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Original Research

Delivery Mode Preferences Among Low-Risk Primiparous Women in China: A Prospective Cross-Sectional Study

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Abstract

Background: In China, low-risk primiparous women without medical indications frequently need to weigh multiple factors—including long-term health outcomes, pain management, and information sources—when choosing a delivery mode. However, there is a lack of systematic quantitative evidence on the preference structures and trade-off mechanisms underlying their decisions. This study aimed to assess the delivery mode preferences of low-risk primiparous women in China and examined how these women handled trade-offs among long-term health outcomes, pain management options, and information sources when making childbirth decisions in the absence of medical indications. **Methods:** In this prospective cross-sectional study, low-risk primiparous women attending antenatal care at a tertiary maternity hospital in China completed a discrete choice experiment administered via a web-based survey. Participants were presented with a hypothetical childbirth decision-making scenario and asked to make a choice between delivery mode A and delivery mode B. Scenarios varied across multiple attributes, including long-term maternal impact, neonatal complication risk, availability of pharmacological pain relief, physician recommendation, and social media advice. Preference structures were estimated using conditional logit, mixed logit, and latent class models. Subgroup analyses were performed according to gestational stage, psychological resilience, and current medical advice received. **Results:** A total of 396 questionnaires were collected. After applying the inclusion and exclusion criteria, 365 low-risk primiparous women were eligible for analysis. Following the consistency test, 284 respondents were retained in the final analytical sample. Five of the seven attributes examined were statistically significant; the two exceptions were "medical service quality" and "process control". Among the five significant attributes, participant importance rankings followed the order: maternal long-term impact > neonatal complication risk > pain relief > physician recommendation > social media advice. Scenario analysis showed that 92.6% of primiparous women would support a change from nonpharmacological to pharmacological pain management during vaginal delivery. The latent class model identified three distinct preference profiles among the participants. Subgroup analyses demonstrated preference heterogeneity across gestational stage, psychological resilience, and current medical advice received. **Conclusions:** Among low-risk primiparous women in a predominantly urban tertiary hospital setting, delivery mode preferences were heterogeneous and primarily driven by concerns about long-term maternal and neonatal health outcomes, were highly responsive to pain management options and information environments, and evolved across pregnancy. These findings support the need for preference-sensitive antenatal counseling that integrates clinical evidence, pain management options, and tailored communication strategies to support informed childbirth decisions that align with individual patient values.

Keywords: discrete choice experiment; low-risk primiparous women; delivery mode preference

1. Introduction

Childbirth is a pivotal life event with profound and lasting implications for maternal and neonatal health [1]. Low-risk primiparous women account for a substantial fraction of the ~140 million births occurring worldwide each year and are, from a medical perspective, generally eligible for both vaginal delivery and cesarean section [2]. Despite this considerable clinical flexibility, cesarean section rates continue to rise globally, particularly in developing regions, where they often exceed World Health Organization recommendations two to threefold [3,4].

For low-risk primiparous women, delivery mode choice is rarely a purely biomedical decision. In the absence of obstetric necessity, childbirth decision-making is shaped by the combined influence of multiple factors, including the considerations of long-term maternal and neonatal health outcomes, expectations regarding labor pain and postpartum recovery, professional advice from healthcare providers, and broader social contextual influences [5]. The neglect of women's delivery preferences or their misalignment with clinical recommendations may increase the risk of postpartum depression, reduce birth satisfaction, or have other adverse psychological consequences [6,7]. By contrast, shared decision-making models respecting women's values and autonomy improve childbirth experiences and mental health outcomes [8]. Accordingly, a deep under-

standing of how women weigh and prioritize these competing considerations is essential for advancing value-based and ethically grounded maternity care.

Previous studies on delivery mode preferences have primarily relied on qualitative approaches and conventional survey methods [9,10,11,12], generating valuable insights but featuring a limited ability to quantify trade-offs among attributes or uncover the implicit decision rules women apply when confronted with multiple risks and benefits. Discrete choice experiments (DCEs) provide a robust methodological framework to address these limitations by simulating realistic decision-making scenarios and estimating the relative importance of multiple attributes simultaneously [13,14] and have been applied to the study of childbirth preferences in international contexts [15,16,17,18]. However, childbirth decision-making in China is occurring within a rapidly evolving social and informational environment. Beyond physician recommendations, social media platforms increasingly influence women's perceptions of childbirth risk, normative delivery practices, and self-efficacy, potentially reshaping traditional authority structures in maternity care [6]. However, our knowledge of how diverse information sources interact with individual psychological characteristics and gestational stage to jointly shape delivery mode preferences is insufficient.

The present study employs a DCE to systematically investigate the delivery mode preferences of low-risk primiparous women in China, aiming to (1) identify the key attributes influencing delivery mode choice and assess their relative importance; (2) quantify the trade-offs among long-term health outcomes, pain management options, and information sources women are willing to make; and (3) uncover the latent heterogeneity in delivery preferences across different gestational stages, levels of psychological resilience, and medical advice contexts. By elucidating the underlying structure of childbirth decision-making, we provide empirical evidence that supports the development of preference-sensitive antenatal counseling strategies and thereby improves the alignment between clinical practice and women's values in an increasingly complex decision-making environment.

2. Methods

2.1 Study Design

This study used a prospectively performed cross-sectional design and discrete choice experiment methodology. The latter methodology is widely employed in health economics to quantify preferences for healthcare goods or services, allowing the decomposition of complex decisions into trade-offs across defined attributes and levels [19]. Guided by prior literature, we assumed that respondents' choice behavior is largely determined by the characteristics of the attributes constituting the hypothetical alternatives.

2.2 Participants

Following the rule of thumb proposed by Orme [20], we calculated the minimum sample size N [13] as $N > 500 \times c/(t \times a)$, where c is the largest number of levels for any single attribute, t is the number of choice tasks, and a is the number of alternatives per task. In our design, the relevant parameters were $c = 4$, $t = 9$, and $a = 2$, and the minimum sample size was therefore $N > 500 \times 4 / (9 \times 2) \approx 111$. Hence, we aimed to recruit at least 112 participants.

Participants were recruited in October 2025 from the outpatient departments of Women's Hospital, School of Medicine, Zhejiang University, which serves as the lead institution for the National Regional Medical Center for Obstetrics and Gynecology and provides services nationwide. The inclusion criteria were (1) age over 20 years; (2) primiparity (first pregnancy leading to delivery); (3) low-risk pregnancy according to the Chinese Society of Perinatal Medicine guideline for antenatal care and the American College of Obstetricians and Gynecologists (ACOG) Levels of Maternal Care framework [21] (the specific low-risk assessment checklist is provided in **Supplementary Table 1**); and (4) voluntary informed consent.

2.3 Establishment of DCE Attributes and Levels

In alignment with the best practice guidelines for designing DCEs [22], we implemented a mixed-method multistage process to establish attributes and their levels [20]. First, a systematic literature review was conducted using the terms "maternal", "delivery mode", and "discrete choice experiment" to identify relevant prior studies. An initial pool of candidate attributes and levels was extracted from the four well-matched publications identified in this way [15,16,17,18]. Second, semistructured in-depth interviews were conducted with seven obstetric health providers and seven primiparous women. Obstetric care providers included obstetricians and midwives with varying clinical experience durations and professional titles. Primiparous women varied in age, gestational week, and educational background. During the interviews, data were analyzed iteratively, and no new attributes or major misunderstandings emerged after the 5th–6th interviews in both groups, which indicated that saturation had been reached. The related information is provided in **Supplementary Table 2**. The interviews aimed to assess the salience, comprehensibility, and completeness of candidate attributes and identify additional attributes not captured in the literature. To ensure clarity and consistency, trained interviewers were involved, and a standardized interview guide was developed. Third, based on our literature review and qualitative findings, the research team conducted internal discussions to refine the attribute list. This process involved merging overlapping attributes, removing less relevant ones, and revising attribute wording to improve clarity and realism. The thus identified 11 candidate attributes were pain relief, long-term effects on the mother, risk of neonatal complications, strength of physician recommendation, quality of medical

care service, social media experience sharing, sense of control during childbirth, time required to return to work, future fertility considerations, advice from family and friends, and out-of-pocket costs. Finally, a quantitative rating exercise was conducted using an independent sample of obstetric staff and primiparous women, who were asked to rate the importance of each attribute on a 10-point scale. Attributes were ranked based on their mean scores (**Supplementary Table 3**), and the seven highest-ranked ones were selected for inclusion in the final DCE to ensure relevance and cognitive feasibility (Table 1).

2.4 Questionnaire Design and Quality Control

Choice sets were generated using the Ngene software and a D-efficient design approach. Twenty-seven paired choice sets were created and randomly divided into three nine-set blocks to reduce respondent cognitive burden. The fourth choice set from each block was repeated as the 10th choice set to assess respondent consistency. To evaluate respondent rationality, a dominance question was introduced as the 11th choice set, where all attributes of delivery mode A were superior to those of delivery mode B (**Supplementary Table 4**) [23]. Each choice set presented two alternative scenarios and an opt-out option, allowing respondents to choose neither option to avoid the overestimation of participation rates. The questionnaire comprised sections detailing the study's objectives, demographic information, clinical and pregnancy education content, and discrete choice questions. Place of residence (major city, small city, county town, or rural area) was classified based on participants' current residence following the National Bureau of Statistics urban-rural classification standard [24] regardless of household registration. Additionally, the 10-item Connor–Davidson Resilience Scale (CD-RISC)—a self-report measure of psychological resilience—was included in the questionnaire [25]. Respondents rated each of the 10 items on a five-point Likert scale from 0 = "Not true at all" to 4 = "True nearly all the time". Total scores ranged from 0 to 40, with higher scores indicating greater resilience. The 10-item version is a refined short form derived from the original 25-item scale, demonstrating a robust unidimensional structure while reducing respondent burden. The Chinese version has been translated and validated in various populations, showing good internal consistency and validity [26]. Given the absence of an established or validated threshold for the CD-RISC in the examined population, we used the median score as a cut-off to differentiate low versus high resilience levels and enable balanced and interpretable subgroup comparisons. However, dichotomizing a continuous variable may lead to information loss and misclassification, and the results should therefore be interpreted with caution.

2.5 Data Collection and Quality Control

Research assistants screened potential participants using electronic medical records (EMRs) to exclude women with documented severe pregnancy complications or absolute indications for cesarean section, in accordance with the inclusion criteria. Eligible primiparous women were then invited to scan a quick response (QR) code and complete a web-based questionnaire.

Data collection was conducted in a one-on-one (face-to-face) setting in October 2025. Electronic informed consent was obtained prior to the survey. To minimize interference and preserve confidentiality, the survey was conducted in quiet, private, and undisturbed spaces. During the session, the research assistant immediately checked the questionnaire for completeness and logical consistency. Each interviewer was a trained member of our research team and provided a detailed explanation of the discrete choice tasks, as well as the study's purpose, to the participant.

Beyond the standardized training of research assistants in one-on-one questionnaire administration, a two-step screening and cleaning procedure was applied to enhance data quality. First, EMR-based prescreening excluded ineligible participants before questionnaire administration. Second, questionnaire-based confirmation and quality checks were conducted during data cleaning. As EMRs may not capture newly developed or incompletely documented conditions, participants who self-reported high-risk pregnancy status in the questionnaire and those who reported any of the predefined high-risk conditions were excluded. Additional exclusion criteria included (1) completion time of less than 240 s (according to the pilot study), which indicated insufficient attention; and (2) failure to pass the dominance test, i.e., not selecting the clearly superior option.

Ethical approval for this research was granted by the Institutional Review Board (reference number: IRB-20250376-R). The study was conducted in accordance with the principles of the Declaration of Helsinki, and all participants provided informed consent before enrollment.

2.6 Statistical Analysis

The STATA software (version 17.0; StataCorp LLC, College Station, TX, USA) was used to analyze delivery method preferences. Initially, descriptive statistics (frequencies, percentages, means, and standard deviations (SDs)) were generated to describe the demographic and clinical characteristics of the sample. DCE data were analyzed using conditional and mixed logit models [14], wherein all attributes were treated as random parameters and dummy-coded to represent distinct features of the delivery options. Preference heterogeneity was captured by assuming normally distributed random coefficients. Model selection was guided by the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC). The robustness of the parameter estimates of the selected mixed logit model was confirmed by systematically increasing the number of random draws.

Table 1. Attributes and their levels used in the present study.

Attribute	Definition	Level
Pain relief	Holistic pain management strategies integrated with the delivery mode	Nonpharmacological pain relief during vaginal delivery Pharmacological pain relief during vaginal delivery Cesarean section using regional or general anesthesia for surgical delivery
Long-term effects on the mother	Potential impact of delivery mode on the health outcomes (e.g., physical function, mental health, and quality of life) of primiparous women in the months and even years following childbirth	No long-term effects: Physical recovery is good with no residual symptoms. All prepregnancy activities—including exercise—can be resumed. Emotional state is positive, and quality of life has not diminished because of childbirth Minor impacts: Occasional mild lower back pain or slight urinary leakage upon sneezing or laughing that does not interfere with daily activities or exercise. The emotional state is generally stable, and life quality remains largely unaffected Moderate impact: Frequent lower back pain and/or urinary leakage when lifting heavy objects or exercising, requiring regular rehabilitation training. Occasional feelings of anxiety or low mood. Quality of life is somewhat affected but can be improved with effort Severe impact: Persistent pain or leakage severe enough to disrupt daily life, work, or social activities, e.g., that requiring long-term pad use and preventing outings. May be accompanied by pelvic organ prolapse or persistent depression/anxiety. Quality of life is notably diminished and requires restoration through long-term medical intervention
Risk of neonatal complications	Health issues infants may encounter during delivery	Low risk: Minor issues with rapid recovery Moderate risk: Issues potentially requiring medical intervention and mostly recoverable High risk: Serious issues potentially causing long-term effects
Quality of medical services	Overall quality of the selected hospital, including professional standards, healthcare provider attitudes, and environment	Basic coverage tier: Primary coverage, broad scope, and low cost, e.g., medical services at nontertiary hospitals Standard efficiency tier: Standardized diagnosis and treatment, stable quality, and high cost-effectiveness, e.g., general ward services at tertiary hospitals Premium experience tier: Concentrated resources, refined services, and superior experience, e.g., VIP ward services at tertiary hospitals Excellence benchmark tier: Top-tier resources, personalized care, and high added value, e.g., services at high-end private hospitals
Strength of physician recommendation	Physicians' recommendations to primiparous women regarding delivery methods, used to gauge the extent to which doctors tend to recommend a particular method	No clear recommendation Tends to recommend Strongly tends to recommend
Sense of control during childbirth	Degree of involvement in decision-making and execution regarding delivery method, process, and pain management during labor, encompassing expectations about childbirth, acceptance of physician or midwife instructions, and sense of control over the birthing process	Independent decision-making Participates in consultation Medical professional leads
Social media experience sharing	Influence of social media (e.g., pregnancy bloggers and maternal and infant influencers) on the delivery method choices of primiparas	Divergent opinions Majority recommends Widely recommended

The relative importance of each attribute was quantified by calculating its proportional contribution, i.e., the range of its utility coefficients divided by the sum of ranges across all attributes [27], and used to elucidate the hierarchy of factors influencing patient decisions. The formula is as follows:

$$RI_i = \frac{\beta_{i,max} - \beta_{i,min}}{\sum_{j=1}^{n} (\beta_{j,max} - \beta_{j,min})} \times 100\%$$

Subsequently, we evaluated the strength and direction of the influence exerted by different attributes on delivery method choice in various scenarios. Finally, subgroup analyses were performed to examine preference heterogeneity across key demographics, including age, geographic region, health insurance type, and gestational duration. Within each subgroup, the relative importance of attributes was determined based on the range of utility coefficients across attribute levels. A latent class model was fitted to identify unobserved preference heterogeneity across the full respondent population [28].

3. Results

3.1 Sociodemographic Characteristics

Of the initially enrolled 396 participants, 365 low-risk primiparous women were selected for analysis after excluding participants with response times of less than 240 s (n = 7), those classified as high-risk (n = 12), and those who failed the dominant attention-check test (n = 12). The demographic and clinical characteristics of the selected participants are detailed in Table 2. The participants were aged 20–40 years (mean 29.8 ± 3.2) and largely lived in provincial capital cities (83.0%), had completed a university degree or higher education (94.2%), worked in enterprises (55.6%), and were covered by urban employee medical insurance (61.1%). Regarding annual household income, 44.7% reported earning less than 29,048 USD.

Table 2. Sociodemographic characteristics of respondents (*N* = 365).

Characteristic	*N* (%)
Age, years	
<30	173 (47.4%)
≥30	192 (52.6%)
Geographical location	
Major cities (provincial capitals/municipalities)	303 (83.0%)
Small cities	25 (6.8%)
County towns	23 (6.3%)
Rural areas	14 (3.8%)
Education	
Junior high school and below	8 (2.2%)
High school/vocational school	13 (3.6%)
College/undergraduate	280 (76.7%)
Graduate and above	64 (17.5%)
Marital status	
Married	353 (96.7%)
Single	12 (3.3%)
Spouse's education level	
Junior high school and below	9 (2.5%)
High school/vocational school	16 (4.4%)
College/undergraduate	266 (72.9%)
Graduate and above	74 (20.3%)
Occupation	
Corporate employee	203 (55.6%)
Public institution employee/civil servant	51 (14.0%)
Freelancer	46 (12.6%)
Other	18 (4.9%)
Self-employed	31 (8.5%)
Student	2 (0.5%)
Unemployed	14 (3.8%)
Primary health insurance type	
Urban employee insurance	223 (61.1%)
Urban and rural residents' medical insurance	121 (33.2%)
Commercial health insurance	12 (3.3%)
Self-funded	9 (2.5%)
Annual household income	
≥300,000 RMB	130 (35.6%)
200,000–300,000 RMB (excluding 300,000)	72 (19.7%)
100,000–200,000 RMB (excluding 200,000)	124 (34.0%)
<100,000 RMB	39 (10.7%)

Exchange rate: 1 USD = 6.8852 RMB (as of February 18, 2026).

3.2 Clinical Characteristics

Regarding the gestational stage, 59.7% of the participants were in late pregnancy; 77.0% were in their first pregnancy with no late miscarriage (≥28 weeks) or stillbirth, and 63.8% rated their health as good. Regarding pregnancy education and training, 24.4% reported having attended relevant courses, 50.1% preferred vaginal delivery. Regarding information seeking, 36.2% reported browsing delivery-related information on online platforms 2 days per week, and 74.5% spent less than 1 h per session. The CD-RISC scores ranged from 7 to 40, the median score being 27. Detailed information is presented in Table 3.

3.3 Model Estimates

The DCE results are based on 9855 observations collected from 365 participants. To assess robustness, we conducted sensitivity analysis (**Supplementary Table 5**), excluding 81 participants who failed the internal consistency check and selected the "opt-out" option in all choice tasks. Ultimately, 284 valid respondents were included in the final analysis based on AIC and BIC metrics and the requirement to retain only rational responses. Model comparison favored a mixed logit specification over the conditional logit. After 2000 iterations, the mixed logit model achieved optimal fit stability (coefficient convergence is shown in **Supplementary Fig. 1**). The coefficients estimated using the mixed logit model are listed in Table 4.

Table 3. Clinical characteristics of respondents (N = 365).

Characteristic	N (%)
Gestational age, weeks	
≤12	38 (10.4%)
13–27	109 (29.9%)
28–40	218 (59.7%)
Pregnancy history	
First pregnancy	281 (77.0%)
One or more previous pregnancies	84 (23.0%)
Self-rated health status	
Good	233 (63.8%)
Very good	75 (20.5%)
Average	57 (15.6%)
Attended prenatal classes	
Yes	89 (24.4%)
No	276 (75.6%)
Physician's delivery recommendation	
No specific recommendation	307 (84.1%)
Vaginal delivery	58 (15.9%)
Preferred method of delivery	
Vaginal delivery	183 (50.1%)
Cesarean section	69 (18.9%)
Undecided	113 (31.0%)
Frequency of accessing delivery-related information online	
Daily	65 (17.8%)
5–6 days per week	18 (4.9%)
3–4 days per week	57 (15.6%)
2 days per week	132 (36.2%)
≤1 day per week	93 (25.5%)
Major platforms	
Tiktok	234 (64.1%)
Xiaohongshu (RED)	120 (32.9%)
Others	11 (3.0%)
Duration of online session, h	
<1	272 (74.5%)
1–<2	74 (20.3%)
2–<3	11 (3.0%)
3–4	3 (0.8%)
>4	5 (1.4%)
Psychological resilience, CD-RISC score	
Low (≤27)	209 (57.3%)
High (>27)	156 (42.7%)
Total score, mean ± SD	29.96 ± 6.40

CD-RISC, Connor–Davidson Resilience Scale.

Statistically significant differences in utility were observed between each attribute level and its corresponding reference level for all attributes, except for "quality of medical services" and "sense of control during childbirth". Examination of the standard deviations of the random parameters in the mixed logit model indicated significant heterogeneity in preferences across respondents. Compared with vaginal birth using nonpharmacological pain relief, participants showed a strong preference for vaginal birth using epidural anesthesia (β = 2.525). This preference was stronger than that for cesarean section using regional or general anesthesia for surgical delivery (β = 1.647). The disutility regarding long-term effects on the mother increased proportionally with effect severity. A pronounced disutility associated with a higher risk of neonatal complications was observed (β = –4.809, $p < 0.001$). Delivery preferences were substantially influenced by physician recommendations, with the coefficient for "strongly recommends" (β = 1.498) exceeding that for "tends to recommend" (β = 0.445) approximately threefold. The participants also exhibited sensitivity to social media influence, preferring delivery methods endorsed by the majority on social media platforms (β = 0.581).

3.4 Relative Importance

The mixed logit model was used to derive the relative importance of different attributes, which followed the order of "maternal long-term impact" > "neonatal complication risk" > "pain relief" > "physician recommendation" > "social media advice" (Fig. 1).

3.5 Scenario Analysis

Table 5 shows the results of scenario analysis. With reference to the baseline scenario, 92.6% of primiparous women supported pain management upgrading from nonpharmacological to pharmacological (epidural anesthesia) during vaginal delivery. Similarly, 83.8% supported a shift to cesarean section with regional or general anesthesia. Conversely, the support rate significantly declined to 0.2%–34.3% in the case of potential long-term maternal effects or neonatal complications. Furthermore, 81.7% favored the delivery option that physicians tended to recommend, while 64.1% opted for a delivery method mainly recommended on social media platforms. Compared with a scenario characterized by divergent social media opinions, no clear physician recommendation, and nonpharmacological pain relief during vaginal delivery, 95.1% chose a delivery method that involved pharmacological pain relief during vaginal delivery, strong physician recommendation, and majority recommendation on social media.

3.6 Latent Class Model

The latent class model identified three subgroups within the qualified sample, demonstrating preference heterogeneity (Table 6). As shown in **Supplementary Table 6**, models with 2–4 classes were estimated and compared using AIC, BIC, and convergence diagnostics. Class 1 subjects (54.6%) exhibited a risk-averse physician-guided profile, strongly preferring physician-endorsed options (β = 0.94), demonstrating a profound aversion to severe maternal (β = –1.45) and neonatal clinical risks (β = –1.35), and showing a negative preference toward premium medical services (β = –0.35), i.e., prioritizing basic coverage and

Table 4. Mixed logit estimates (N = 284).

Attributes and levels	β	Standard error	$p > Z$	Standard Deviation	Standard error	$p > Z$
Opt-out	–9.062	1.243	<0.001	7.145	0.983	<0.001
Pain relief						
Pharmacological pain relief during vaginal delivery	2.525	0.418	<0.001	3.663	0.624	<0.001
Cesarean section using regional or general anesthesia for surgical delivery	1.647	0.436	<0.001	5.517	0.816	<0.001
Maternal long-term impact						
Minor	–0.649	0.262	0.013	0.312	0.303	0.303
Moderate	–2.195	0.452	<0.001	1.328	0.313	0.000
Severe	–5.790	0.907	<0.001	3.826	0.614	0.000
Neonatal complication risk						
Moderate	–1.983	0.379	<0.001	1.031	0.443	0.020
High	–4.809	0.755	<0.001	2.221	0.583	<0.001
Medical service quality						
Standard efficiency tier	–0.297	0.239	0.213	1.119	0.426	0.009
Premium experience tier	–0.258	0.261	0.324	0.448	0.328	0.172
Excellence benchmark tier	–0.298	0.311	0.339	1.402	0.621	0.024
Physician recommendation						
Tends to recommend	0.445	0.225	0.048	1.171	0.294	<0.001
Strongly tends to recommend	1.498	0.310	<0.001	1.069	0.363	0.003
Process control						
Participates in consultation	–0.352	0.210	0.093	0.203	0.355	0.568
Medical professional leads	–0.082	0.296	0.782	0.518	0.510	0.310
Social media advice						
Majority recommends	0.581	0.239	0.015	1.176	0.393	0.003
Widely recommended	–0.080	0.242	0.741	1.115	0.365	0.002
Log pseudolikelihood				–1554.8121		
AIC				3177.624		
BIC				3413.748		

AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion. Absolute values of the estimated standard deviation parameters are reported for ease of interpretation.

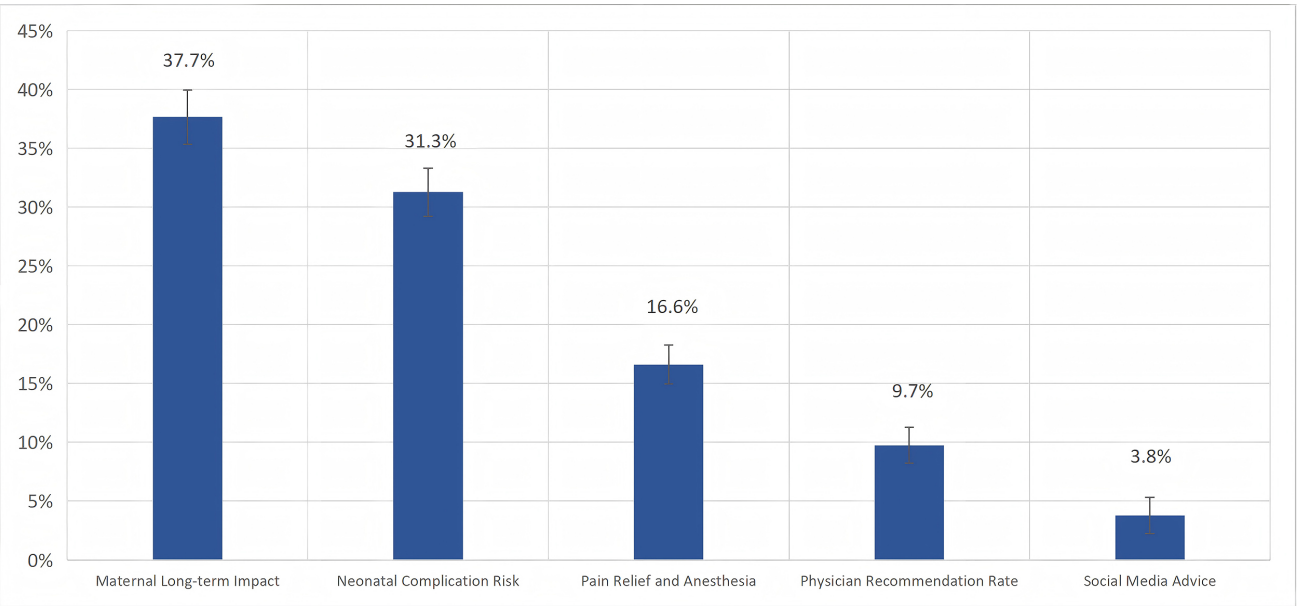

Fig. 1. Relative importance of attributes.

Table 5. Estimated uptake rates of hypothetical scenarios with reference to the base scenario.

	Base scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9
Pain relief	Nonpharmacological pain relief during vaginal delivery	Pharmacological pain relief during vaginal delivery	Cesarean section using regional or general anesthesia for surgical delivery	Nonpharmacological pain relief during vaginal delivery	Nonpharmacological pain relief during vaginal delivery	Nonpharmacological pain relief during vaginal delivery	Nonpharmacological pain relief during vaginal delivery	Nonpharmacological pain relief during vaginal delivery	Nonpharmacological pain relief during vaginal delivery	Pharmacological pain relief during vaginal delivery
Maternal long-term impact	None	None	None	Moderate	Severe	None	None	None	None	None
Neonatal complication risk	Low	Low	Low	Low	Low	Moderate	High	Low	Low	Low
Physician recommendation	No clear preference	No clear preference	No clear preference	No clear preference	No clear preference	No clear preference	No clear preference	Tends to recommend	No clear preference	Tends to recommend
Social media advice	Divergent opinions	Divergent opinions	Divergent opinions	Divergent opinions	Divergent opinions	Divergent opinions	Divergent opinions	Divergent opinions	Majority recommends	Majority recommends
Estimated uptake rate	NA	0.926	0.838	0.100	0.003	0.121	0.002	0.817	0.641	0.951

fundamental safety over luxury experiences. Class 2 subjects (27.0%) demonstrated an intense demand for birthing comfort coupled with a strong desire for decision-making autonomy, uniquely favoring pharmacological pain relief (β = 3.98) and excellence-tier services (β = 1.38). In stark contrast to Class 1 subjects, Class 2 subjects strongly rejected physician interventions (β = –2.86) and medical-led processes (β = –1.48), favoring absolutely independent decision-making, and were highly sensitive to physical recovery, severely avoiding even minor maternal impacts (β = –3.05). Class 3 subjects (18.4%) represented a minority with a preference for surgical delivery and external social validation. Unlike those in the other classes, these subjects exhibited a dominant preference for cesarean sections (β = 2.43). Furthermore, their decision-making was unaffected by physician recommendations and was instead significantly guided by social media consensus (β = 0.62), which highlights reliance on peer influence alongside a preference for premium care. Comparisons of sociodemographic and psychological characteristics across latent classes showed no statistically significant differences (all $p > 0.05$), suggesting that the observed class membership was not associated with measured individual characteristics (**Supplementary Table 7**). The class proportions reported in Table 6 represent the model-estimated class membership probabilities. The proportions shown in **Supplementary Table 7** were derived by assigning each respondent to the class with the highest posterior probability. Therefore, differences between the two sets of proportions are expected.

3.7 Subgroup Analysis

Fig. 2a shows the results of subgroup analysis based on gestational stage. In early pregnancy, women placed comparable emphasis on process control and physician recommendation, ranking both at the third tier of importance, and showed a stronger preference for cesarean section (β = 1.320) than for vaginal delivery with pharmacological pain relief (β = 0.614). During this stage, the importance assigned to neonatal complication risk increased and reached parity with maternal long-term impact, the two being the most important factors. In mid-pregnancy, women additionally prioritized medical service quality. In late pregnancy, women still valued medical service quality, physician recommendation, and process control, although the emphasis on these factors was not as pronounced as that on neonatal and maternal outcomes. Fig. 2b shows the results of subgroup analysis based on psychological resilience. Women with low resilience ranked neonatal complication risk and maternal long-term impact as most important and also showed concern for medical service quality, whereas those with high resilience assigned top importance to maternal long-term impact. Fig. 2c shows the results of subgroup analysis based on current medical advice. Among women without a clear recommendation from their physician, attention was focused on medical service quality and process control. However, when the physician explicitly recommended vaginal delivery, women focused exclusively on neonatal complication risk, maternal long-term impact, and pain relief and anesthesia.

4. Discussion

This first-time DCE-based analysis of delivery mode preferences among low-risk primiparous women in China offers quantitative insights into how these women structure trade-offs when a medical indication favoring a specific delivery mode is lacking. Our findings demonstrate that delivery decisions are not driven by single attributes in isolation but rather reflect a structured hierarchy of values where long-term maternal and neonatal health outcomes consistently take precedence over short-term experiential and service-related considerations.

The dominance of long-term maternal impact and neonatal complication risk underscores a fundamentally forward-looking decision logic. Women appear to prioritize enduring health trajectories over immediate procedural comfort, which reflects a risk–benefit calculus aligned with global evidence on the long-term consequences of the delivery mode [29,30,31]. This finding challenges assumptions that elective cesarean preferences are primarily driven by convenience or fear of labor, instead suggesting that concerns about future health and bodily integrity are central to decision-making. From a clinical standpoint, this conclusion underscores the importance of framing antenatal counseling around longitudinal outcomes, helping women contextualize delivery options in terms of future reproductive health, recovery trajectories, and neonatal well-being. This approach may be more effective than focusing solely on intrapartum experiences or procedural differences.

At the same time, access to pharmacological pain relief emerged as a pivotal modifiable factor. The utility associated with pharmacological analgesia during vaginal delivery exceeded that of cesarean delivery itself, indicating that women's preference for vaginal delivery is highly conditional on pain management availability. This finding helps reconcile inconsistencies in prior Chinese survey research, where stated preferences for vaginal delivery coexist with persistently high cesarean rates [11]. Our scenario analysis demonstrates that guaranteeing effective analgesia could substantially shift preferences toward vaginal delivery, highlighting pain management as a critical leverage point for policy and practice. However, this interpretation should be considered in light of the unlabeled DCE design. By removing explicit labels such as "vaginal delivery" and "cesarean section", the design encourages respondents to evaluate options based on attribute-level trade-offs rather than pre-existing perceptions associated with specific delivery modes. In real-world settings, where labels carry strong emotional, cultural, and experiential connotations, these perceptions may moderate the influence of analgesia. This suggests that improving access to and communi-

Table 6. Results obtained using the latent class model (N = 284).

Attributes and levels	Class 1		Class 2		Class 3	
Size	54.6%		27.0%		18.4%	
	β	Standard Error	β	Standard Error	β	Standard Error
Opt-out	**–4.723**	0.487	**–7.489**	1.017	**1.289**	0.466
Pain relief and anesthesia (ref.: Nonpharmacological pain relief during vaginal delivery)						
Pharmacological pain relief during vaginal delivery	**0.373**	0.129	**3.978**	0.636	**0.804**	0.318
Cesarean section using regional or general anesthesia for surgical delivery	**0.374**	0.136	**1.532**	0.580	**2.437**	0.275
Maternal long-term impact (ref.: no impact)						
Minor	–0.242	0.157	**–3.052**	0.786	–0.107	0.261
Moderate	**–0.833**	0.153	–0.666	0.459	**–1.267**	0.315
Severe	**–1.449**	0.173	**–4.280**	0.707	**–1.837**	0.377
Neonatal complication risk (ref.: low risk)						
Moderate	**–0.748**	0.124	–0.378	0.336	**–0.859**	0.230
High	**–1.352**	0.175	**–3.751**	0.618	**–1.691**	0.440
Medical service quality (ref.: basic coverage tier)						
Standard efficiency tier	–0.131	0.133	**–1.163**	0.340	0.279	0.296
Premium experience tier	**–0.416**	0.155	0.139	0.556	–0.044	0.310
Excellence benchmark tier	**–0.377**	0.179	**1.376**	0.458	**0.762**	0.357
Physician recommendation (ref.: no clear recommendation)						
Tends to recommend	**0.710**	0.120	**–2.742**	0.484	0.354	0.237
Strongly tends to recommend	**0.937**	0.141	**–2.853**	0.662	0.316	0.289
Process control (ref.: independent decision-making)						
Participates in consultation	**–0.248**	0.117	**–2.177**	0.519	0.168	0.242
Medical professional leads	0.179	0.182	**–1.475**	0.526	0.379	0.294
Social media advice (ref.: divergent opinions)						
Majority recommends	–0.031	0.114	–0.512	0.361	**0.624**	0.230
Widely recommended	0.054	0.132	**0.777**	0.367	0.007	0.264

Note: Bold coefficients indicate statistical significance ($p < 0.05$).

cation about labor analgesia may reduce preference for cesarean delivery without directly targeting the delivery mode itself. In practice, integrating standardized pain management pathways into routine maternity care, along with clear counseling about analgesia effectiveness and safety, could serve as a key strategy for aligning clinical practice with women's underlying preferences.

Preferences were not static but evolved across the gestational stage. The initial inclination toward cesarean delivery in early pregnancy was attenuated in later stages, becoming similar to that for pharmacologically assisted vaginal delivery. These differences suggest a temporal pattern in preference formation. One possible explanation [32,33] is that decision-making may be influenced by the accumulation of health information, psychological adjustment, and evolving perceptions of risk as childbirth approaches; however, these mechanisms were not directly examined herein. From a practical perspective, the mid-to-late pregnancy period therefore represents a particularly sensitive window for value-sensitive counseling, during which tailored information on pain relief options and recovery trajectories may meaningfully influence final decisions. Further research incorporating longitudinal designs and relevant mediating variables is needed to better elucidate the mechanisms underlying these temporal changes.

Beyond clinical attributes, our findings highlight the growing role of the informational environment. Physician recommendation remained a powerful influence, consistent with the established models of shared decision-making [34]. However, social media advice also exerted a significant effect, often surpassing service quality or process control in importance. This reflects an emerging dual-authority landscape in which professional expertise increasingly competes with algorithmically amplified peer narratives [35,36]. For maternity care systems, this finding implies that effective patient engagement may need to extend beyond clinical settings and incorporate strategies for addressing misinformation, improving digital health communication, and guiding women toward reliable sources of information [37]. To better reflect real-world decision contexts, we explored multiattribute scenarios by combining key favorable attributes, revealing that delivery preferences are highly sensitive to the joint influence of pain management, medical guidance, and the informational environ-

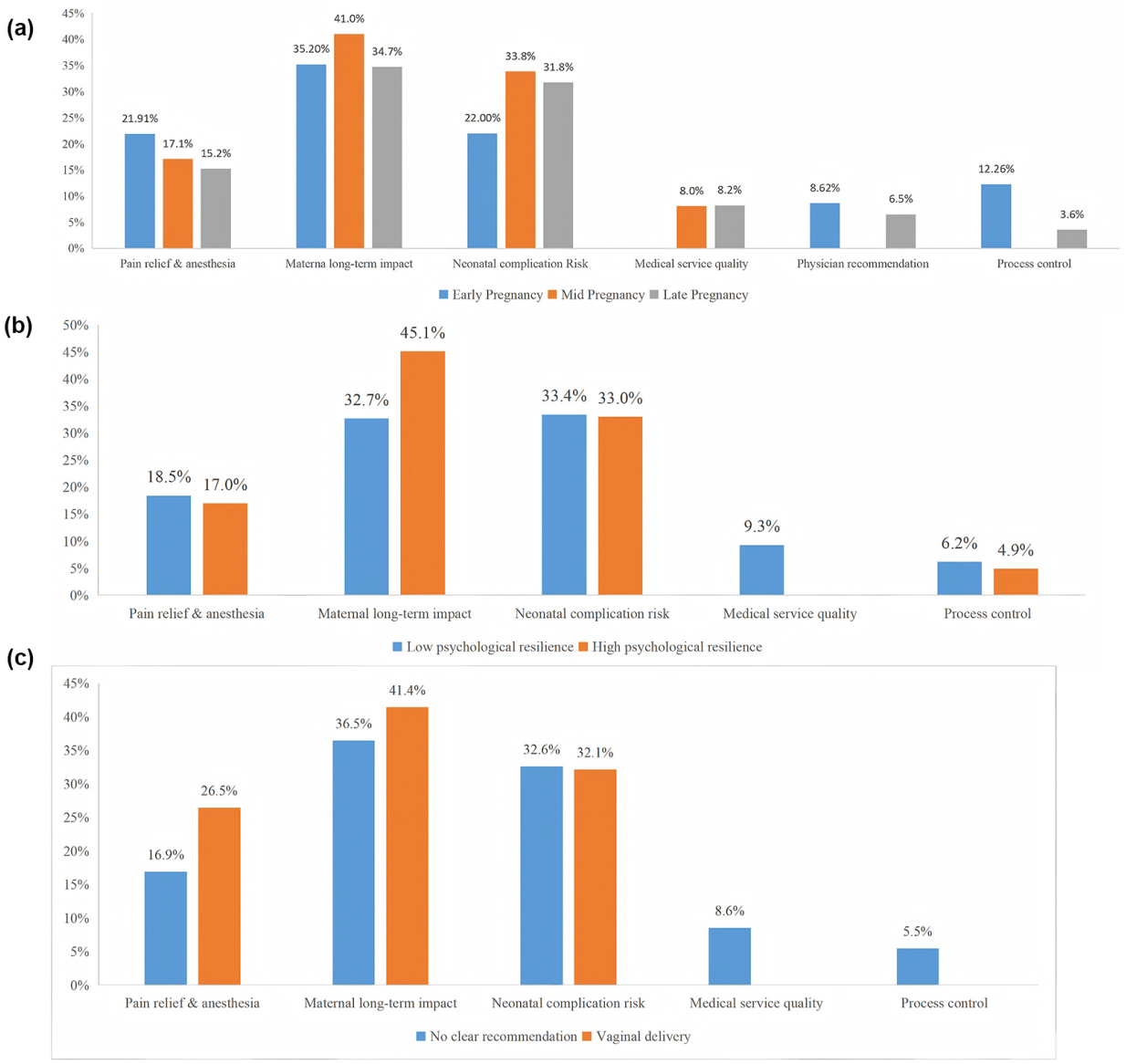

Fig. 2. Subgroup analyses by gestational stage, psychological resilience, and current medical advice. (a) gestational stage, (b) psychological resilience, and (c) current medical advice.

ment. This result highlights the fact that maternal decision-making is driven not by isolated factors but by the combination of clinical benefits, perceived safety, and social signals [38]. The coexistence of these influences underscores the need for antenatal counseling that not only delivers evidence-based guidance but also actively addresses online information biases. Integrating digital health literacy into prenatal care may help women critically appraise social media content and more closely align their decisions with clinical evidence. Future studies could incorporate validated measures of digital health literacy and more detailed platform engagement indicators to better examine these potential moderating effects.

The nonsignificant effects of "quality of medical services" and "degree of control over the delivery process" in the mixed logit model can be ascribed to both contextual and methodological factors [39]. First, as our study was conducted in a tertiary obstetrics-specialized hospital with a relatively high and homogeneous standard of care, respondents may have perceived limited meaningful variation in service quality. Similar findings have been reported in prior DCE studies, where attributes with low perceived variability or high baseline levels tended to exhibit reduced marginal effects. Second, these results may reflect substantial underlying preference heterogeneity [40]. When individuals hold divergent or even opposing preferences regarding certain attributes, the aggregate estimates in mixed logit models may be attenuated toward nonsignificance because of averaging effects. This phenomenon has been widely discussed in works on DCE methodology [41]. Collectively, the abovementioned findings suggest that the lack of statistical significance should not be interpreted as a lack of

importance but rather as an indication of context-dependent salience and heterogeneous valuation across individuals.

Latent class analysis revealed substantial heterogeneity in preference structures, identifying three decision-making profiles ranging from autonomy-oriented women emphasizing pain relief and shared decision-making to risk-averse women strongly deferring to clinician authority. These profiles mirror the findings of international preference segmentation studies [42] and suggest that delivery decision-making cannot be adequately supported through uniform counseling models. Instead, early identification of women's preference typologies and desired decision-making roles may enable more personalized preference-sensitive care that improves satisfaction and psychological outcomes.

Limitations

The limitations of our study are as follows. First, although the institution attracts patients from across China, our sample was drawn from a single tertiary obstetrics-specialized hospital and had a high proportion of urban residents and participants with higher education, which may limit generalizability to primary care settings and rural populations. Differences in access to delivery resources and healthcare infrastructure, health literacy, and childbirth-related perceptions between urban and rural areas may influence preferences and decision-making processes. Therefore, caution is warranted when extrapolating our findings to rural or lower-level healthcare settings. Second, although the employed unlabeled DCE design is advantageous for isolating attribute trade-offs and reducing framing bias, it may not fully capture the influence of real-world labels (e.g., "vaginal delivery" or "cesarean section") on decision-making, potentially limiting the direct translation of findings to clinical scenarios. Third, some subgroup analyses were based on small sample sizes (e.g., early pregnancy groups), which may reduce statistical power and increase uncertainty in subgroup-specific estimates. Although the overall model demonstrated good fitting performance and interpretability, these results should be interpreted with caution.

5. Conclusions

This study identifies a clear value hierarchy in the delivery mode decisions of low-risk primiparous women within a tertiary hospital setting predominantly serving urban populations, showing that these women prioritize long-term maternal and neonatal health outcomes, pharmacological analgesia access, and physician and social media influence. Latent class analysis identified three preference typologies. Subgroup analyses showed that preferences varied across gestational stage, psychological resilience, and current sources of medical advice. In practice, this suggests that maternity care should move beyond a uniform approach and instead align clinical communication and decision support with women's specific preference profiles, paying particular attention to risk concerns, analgesia needs, and information-seeking behaviors.

Availability of Data and Materials

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

Author Contributions

LW, YL and SF conceived and designed the study and are the principal investigators. LW analysed the data and contributed to the drafting of the manuscript. MZ, CY and LZ made their contributions to the questionnaire survey, data acquisition and analysis. All authors contributed to editorial changes in the manuscript. All authors approved the final version submitted for publication and took responsibility for statements made in the published article.

Ethics Approval and Consent to Participate

Ethical approval for this research was granted by Women's Hospital, School of Medicine, Zhejiang University (Approval No.: IRB-20250376-R). The study was conducted in accordance with the principles of the Declaration of Helsinki, and all participants provided informed consent before enrollment.

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Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used DeepSeek-V3 to assist with language editing, including checking spelling, grammar, and sentence clarity. No content, analyses, interpretations, or conclusions were generated by the tool. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the accuracy, integrity, and final publication.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.31083/CEOG51096.

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