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Adolescents versus healthcare providers preferences for abortion services: evidence from a discrete choice experiment in Jiangsu, China

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Abstract

Background Unintended pregnancies and induced abortions among Chinese adolescents have emerged as a pressing public health concern. Discrepancies in service preference between the supply and demand sides may reduce service utilization and compliance among adolescents, potentially leading to suboptimal reproductive health outcomes.

Methods We conducted a discrete choice experiment (DCE) incorporating seven service attributes identified through literature review and expert consultation, including perioperative cost of abortion services, post-abortion contraceptive services, level of privacy and confidentiality, recommended post-abortion rest duration, recommended post-abortion sexual abstinence duration, potential adverse impacts on reproductive health, and facility type providing abortion services. Choice sets were generated using Bayesian D-optimal design. Participants comprised physicians and nurses directly involved in abortion services from relevant departments, along with adolescents aged 16–24 years recruited across 13 prefecture-level cities in Jiangsu Province. Conditional logit model and mixed logit model were employed to analyze the preference of adolescents and healthcare providers (HCPs) respectively. Additionally, the relative importance (RI), willingness to pay (WTP), and service acceptance probability for each attribute were calculated.

Results A total of 294 adolescents and 475 HCPs participated in the survey. Preference analysis revealed that adolescents prioritized “level of privacy and confidentiality” (RI = 36.00%) most, followed by “perioperative cost of abortion services” (RI = 30.80%) and “potential adverse impacts on reproductive health” (RI = 26.16%). HCPs similarly valued “level of privacy and confidentiality” highest (RI = 49.67%), with “post-abortion contraceptive services” ranking second (RI = 18.65%). WTP analysis revealed that both groups demonstrated a high willingness to pay for “facility type providing abortion services”, “potential adverse impacts on reproductive health”, and “level of privacy

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and confidentiality”, though adolescents exhibited higher marginal WTP. Providers required \$670.40 compensation for contraceptive service omission. The scenario simulation identified an optimal service package with minimal preference discrepancy between groups ($\Delta P = 0.030$).

Conclusion It is recommended to establish confidential service protocols aligned with adolescents’ physical and psychological characteristics, enhance their comprehensive understanding and acceptance of abortion services, and promote the synergy between service affordability and quality assurance, thereby systematically constructing an adolescent-friendly abortion service system.

Keywords Adolescents, Healthcare providers, Abortion, Discrete choice experiment, Preferences

Introduction

In China, unintended pregnancy among adolescents remains a significant public health challenge. The country accounts for a substantial share of the global burden of induced abortion, with young, unmarried women constituting an important demographic seeking these services [1]. According to the China Health Statistical Yearbook, of the 9.7 million annual induced abortions, 47.5% involve women under the age of 25, among whom 49.7% are unmarried and 55.9% are repeat procedures [2]. In practice, this situation is further compounded by inadequate provision of contraceptive education and services, coupled with persistent stigma surrounding sexual and reproductive health (SRH) [3]. Existing national programs predominantly target married couples of reproductive age, leaving adolescents—especially unmarried individuals—with restricted access to comprehensive services despite rising premarital sexual activity [4, 5]. The growing divergence between liberalized sexual attitudes and inadequate sexual education has established adolescents as the primary group contributing to increasing abortion service demands.

As a medical intervention for unintended pregnancy, induced abortion can be associated with complications such as pelvic infection, intrauterine adhesions, and subsequent fertility impairment in a subset of patients [6]. Epidemiological and clinical evidence suggests a dose–response pattern for some post-abortion sequelae (notably intrauterine adhesions), with risk increasing as the number of intrauterine procedures rises [7]. Among adolescents, physiological immaturity and structural barriers to confidential, youth-friendly SRH care contribute to elevated risks of pregnancy-related morbidity, including puerperal infection [8]. In settings where stigma and access barriers delay care-seeking, unintended pregnancy may further increase the likelihood of unsafe management and severe complications, with potential long-term sequelae such as chronic pelvic morbidity and infertility [9]. In addition, unintended pregnancy is frequently accompanied by stigma and psychosocial stress, which compound the complexity of adolescent reproductive health needs [10].

At the policy level, China has systematically emphasized the importance of adolescent health promotion and sexuality education through multiple programmatic documents and laws. For instance, the *Healthy China 2030* explicitly advocates for education and interventions regarding sexual ethics, health, and safety to be directed toward key populations, including adolescents, to mitigate risks such as unintended pregnancy [11]. The *Medium-and Long-Term Youth Development Plan (2016–2025)* proposes a comprehensive enhancement of services for youth concerning marriage, family, and reproductive health [12]. Similarly, the *Law on the Protection of Minors of the People’s Republic of China* stipulates that schools must provide age-appropriate puberty and life education, tailored to minors’ physical and psychological developmental stages [13]. Overall, these policies primarily constitute principle-based guidelines and health promotion frameworks.

While existing policies underscore the importance of adolescent health services, operational protocols for delivering adolescent-friendly abortion care across the entire care continuum remain underdeveloped. Notably, there is a lack of specific and auditable requirements for critical components such as confidentiality and data protection protocols, as well as non-judgmental, youth-centered communication. Although technical guidelines such as the *Specification for Post-Abortion Contraception Services (2018)* have been issued in China to standardize post-abortion care (PAC) and mitigate repeat abortion risks, their emphasis remains predominantly on clinical procedures, contraceptive counseling, and follow-up management [14]. Tailored adaptation strategies addressing the specific needs of adolescents remain insufficiently developed. Consequently, a practical disconnect often emerges in clinical settings: healthcare providers (HCPs) generally adhere to standard clinical protocols, prioritizing safety standards and post-procedural contraceptive guidance, while adolescents tend to prioritize service confidentiality, non-judgmental communication, and financial accessibility. Failure to align these divergent priorities may undermine service utilization and follow-up compliance, thereby impeding efforts to prevent repeat abortions and exacerbating avoidable health risks.

Current research primarily focuses on either describing the epidemiology of adolescent abortion or utilizing univariate analyses and multivariate regression models to investigate influencing factors [4, 15–17]. Although these studies have identified key risk factors, they do not account for preference discrepancies between HCPs (supply-side) and adolescents (demand-side) in abortion service selection. The discrete choice experiment (DCE) provides a robust methodological framework for quantifying trade-offs among competing attributes. In the field of healthcare, DCEs are frequently employed to assess the alignment between physician and patient preferences (e.g., treatment options [18], prenatal screening choices [19]) by simulating real-world decision-making scenarios.

To this end, this study innovatively adopts a dual supply–demand perspective and employs a DCE to conduct a systematic quantitative analysis of the preferences of adolescents aged 16–24 and HCPs within simulated abortion care scenarios. By evaluating both groups' preference strength, RI, WTP, and choice probability toward different service attributes, this research aims to identify key service dimensions that require prioritized improvement. The resulting evidence is expected to help narrow the supply–demand preference gap, enhance service utilization and follow-up adherence, and ultimately support the optimization of policies and clinical practices related to adolescent abortion services in China.

Materials and methods

As a quantitative stated-preference research method, discrete choice experiment (DCE) serves as an effective tool for identifying and evaluating the RI of health outcomes and healthcare-related decision-making. This methodology quantifies complex medical decisions into measurable components through carefully designed choice scenarios. The experimental design and research procedures of the present study followed the ISPOR Conjoint Analysis Good Research Practices Task Force Report [6–8].

Attribute and level selection

This study employed a literature review, policy analysis, and expert consultation to identify attributes and their corresponding levels. Initial potential attributes were identified through a systematic literature review, encompassing DCE studies [20–23], a TOPS randomized preference experiment [24], an exploratory study [25], and policy documents [14, 26]. Expert focus group discussions were conducted with 3 chief obstetrician-gynecologists and 2 adolescent reproductive health specialists, utilizing semi-structured interviews to refine the attribute list. Stakeholder prioritization exercises were performed with 5 clinicians, 5 policymakers, and 3 service users to rank attribute importance using a 7-point

scale. Seven finalized attributes were included in the next experimental steps: perioperative cost of abortion services, post-abortion contraceptive services, level of privacy and confidentiality, recommended post-abortion rest duration, recommended post-abortion sexual abstinence duration, potential adverse impacts on reproductive health, and the facility type providing abortion services. Each attribute was divided into two or three levels. For the final selected attributes, we conducted semi-structured interviews with 3 clinical experts in obstetrics and gynecology through a focus group meeting. Drawing from current clinical practice guidelines, relevant policies, and typical service scenarios, these experts collaboratively determined the appropriate level for each attribute. For instance, the level for “recommended post-abortion rest duration” was informed by relevant clinical guidelines [27] and *Special Rules on the Labor Protection of Female Employees* (Order of the State Council No. 619) [28], while the “recommended post-abortion sexual abstinence duration” levels were set to reflect common post-abortion counseling scenarios in China, including a 2-week follow-up window specified in Chinese clinical guidelines and a 1-month abstinence recommendation commonly communicated in standardized service materials [27]. The detailed process and rationale for selecting the attributes and levels are provided in Online Supplementary Material Appendix A1. The finalized attributes, levels and corresponding descriptions are presented in Table 1.

Experimental design

This study employed Ngene 1.2 software (ChoiceMetrics, Sydney, Australia) to determine the combination of levels for the choice set and to exclude logically impossible ones. According to the guidelines of DCE, the experiment was conducted in two steps: a pre-survey and a formal survey [17, 18]. To optimize questionnaire design, we recruited 32 adolescents and 23 healthcare providers (HCPs) for the pilot survey to test the questionnaire and collect prior information on attribute valuation. The pilot questionnaire was generated using an orthogonal main effects design. The questionnaire was revised based on pilot feedback to create the final version. The main survey employed a D-efficient design using pilot results as prior parameters. The D-efficient design minimizes standard errors and prior parameter variance in DCEs [19]. The final D-efficient design generated in Ngene (MNL framework) achieved a D-error of 0.709739 (A-error = 1.192304).

Ultimately, Ngene software generated 12 DCE choice sets each for HCPs and adolescents respectively. Each choice set comprised two hypothetical scenarios of abortion services. Respondents were required to choose between Scenario A and Scenario B. To reduce

Table 1 Attributes and levels for discrete choice experiment choice set

Attributes	Levels	Description
Perioperative cost of abortion services (CNY)	1000, 2000, 4000	The cost encompasses all expenses related to preoperative examinations, the surgical procedure itself, and postoperative follow-up visits.
Post-abortion contraceptive services	Pro-vided, Not provided	The service involves the active provision of health education, one-on-one counseling, and introductions to highly effective contraceptive methods at various stages, including the initial preoperative consultation, on the day of surgery, and during postoperative follow-ups.
Level of privacy and confidentiality	Low, Medium, High	It refers to the level of measures taken by the healthcare institution and personnel to protect patient privacy and ensure that medical information is not disclosed.
Recommended post-abortion rest duration	15 days, 20 days, 30 days	It refers to the number of days recommended based on clinical guidelines and relevant policies for a woman to rest after undergoing an induced abortion.
Recommended post-abortion sexual abstinence duration	14 days, 30 days	It refers to the number of days recommended clinically to avoid sexual intercourse after an abortion to ensure complete physical recovery and reduce the risk of infection and other complications.
Potential adverse impacts on reproductive health	Present, Absent	It refers to potential health issues for women following an abortion: (1) Adverse pregnancy outcomes in subsequent pregnancies; (2) Post-operative gynecological diseases (e.g., pelvic inflammatory disease, menstrual irregularities).
Facility type providing abortion services	Private hospital Primary public hospital Secondary/tertiary public hospital	It refers to the type of hospital providing abortion services, with variations in facility conditions, professional expertise, service quality, etc., among different types of institutions.

Abbreviation: CNY, Chinese yuan

respondent burden, the 12 choice sets were randomly divided into two versions, each including one additional repeated choice set to assess response consistency. Each questionnaire consisted of three sections. The first section gathered sociodemographic characteristics, such as sexual activity data for adolescents and practice details for HCPs. The second section described abortion service attributes and their level settings, with a choice example provided (Fig. 1). The third section contained seven choice tasks: six for data analysis and one repeated task for internal consistency checking.

Sampling

This study was conducted from June to August 2024 in Jiangsu Province, China. We employed stratified sampling to recruit HCPs, adolescents seeking medical care and college students. Jiangsu was purposively selected due to its unique internal heterogeneity, which makes it an ideal model for studying regional issues within China. The surveyed cities in Jiangsu were explicitly stratified into Southern, Central, and Northern Jiangsu, based on socioeconomic development levels and geographical distribution to account for regional disparities. This distinct economic, social, and healthcare gradient provides a controlled, natural experimental setting within a single provincial administration to examine how socioeconomic development influences preferences for abortion services among adolescents and healthcare professionals. To mitigate potential confounding effects of economic development on preferences, each questionnaire version included respondents from all three regions.

Data were collected through online questionnaires. Adolescent participants who met the following inclusion criteria were enrolled in the study: (a) aged 16–24 years; (b) currently enrolled as college students or receiving care at obstetrics/gynecology, family planning, or women’s health clinics; (c) capable of providing informed consent independently. It is worth noting that the lower age limit was set at 16 years to avoid the requirement for parental or guardian consent, ensuring that all participants could provide independent informed consent. HCPs were required to: (a) be licensed healthcare professionals (physicians or nurses) currently working in obstetrics/gynecology, family planning, or women’s health clinics; (b) be directly involved in abortion-related consultation or clinical procedures, such as counseling patients, performing abortions, or providing postoperative care; (c) possess the capacity to provide informed consent. The sample size was determined according to Orme’s rule: $N > 500 \times \frac{c}{t \times a}$ [20], where the largest number of levels, c , across all attributes was 3, and the number of choice sets, t , and the number of alternatives per set, a , were 6 and 2, respectively. To ensure sample representativeness, each questionnaire required a minimum of 125 respondents.

Pilot and formal survey

The study was divided into two stages: pilot testing and the formal survey. The pilot phase evaluated the comprehensibility, acceptability, and effectiveness of the questionnaire. The questionnaire was further modified based on the identified problems. During the formal survey phase, data were collected across 13 prefecture-level cities in Jiangsu Province, resulting in 357 completed adolescent questionnaires and 907 HCP responses. Stringent quality control measures were implemented, excluding















Attributes	Service A	Service B
Perioperative cost of abortion services (CNY)	4000 	1000 
Post-abortion contraceptive services	Provided 	Not provided 
Level of privacy and confidentiality	Medium 	High 
Recommended post-abortion rest duration	15 days 	30 days 
Recommended post-abortion sexual abstinence duration	30 days 	14 days 
Potential adverse impacts on reproductive health	Present 	Absent 
Facility type providing abortion services	Primary public hospital 	Secondary/tertiary public hospital 
Which service would you choose?	<input type="checkbox"/> Service A	<input type="checkbox"/> Service B

Fig. 1 Example of a choice set. CNY, Chinese yuan

questionnaires that: (a) contained incorrect responses to validation items, (b) were completed in less than 120 s, or (c) failed to meet predetermined inclusion criteria. 769 valid questionnaires were retained for analysis after the quality assurance process, including 294 from adolescents and 475 from HCPs. The flow chart of sample size screening is presented in Fig. 2.

Statistical analysis

Model specification

The conditional logit model and the mixed logit model were employed to analyze the choice preferences of adolescents and HCPs, respectively. The coefficients derived from these models are interpreted as preference weights, quantifying the marginal utility associated with each attribute level relative to its predefined baseline. The sign of the coefficient indicates the direction of preference: a positive coefficient denotes that the attribute level is preferred over the baseline, thereby increasing the likelihood of its choice, while a negative coefficient suggests a preference against it and a decreased likelihood. The magnitude of the coefficient reflects the RI of the attribute level; a larger absolute value implies a stronger impact on the choice probability.

Attribute Relative Importance (RI)

To evaluate the RI of each attribute, we computed the proportion of its utility coefficient range relative to the

total range across all attributes. The specific calculation formula is as follows:

$$RI_k = \left(\frac{A_k}{\sum_{k=1}^7 A_k} \right) \times 100\%$$

In the formula, A_k represents the range of utility coefficients for the k -th attribute. $\sum_{k=1}^7 A_k$ denotes the total sum of utility coefficient ranges across all attributes, and RI_k indicates the RI of the k -th attribute, expressed as a percentage to reflect its influence on decision-making relative to all attributes.

Willingness to pay

Using the continuous variable “Perioperative cost of abortion services” as a reference, we computed WTP for other attribute levels. Marginal WTP (mWTP) was calculated as the ratio of the coefficients for other attribute levels to the perioperative cost coefficient. All cost and mWTP values were converted to USD using the People’s Bank of China exchange rate as of May 2025 (1 USD = 7.2034 CNY).

Scenario analysis

Additionally, we simulated changes in choice probability resulting from variations in attribute levels from their baseline (reference) values through constructed

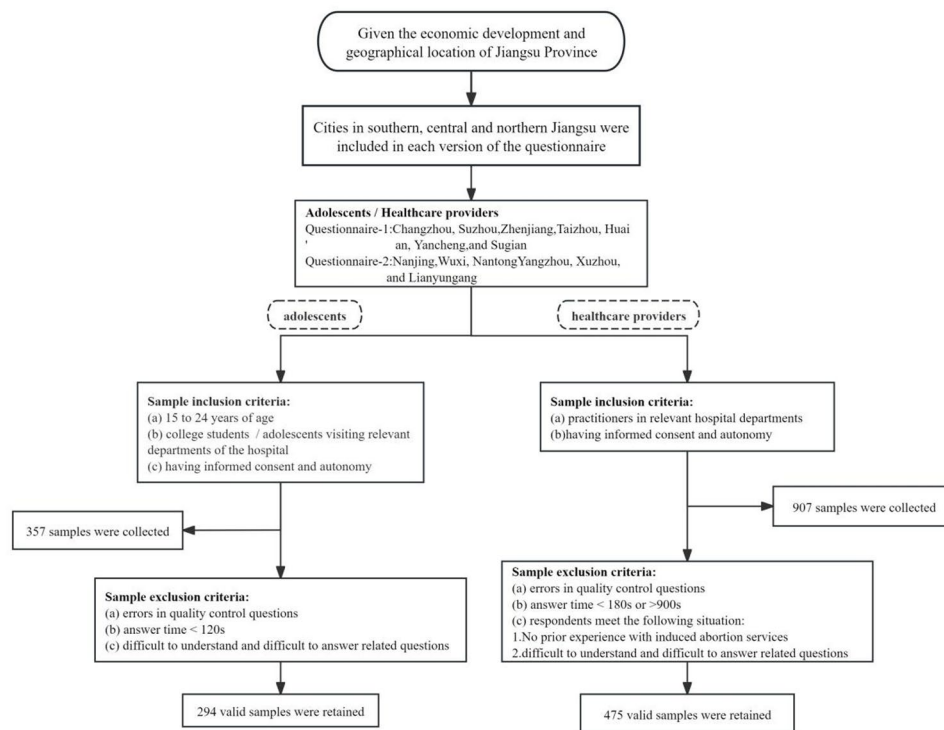


Fig. 2 Flow chart of sample size screening

hypothetical service scenarios, evaluating participant acceptance of different abortion service packages.

The logistic probability function for respondents choosing abortion service scenario i over other scenarios j is specified as follows [21]:

$$P_i = \frac{e^{\beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_n x_{ni}}}{\sum_j e^{\beta_1 x_{1j} + \beta_2 x_{2j} + \dots + \beta_n x_{nj}}} \forall i, j \in J$$

Here, x_{ni} and x_{nj} denote the attribute coefficient vectors for abortion service scenarios i and j , respectively. If a specific attribute level within scenario i is modified, resulting in a new scenario j , the change in an individual's probability of selecting the service is expressed as:

$$P_c = P_i - P_j$$

Lastly, statistical analyses were performed using Stata MP 16 (Stata Corp LLC, USA). We followed the DIRECT checklist for reporting DCE results (supplementary "Appendix A2").

Results

Sociodemographic information

As presented in Table 2, the adolescent cohort exhibited notable sociodemographic characteristics: three-quarters (74.83%) had attained at least a bachelor's degree, with geographic distribution concentrated in Southern

Jiangsu (45.58%), followed by Northern Jiangsu (39.46%) and Central Jiangsu (14.97%). The sample comprised slightly more urban residents (53.10%) than rural residents (46.90%), with half (50.00%) unemployed (including students), the majority being single (70.70%), and nulliparous (74.80%). Economically, 39.50% reported personal monthly incomes ≤ 2000 CNY, while nearly one-fifth (19.73%) came from households earning < 5000 CNY monthly, and 11.90% ($n = 35$) lacked health insurance coverage. Furthermore, half of the respondents reported being sexually experienced, and 46.5% indicated having used no contraceptive method during their most recent sexual encounter. Additionally, 20.7% of participants reported a history of abortion, with the choice of abortion methods showing a relatively balanced distribution.

The HCP sample was predominantly female (97.26%), with half (50.95%) practicing in Southern Jiangsu. Approximately 56.00% were aged 36–50 years, with 50.32% employed at secondary-level hospitals. Professionally, most were clinicians (75.37%), nearly half (46.11%) held senior professional titles, and the vast majority (89.68%) had abortion service experience, among whom 78.21% reported using shared decision-making approaches with patients. (Table 2)

Table 2 Characteristics of adolescents (aged 16–24, born female) and related healthcare providers in China, 2024 survey

Characteristic	No. (%) of adolescents (n = 294)	Characteristic	No. (%) of healthcare providers (n = 475)
Current Residence		Work Location	
Southern Jiangsu	134 (45.58)	Southern Jiangsu	242 (50.95)
Central Jiangsu	44 (14.97)	Central Jiangsu	115 (24.21)
Northern Jiangsu	116 (39.46)	orthern Jiangsu	118 (24.84)
Household Registration		Gender	
Urban	156 (53.10)	Male	13 (2.74)
Rural	138 (46.90)	Female	462 (97.26)
Education Level		Age (Years)	
Junior High or Below	22 (7.48)	18–35	113 (23.79)
Senior High School	52 (17.69)	36–50	266 (56.00)
University and Above	220 (74.83)	> 50	96 (20.21)
Professional Category		Hospital Level	
Medical-related	148 (50.30)	Tertiary Hospital	89 (18.74)
Non-medical	146 (49.70)	Secondary Hospital	239 (50.32)
Employment Status		Primary Hospital	147 (30.95)
Unemployed	147 (50.00)	Professional Role	
Employed	128 (43.50)	Doctor	358 (75.37)
Other	19 (6.50)	Nurse	117 (24.63)
Marital Status		Professional Title	
Single	208 (70.70)	Junior	95 (20.00)
Married	86 (29.30)	Intermediate	161 (33.89)
Fertility Status		Senior	219 (46.11)
No Children	220 (74.80)	Years of Practice	
Having Children / Pregnant	74 (25.20)	≤ 10 Years	78 (16.42)
Personal monthly income (2023)		11–20 Years	162 (34.11)
≤ 2000	116 (39.50)	> 20 Years	235 (49.47)
2001–3000	57 (19.40)	Personal monthly income (2023)	
3001–4000	58 (19.70)	≤ 5000	74 (15.58)
> 4000	63 (21.40)	5,001–10,000	295 (62.11)
Family Monthly Income (2023)		10,001–15,000	95 (20.00)
≤ 5000	58 (19.73)	> 15,000	11 (2.32)
5,001–10,000	110 (37.41)	Exposure to Abortion Services	
10,001–15,000	68 (23.13)	Yes	426 (89.68)
> 15,000	58 (19.73)	No	49 (10.32)
Health Insurance Type		Monthly Average Abortion Services	
UEBMI	115 (39.10)	0–50	383 (89.91)
URRBM	137 (46.60)	51–100	27 (6.34)
Comercial Insurance	7 (2.40)	> 100	16 (3.76)
None	35 (11.90)	Communication Method with Patients (Doctors only)	
Maternity Insurance (Urban employees only)		Doctor-led	19 (5.31)
Yes	88 (76.52)	Patient-led	52 (14.53)
No	27 (23.48)	Shared Decision-making	280 (78.21)
Sexual experience		Other	7 (1.96)
Yes	157(53.4)		
No	137(46.6)		
Contraceptive use at last sexual intercourse (n = 157)			
Yes	84(53.5)		
No	73(46.5)		
History of abortion			
Yes	61(20.7)		
No	233(79.3)		
Method used for the most recent abortion (n = 61)			

Table 2 (continued)

Characteristic	No. (%) of adolescents (n = 294)	Characteristic	No. (%) of healthcare providers (n = 475)
Medical abortion	20(32.79)		
Surgical abortion	23(37.7)		
Medical abortion followed by uterine aspiration	18(29.51)		

Abbreviations: CNY Chinese Yuan, UEBMI Urban Employee Basic Medical Insurance, URRBMI Urban and Rural Resident Basic Medical Insurance, CI Commercial Insurance

Table 3 Preferences of adolescents in conditional logit model and healthcare providers in mixed logit model

Attributes	Adolescents (n = 294)				Healthcare providers (n = 475)			
	β	SE	95%CI		β	SE	95% CI	
Perioperative cost of abortion services	<-0.001	<0.001	-9.32E-05	9.30E-06	-0.004***	0.001	-0.005	-0.002
Post-abortion contraceptive services (ref: provided)								
Not provided	0.041	0.112	-0.178	0.260	-16.880***	4.186	-25.084	-8.676
Level of privacy and confidentiality (ref: low)								
Medium	0.275*	0.139	0.004	0.547	8.822***	2.240	4.432	13.212
High	0.560***	0.084	0.396	0.725	17.041***	4.362	8.493	25.590
Recommended post-abortion rest duration (ref: 15 days)								
20 days	0.025	0.073	-0.117	0.168	-3.676***	1.114	-5.859	-1.494
30 days	0.047	0.084	-0.118	0.212	0.361	0.699	-1.009	1.730
Recommended post-abortion sexual abstinence duration (ref: 14 days)								
30 days	-0.022	0.041	-0.102	0.058	-1.644*	0.707	-3.031	-0.257
Potential adverse impacts on reproductive health (ref: present)								
Absent	0.694***	0.173	0.354	1.033	4.600*	1.797	1.077	8.123
Facility type providing abortion services (ref: private hospital)								
Primary public hospital	0.342***	0.074	0.197	0.486	17.795***	4.576	8.826	26.764
Secondary/ tertiary public hospital	0.790***	0.094	0.605	0.976	22.670***	5.472	11.945	33.395
Sample size	294				475			
Number of observations	4116				6650			
Log likelihood	-1214.301				-1574.088			
AIC	2448.602				3188.176			
BIC	2511.828				3324.223			

Abbreviations: β , coefficient; SE, standard error; ref, reference; 95% CI, 95% confidence interval; range, the range of values within which the true parameter estimate is expected to lie with 95% probability; AIC, Akaike information criterion; BIC, Bayesian information criterion. * $p < 0.05$; *** $p < 0.001$

Preference and relative importance

The estimation results of the conditional logit model are presented in Table 3. Adolescents' preferences for abortion services were significantly influenced ($p < 0.05$) by three attributes: level of privacy and confidentiality, potential adverse impacts on reproductive health, and the type of facility providing abortion services. The signs of the estimated coefficients aligned with our expectations, indicating this population's positive preference for a higher level of privacy and confidentiality, no potential adverse impacts on reproductive health, and superior healthcare facility types. Specifically, adolescents exhibited a preference for abortion services provided by primary public hospitals or secondary/tertiary public hospitals, with no negative impact on reproductive health and medium/high levels of privacy and confidentiality.

Among HCPs, all attribute levels significantly influenced decision-making ($p < 0.05$), except for the 30-day recommended post-abortion rest duration. The signs of

the estimated coefficients aligned with expectations, indicating that HCPs had a positive preference for a higher level of privacy and confidentiality, no adverse impact on women's reproductive health, and better facility types, but a negative preference for higher perioperative costs, lack of post-abortion contraception, longer recovery periods, and extended recommended sexual abstinence. Specifically, HCPs preferred abortion services with medium/high privacy protection, no adverse effects on reproductive health, and primary or secondary/tertiary public hospitals, while showing aversion to services with higher perioperative costs ($\beta = -0.004$) and those lacking post-abortion contraception. The estimated coefficients for each attribute in the mixed logit model are shown in Table 3.

RI analysis identified the level of privacy and confidentiality as the most valued attribute among adolescents (36.00%) and HCPs (49.67%). For adolescents, cost

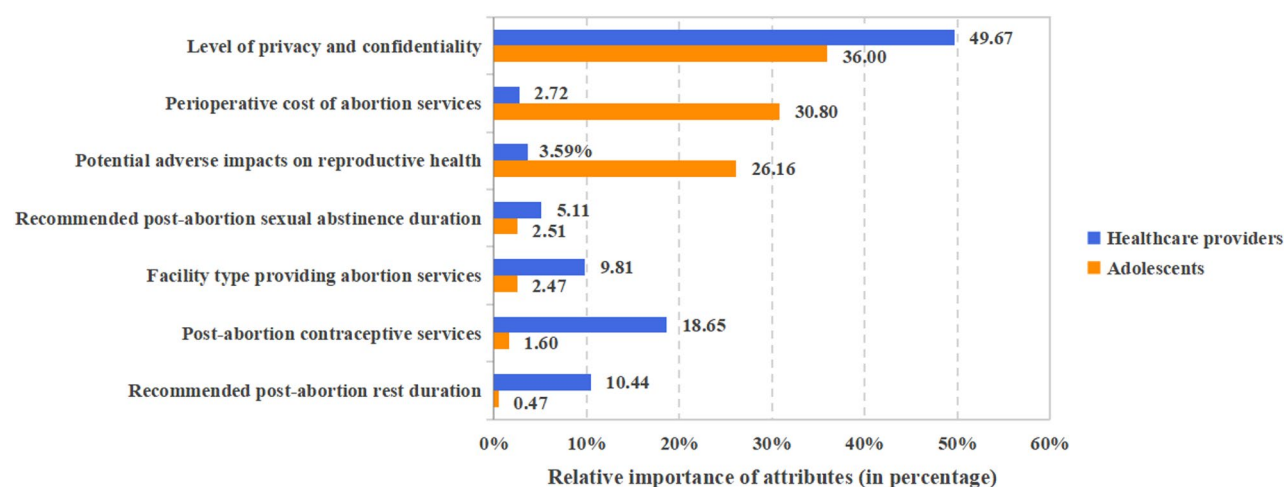


Fig. 3 Relative importance of attributes to adolescents and healthcare providers

Table 4 Willingness to pay of adolescents and healthcare providers

Attributes and levels	Adolescents (n = 294)			Healthcare providers (n = 475)		
	WTP (US\$)	95% CI		WTP (US\$)	95% CI	
Post-abortion contraceptive services						
Provided → Not provided	136.87	-608.17	881.90	-670.42	-846.93	-565.46
Level of privacy and confidentiality						
Low → Medium	918.46	-594.00	2430.92	350.38	266.08	493.83
Low → High	1870.58	-592.96	4334.12	676.83	556.75	852.93
Recommended post-abortion rest duration						
15 days → 20 days	84.15	-379.94	548.23	-146.01	-210.16	-93.66
15 days → 30 days	156.05	-414.02	726.12	14.32	-52.34	70.47
Recommended post-abortion sexual abstinence duration						
14 days → 30 days	-74.39	-344.31	195.53	-65.30	-115.32	-10.84
Potential adverse impacts on reproductive health						
Present → Absent	2315.09	-756.86	5387.04	182.69	62.35	277.60
Facility type providing abortion services						
Private → Primary Public	1139.93	-330.95	2610.80	706.76	603.60	868.10
Private → Secondary/Tertiary Public	2638.63	-671.98	5949.24	900.38	758.24	1161.87

Abbreviations: WTP, willingness to pay; 1 CNY = 0.14 USD (average exchange rate during the study period, sourced from the People's Bank of China, accessed May 2025); 95% CI, 95% confidence interval, representing the range of values within which the true parameter estimate is expected to lie with 95% probability

(30.80%) and reproductive health impact (26.16%) were secondary considerations, whereas the recommended post-abortion rest duration held minimal RI (0.47%). In contrast, HCPs prioritized post-abortion contraceptive services (18.65%) and recommended rest duration (10.44%), while attributing the least significance to the cost of abortion services (2.72%) (Fig. 3).

Willingness to Pay (WTP)

Table 4 displays the mWTP estimates for various abortion service attributes among adolescent recipients and HCPs. The magnitude of WTP values reflects the relative strength of preferences for specific service characteristics, with higher values indicating more desirable attribute levels from respondents' perspectives. (Fig. 4)

Adolescents exhibited the highest WTP for the facility type providing abortion services among all evaluated attributes. Compared to private hospitals, they were willing to pay \$1,139.93 more for services at primary public hospitals and \$2,638.63 more at secondary/tertiary public hospitals, holding other attributes constant. The second most valued attribute was potential adverse impacts on reproductive health, with adolescents willing to pay a \$2,315.09 premium for services guaranteeing no adverse effects. Similarly, improving privacy and confidentiality from low to high levels commanded an additional \$1,870.58 in WTP. Conversely, extending the recommended post-abortion sexual abstinence duration from 14 to 30 days resulted in negative marginal WTP

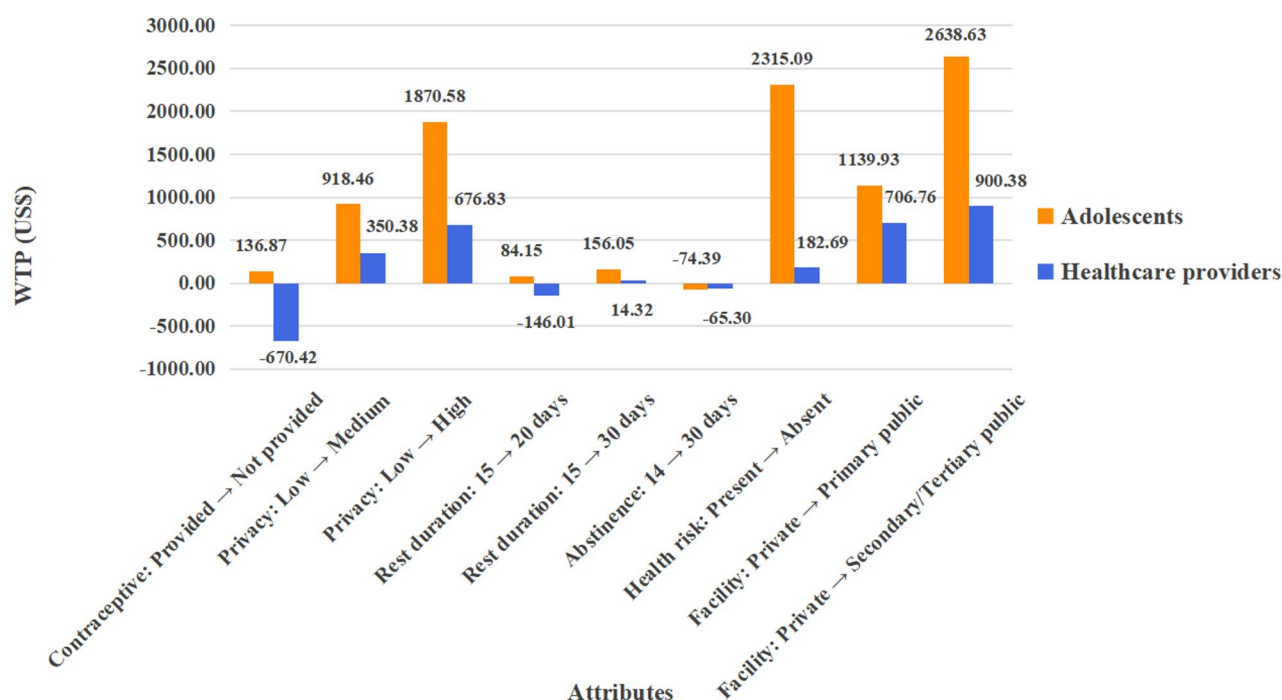


Fig. 4 Willingness to pay for each attribute-level among adolescents and healthcare providers

(-\$74.39), indicating adolescents would require compensation for this less desirable attribute change.

HCPs' preferences aligned with theoretical expectations for all attributes, except for the recommended post-abortion rest duration and sexual abstinence duration. Providers demonstrated the highest WTP for the facility type providing abortion services, valuing upgrades from private to primary public hospitals at \$706.76 and to secondary/tertiary public hospitals at \$900.38. Improved privacy and confidentiality levels generated additional WTP of \$350.38 (medium) and \$676.83 (high), while eliminating adverse impacts on reproductive health was valued at \$182.69. Notably, providers exhibited negative WTP for three service characteristics: absence of post-abortion contraceptive services (-\$670.42), extended post-abortion rest duration, and prolonged post-abortion sexual abstinence duration, suggesting these attribute changes would require compensation from the providers' perspective.

Scenario Prediction Analysis

We analyzed the differences in utility preferences between adolescents and HCPs under different service scenarios. The baseline scenario was set with a perioperative cost of 1,000 CNY, provision of postoperative contraceptive services, low confidentiality level, 15-day recovery period, 14-day sexual abstinence period, existing health impacts, and treatment at a private medical institution, yielding utility values of 0.490 for adolescents and 0.455 for providers. When the service cost increased

from CNY 1,000 to 4,000, adolescents' utility showed a modest decline (from 0.490 to 0.469), while providers' utility decreased substantially (from 0.455 to 0.326), widening the absolute difference between the two groups from 0.035 to 0.143 (①–③). Among single-attribute optimization scenarios (④–⑫), elevating confidentiality to the highest level achieved optimal balance (adolescents: 0.627, providers: 0.642, $\Delta = 0.015$), whereas selecting secondary/tertiary public hospitals substantially improved overall utility (adolescents: 0.679, providers: 0.742). The comprehensive optimization scenario (1,000 CNY cost, contraceptive services, high confidentiality, 30-day abstinence, no health impacts, and secondary/tertiary public hospital care) projected utility values of 0.879 and 0.909 for adolescents and providers respectively, achieving the minimal absolute difference. (Fig. 5)

Discussion

To our knowledge, this is the first study in China to use a discrete choice experiment (DCE) to simultaneously compare adolescents' and healthcare providers' preferences for induced abortion services, and to identify actionable strategies for service improvement. We observed strong convergence on several core attributes. Privacy and confidentiality emerged as the most highly valued attributes for both groups, with adolescents placing substantially greater monetary value on enhanced privacy protection than did healthcare providers (HCPs). Both groups also preferred receiving services in public secondary/tertiary hospitals and favored

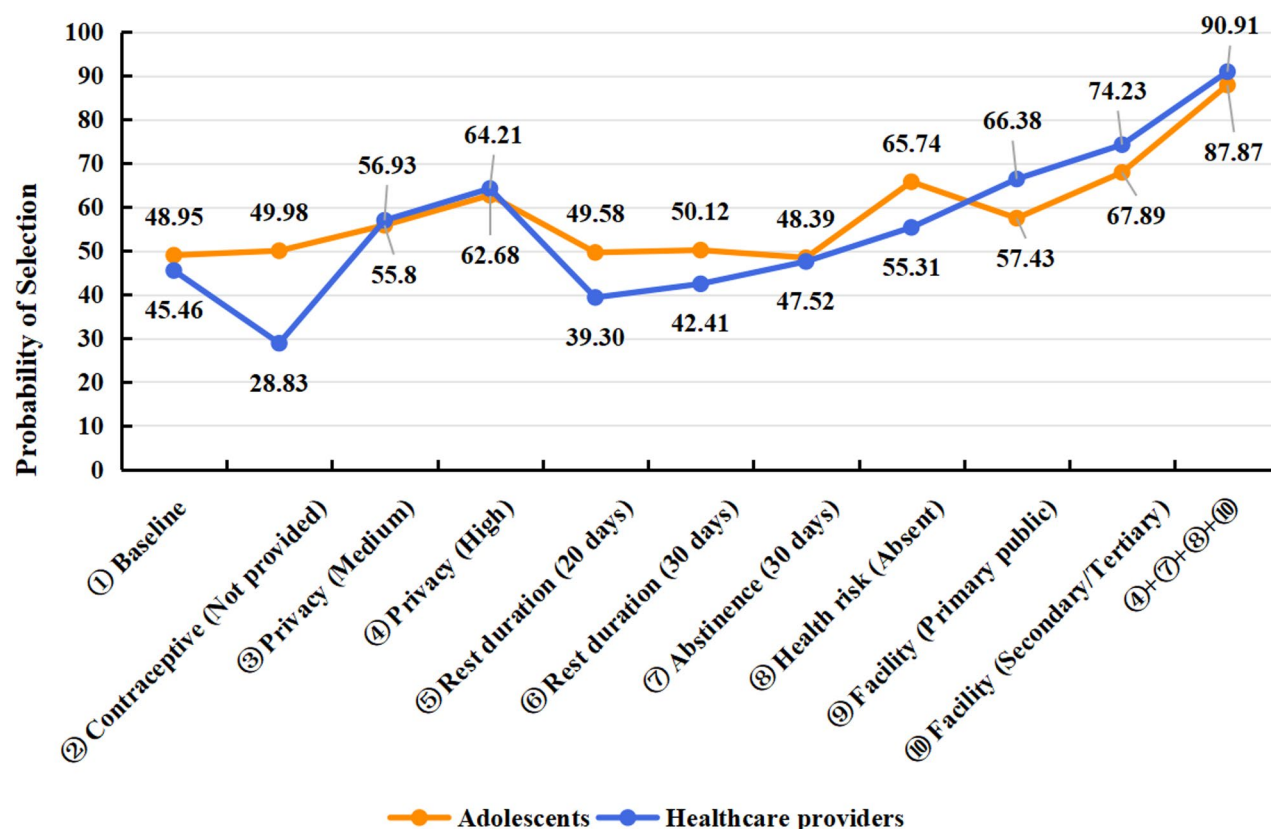


Fig. 5 Comparison of uptake rate between adolescents and healthcare providers. The baseline scenario was set with a perioperative cost of 1,000 CNY, provision of postoperative contraceptive services, low confidentiality level, 15-day recovery period, 14-day sexual abstinence period, existing health impacts, and treatment at a private medical institution

service scenarios without adverse impacts on reproductive health. At the same time, the analysis revealed notable misalignments in priorities between adolescents and HCPs. Adolescents placed high weight on potential long-term fertility-related harms, yet attached limited importance to risk-reduction measures embedded in post-abortion care (PAC), such as recommended postoperative rest and the provision of post-abortion contraception. In contrast, providers prioritized post-operative management and PAC-related services. Notably, although adolescents perceived higher-level public hospitals as a signal of quality and safety, the relative importance (RI) they assigned to facility type was lower than that assigned to privacy and cost, suggesting that affordability and procedural barriers may constrain their ability to access secondary/tertiary public hospitals in practice. Collectively, these findings suggest that adolescent-friendly abortion care in China should move beyond principle-based advocacy toward concrete and implementable reforms. Such reforms include strengthening verifiable confidentiality standards and data-protection workflows, ensuring discrete and accessible entry points for adolescents within public hospitals, and integrating affordability measures with standardized PAC counseling

and follow-up support to improve both acceptability and clinical quality.

First, our study revealed that privacy and confidentiality were the most highly valued attributes among both HCPs (RI = 49.67%) and adolescents (RI = 36.00%) when selecting abortion services, underscoring their central role in decision-making. This finding is consistent with stated-preference evidence showing that adolescents typically place greater emphasis on confidentiality within sexual and reproductive health (SRH) services and are more inclined to seek care when confidentiality is guaranteed [29]. Notably, when the level of privacy protection was increased from low to high, adolescents demonstrated a significantly higher willingness to pay (WTP; USD 1,870.58) than HCPs (USD 676.83). This suggests that although both groups value privacy, adolescents may attribute a higher monetary value to it and place greater relative weight on it in their decision-making. A plausible explanation is that many adolescents aged 16–24 years seeking abortion services in China are unmarried and may be more vulnerable to abortion-related stigma than older women, which heightens their perceived need to conceal pregnancy and abortion care [30]. Our scenario simulation further indicates that enhancing privacy

protection could serve as a particularly actionable lever to increase the predicted likelihood that both adolescents and HCPs would select a given service option. Specifically, when a single attribute was optimized, increasing privacy protection from low to high resulted in high predicted uptake for both groups and yielded the smallest between-group difference ($P_{\text{adolescents}} = 62.68\%$; $P_{\text{HCPs}} = 64.21\%$; $\Delta P = 1.53\%$).

Therefore, to enhance service uptake, acceptability, and follow-up adherence among adolescents in abortion care, the strengthening of privacy protection mechanisms should be prioritized as a core strategy. China's current *Specification for Post-Abortion Contraception Services (2018)* requires relevant staff to possess appropriate knowledge, training, and communication skills; however, it does not delineate competencies tailored specifically to adolescents. Consequently, we recommend supplementing existing guidance with communication training that is responsive to adolescents' needs. Such training should emphasize a non-judgmental approach, interactions that are sensitive to stigma, and explicit communication of confidentiality commitments, in alignment with international quality standards for adolescent-friendly services and abortion care [31, 32]. In parallel, indicators of privacy and confidentiality should be integrated into institutional quality management and performance evaluation systems. Furthermore, public funding should prioritize infrastructure and workflows that safeguard privacy, as these constitute priority investments supported by high stakeholder consensus and potentially yield substantial marginal returns.

Furthermore, our prior semi-structured interviews with clinicians revealed a conceptual divergence between HCPs and adolescents in their definitions of "privacy." Adolescents frequently interpret privacy as minimizing identity exposure and, consequently, prefer care pathways characterized by low visibility and minimal documentation. In contrast, HCPs tend to conceptualize privacy in terms of institutional confidentiality safeguards. For providers, this entails recording information only when necessary and ensuring access solely for authorized clinical purposes. This divergence may help explain why adolescents perceive privacy protection as insufficient, even when providers believe that confidentiality standards have been met. Prior research indicates that adolescents frequently have a limited understanding of how confidentiality functions within SRH services, which may impede timely care-seeking [33, 34]. Therefore, school-based sexuality education and broader health promotion initiatives (e.g., public service announcements and online platforms) should extend beyond simply stating adolescents' rights to confidential care. These initiatives should aim to help adolescents understand the specific privacy and confidentiality practices applied in abortion

care. Specifically, this encompasses what information is recorded, who has access to it, what safeguards are in place, and the procedures for raising concerns or filing complaints. Such clarity may alleviate concerns regarding identity exposure and mitigate privacy-related barriers to service uptake. Moreover, healthcare institutions should reinforce protections for sensitive health information to ensure alignment with China's evolving personal information protection framework and to uphold their duty of safeguarding patient privacy [35].

Second, this study found that adolescents assigned substantial importance to the attribute "potential adverse impacts on reproductive health" ($RI = 26.16\%$). When the level of this attribute shifted from "present" to "absent," adolescents exhibited a markedly higher WTP (USD 2,315.09) compared with HCPs (USD 182.69). This finding suggests that adolescents are more concerned about potential long-term reproductive health risks associated with abortion. However, this heightened concern regarding long-term risks does not appear to translate into sufficient attention to key risk-reduction measures in PAC. Specifically, adolescents assigned low importance to attributes related to postoperative recovery management (e.g., recommended duration of postoperative rest: $RI = 0.47\%$; recommended postoperative sexual abstinence: $RI = 2.51\%$), and model estimates indicated a slight positive preference for "not providing post-abortion contraception services" ($\beta = 0.041$). In contrast, HCPs assigned greater importance to the "provision of post-abortion contraception services" ($RI = 18.65\%$) and "recommended post-abortion rest duration" ($RI = 10.44\%$), and exhibited a significantly negative preference for "not providing post-abortion contraception services" ($\beta = -16.880$, $P < 0.001$). This supply-demand discrepancy suggests a gap in adolescents' knowledge of reproductive health. Although concerned about future fertility, adolescents appear not to recognize the critical role that timely and specific preventive measures play in reducing repeat unintended pregnancies and postoperative complications. This interpretation is further supported by behavioral data from our study sample: among sexually experienced adolescents, nearly half (46.5%) reported using no contraceptive method during their most recent sexual encounter.

In light of these findings, enhancing adolescents' awareness of and acceptance toward PAC and related follow-up support should be considered a primary step. Evidence suggests that many women become aware of PAC-related services only when seeking medical care for an abortion [36]. Moreover, existing free family planning services in China are rarely accessible to young and unmarried individuals [37]. Therefore, in addition to education provided within healthcare institutions, efforts should be directed toward strengthening reproductive health education in

schools, within families, and via new media platforms [38, 39]. It is also advisable to expand the coverage of current premarital family planning services to encompass young, unmarried women. Although the National Health Commission has issued guidelines for post-abortion family planning services [20], offering technical and procedural recommendations, these services currently lack supervision, evaluation, and financial support, thereby hindering their standardized implementation. In the future, integrating PAC into the basic reproductive health service system and exploring payment and incentive mechanisms tied to service quality should be considered [37]. Such measures would enhance the sustainable service capacity of institutions and alleviate implementation burdens on providers.

Third, this study found that both adolescents and HCPs exhibited a strong preference for abortion services to be delivered in public secondary or tertiary hospitals (adolescents: $\beta = 0.790$, $p < 0.001$; HCPs: $\beta = 22.670$, $p < 0.001$). Compared with private healthcare institutions, the marginal WTP for accessing services at a public secondary or tertiary hospital was highest among both groups (adolescents: USD 2,638.63; HCPs: USD 900.38). This finding suggests that, within the highly sensitive and socially stigmatized context of abortion care, high-level public hospitals may serve as a more reliable signal of quality and safety. Previous DCEs conducted in Shanghai, China, have demonstrated that residents place considerable importance on hospital attributes reflecting medical capability and resource allocation when selecting a first-contact institution [40]. Furthermore, compared with private institutions, the public system generally attains higher ratings across multiple patient experience dimensions—including communication, autonomy, and confidentiality—thereby reinforcing its appeal in risk-averse decision-making [41].

Notably, although public secondary or tertiary hospitals exerted a significant positive effect on utility and were associated with a high WTP, adolescents assigned relatively low importance (RI = 2.47%; ranking among the lowest of the seven attributes) to the attribute “healthcare institution type”, while attributing greater importance to surgical cost (RI = 30.80%), second only to “privacy and confidentiality” (RI = 36.00%). This finding indicates that, while higher-level public hospitals can enhance the overall acceptability of service options for adolescents, their actual choices are more strongly driven by operational factors such as privacy protection and cost. Existing studies suggest that, in China, adolescents may seek abortion services from unregulated commercial facilities due to concerns regarding stigma, information leakage, inconvenient access to care, and inadequate health insurance coverage [32, 42]. Therefore, where feasible, implementing cost-reduction or subsidy mechanisms

targeting adolescents experiencing financial hardship or insufficient health insurance coverage could help reduce their motivation to seek informal services. Nevertheless, adolescents demonstrated a relatively low preference for risk-reduction measures, such as PAC. If financial support mechanisms are implemented without integration of PAC education, follow-up, and service-quality improvement, policy efforts may diverge from the goal of reducing repeat abortion risk. A more rational approach would be to bundle payment support with service quality, exploring incentive mechanisms tied to the provision of PAC services and follow-up completion rates, thereby enhancing the translation of public investment into measurable health benefits.

Fourth, existing research demonstrates substantial heterogeneity in adolescents’ priority considerations for abortion services across different countries and policy contexts. This study found that privacy and confidentiality, surgical cost, and impact on female reproductive health were the most highly valued attributes for adolescents selecting abortion services in economically developed regions of China. In contrast, a systematic review of preferences for SRH services among adolescents and young adults in Africa identified service cost, type of treatment, and frequency of counseling as key determinants, suggesting that in resource-limited settings, economic burden and service accessibility remain primary concerns [21]. Research on abortion service preferences among the reproductive-age population in the United States indicates that cost (RI = 44.3) and waiting time (RI = 23.2) are the most important determinants [20]. Similarly, a study on preferences for out-of-state abortion facilities in Texas found that next available appointment time was the most important attribute, followed by cost and distance [43]. Notably, within the Chinese context of the present study, despite the existence of the “15-minute healthcare service circle” policy, stakeholder evaluations indicated that waiting time was the least valued factor. This difference likely reflects structural disparities across different health systems and policy environments: in the United States, policy restrictions increase cross-state healthcare costs and exacerbate barriers to clinic accessibility; in many African settings, cost and counseling frequency remain major obstacles; whereas in China, waiting times and consultation processes are relatively predictable, leading service users to prioritize higher-level quality dimensions such as privacy protection and professional standards. Moreover, studies across diverse settings consistently indicate that surgical cost remains a significant determinant of adolescents’ decisions, likely because young, economically dependent females are more sensitive to out-of-pocket expenses. In summary, these findings illustrate that strategies for optimizing abortion services should be tailored to local institutional

and service-delivery realities, rather than directly transplanting models from other countries. These findings also underscore the practical relevance and policy significance of conducting preference-based research on adolescent reproductive health services in China.

Limitations

This study has several limitations. First, external validity may be limited. Participants were recruited in a single province (Jiangsu), and the adolescent sample included clinic attendees and college students with a relatively high educational profile; preferences may differ in less-developed regions, among out-of-school adolescents, or other hard-to-reach groups. Second, the DCE measures stated preferences in hypothetical scenarios rather than revealed behavior. Real-world abortion decisions may be shaped by constraints not fully captured here. Thus, scenario simulations should be interpreted as model-based comparisons rather than direct predictions of actual uptake. Third, WTP estimates should be interpreted cautiously, as they are sensitive to the magnitude of the cost coefficient and may be influenced by unobserved scale differences between adolescents and healthcare providers. Fourth, selection and reporting biases are possible given the sensitivity of abortion and sexual behaviors and the use of an online survey; adolescents may underreport sexual or abortion experiences, and providers may respond in line with professional norms. Finally, although attributes/levels were informed by literature and expert input, they necessarily simplified abortion care and could not include all policy-relevant features.

Conclusion

As the first quantitative study in China to employ a DCE to examine the preferences of adolescents and HCPs regarding abortion services, this research reveals significant discrepancies between the two groups. The findings indicate that adolescents are highly concerned about potential long-term reproductive health risks and are relatively cost-sensitive, yet they attach comparatively lower importance to specific risk-reduction measures within postoperative care, such as recovery guidance and post-abortion contraception services. This contradiction suggests that adolescents' concern for future fertility does not necessarily translate into active acceptance of relevant clinical protective measures. In contrast, HCPs place greater emphasis on PAC and postoperative management, reflecting a practice orientation consistent with clinical guidelines. Notably, although both groups rank "privacy and confidentiality" as the most important attribute, the intensity of their emphasis differs: adolescents are willing to pay more for stricter confidentiality measures. This implies that even when services meet the confidentiality standards set by providers, they may

still fall short of adolescents' expectations, thereby continuing to hinder timely service-seeking behavior. Based on these findings, three recommendations for service optimization are proposed: first, strengthen privacy-protection mechanisms by establishing confidential service protocols tailored to adolescents' characteristics; second, enhance adolescents' awareness and acceptance of postoperative fertility-preservation services through targeted education and communication; third, promote synergy between cost affordability and service quality, ensuring both care standards and reasonable economic accessibility.

Abbreviations

DCE	discrete choice experiment
HCP	healthcare provider
RI	relative Importance
WTP	willingness to pay
PAC	post-abortion care
SRH	sexual and reproductive health

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12978-026-02308-x>.

Supplementary Material 1.

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Authors' contributions

JZ contributed to the study design, data analysis, and drafting and editing of the manuscript. YF and XZ contributed to the study design, funding acquisition, revising of manuscript. MC, LB and FY contributed to the study design, funding acquisition, data collection, review and editing of the manuscript. All authors read and approved the final manuscript.

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Data availability

The datasets generated and/or analysed during the current study are not publicly available due to privacy considerations as they may contain potentially identifiable information about participants but are available from the corresponding author (yangfan512@njmu.edu.cn) on reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the Jiangsu Provincial Health Development Research Center (Approval No. SC-08/2023NL11) on November 23, 2023. All procedures performed in this study were in accordance with the ethical standards of the Declaration of Helsinki. Informed consent was obtained electronically from all participants. Prior to the survey, participants were informed about the study aims and the measures for ensuring confidentiality. Consent was confirmed via a mandatory question; only those who selected "Yes" to participate could proceed to the survey.

questions. Participation was voluntary, and respondents could withdraw at any time by closing the browser without any consequence.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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