbirth readiness requires facilitating a healthy transition to motherhood by strengthening personal abilities (eg, knowledge and coping skills) and environmental resources (eg, family support).^{14,15} However, this interpretation was intended to contextualize the observed profile differences rather than to imply causal mechanisms underlying childbirth readiness.

Key Factors Influencing Childbirth Readiness

Consistent with previous studies, we found that prior childbirth experience and a positive attitude toward childbirth were associated with higher readiness levels.^{22,23} These findings indicated statistical associations and should not be interpreted as evidence of causal relationships. Women with previous birth history were often more confident and better prepared for labor.²⁴ Conversely, negative attitudes or intense fear of childbirth—and especially a history of past adverse pregnancy outcomes—were associated with lower readiness scores, underscoring the importance of psychological and emotional support during pregnancy.^{25–36} Furthermore, women early in their third trimester (eg, 28–31 weeks) showed lower preparedness, likely due to inadequate time for learning, limited knowledge acquisition, and reduced support at that stage of pregnancy.^{37–41}

Implications for Interventions

These findings suggest that interventions should be tailored to the specific needs of women in each latent profile of childbirth readiness. Nevertheless, the proposed intervention strategies were exploratory in nature and should be applied cautiously, given the observational and cross-sectional design of the study. For the Low Readiness – Childbirth Knowledge Deficit (C1) group, intensive educational programs focusing on childbirth knowledge and practical coping strategies are essential. It would be beneficial to initiate these programs early in the third trimester (around 28 weeks) to give these women ample time to prepare. Many women in the C1 profile were first-time mothers or had previous

obstetric complications. Thus, personalized counseling and psychological support should be provided to address their fears or past traumas and to help build confidence.⁷

The Moderate Readiness – Good Lifestyle Habits (C2) group may benefit most from interventions that enhance psychological preparedness and alleviate anxiety. These women generally have healthy habits and certain knowledge, but might experience moderate fear of childbirth. Targeted workshops or classes could focus on pain-coping techniques, relaxation and mindfulness training, and birth planning to reduce fear. Involving their partners or other family members in these programs can provide additional emotional support and reassurance.⁴²

Lastly, for the High Readiness – Rich Health Knowledge (C3) group, routine care should aim to reinforce their existing knowledge and encourage continued healthy behaviors. Although these women are well-prepared, healthcare providers should continue to address any questions or concerns they have as delivery approaches. Maintaining social support engagement is also important so that their high readiness levels persist.⁴³

Social Support

Social support emerged as a critical factor influencing childbirth readiness in our study, which aligns with other reports.^{44–46} We observed a clear gradient: women in the high-readiness group (C3) reported the strongest social support networks, followed by the moderate group (C2), with the low-readiness group (C1) having the least support. Strengthening social support for pregnant women should be a key component of interventions. Programs that actively involve husbands, partners, and other family members in the prenatal preparation process have been shown to reduce maternal anxiety and improve readiness.^{47,48} For example, implementing family-centered antenatal care or encouraging husbands' participation in birth preparedness plans can significantly bolster a woman's confidence and preparedness for childbirth.^{23,24} Healthcare providers should assess each woman's support system and, when necessary, connect those lacking support with community resources such as support groups or peer mentors. It should be noted that perceptions of social support were self-reported and could be influenced by individual reporting tendencies.

Strengths and Limitations

This study is the first to use LPA to assess childbirth readiness profiles among third-trimester pregnant women in China. By identifying distinct subgroups and their influencing factors, we provide a novel person-centered insight that can inform targeted prenatal interventions. However, several limitations should be noted. First, the study was conducted at a single medical center in one city, which may limit the generalizability of the findings to other regions or healthcare settings. Second, the cross-sectional design precluded causal inference, and the observed associations should be interpreted with caution. Finally, data were collected via self-reported questionnaires, which carried the risk of response bias and social desirability bias. In addition, the latent profiles reflected overall response patterns across CRS dimensions rather than causal relationships between individual variables.

Conclusion

In this cross-sectional study of Chinese women in their third trimester of pregnancy, three distinct latent profiles of childbirth readiness (low, moderate, and high readiness) were identified. Key factors associated with these profiles included gestational age, previous childbirth experience, history of adverse pregnancy outcomes, fear of childbirth, and perceived social support. These findings highlight substantial heterogeneity in childbirth knowledge, psychological readiness, and available social resources across the three profiles, underscoring the need for personalized prenatal interventions to improve childbirth readiness. In practice, this could involve early targeted educational programs for women with knowledge deficits and enhanced psychosocial support for those experiencing fear or limited support, while recognizing that such implications are exploratory and based on observed associations rather than causal evidence. However, given the cross-sectional design of this study, these recommendations should be interpreted cautiously and should not be viewed as prescriptive or indicative of causal effects. By tailoring prenatal care to the specific needs of each subgroup, healthcare providers may facilitate a smoother transition to motherhood. From a broader maternal health perspective, identifying distinct childbirth readiness profiles may help inform more differentiated antenatal care pathways and support the development of person-centered strategies in obstetric

and nursing practice. Further longitudinal and interventional studies are warranted to determine whether profile-based approaches can lead to improved maternal and neonatal outcomes.

Abbreviations

CRS, Childbirth Readiness Scale; CAQ, the Childbirth Attitude Questionnaire; LPA, latent profile analysis; PSSS, the Perceived Social Support Scale.

Data Sharing Statement

The datasets generated and analyzed during the present study are available from either of the two corresponding authors upon reasonable request.

Ethics Approval and Informed Consent

The study protocol was approved by the Ethics Committee of the Second Hospital of Dalian Medical University (the ethical approval number: KY2024-020-01). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All study participants signed the informed consent.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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The authors declare that they have no conflicts of interest in this work.

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