ORIGINAL ARTICLE

Economic resources, childcare services, and son preference: a conjoint analysis of fertility potential in China

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Abstract

Using a randomized experiment that we designed for the 2021 Chinese General Social Survey, this study conducts a conjoint analysis to explore the fertility potential among Chinese adults. We examine the separate impacts of different factors and their heterogeneity across social groups. The results suggest that fertility potential is context-dependent. In addition, greater economic resources and availability of childcare significantly increase fertility potential. However, preferences in terms of the care provider, family versus the market, vary by gender, educational level, and desired number of children. Notably, we also find that son preference no longer has a significant effect on fertility potential in China. In light of China's current low fertility, our study suggests that childbearing behavior will become increasingly differentiated by socioeconomic status. Fertility-enhancing policies should focus on supplementing economic resources and improving access to childcare.

Keywords Fertility potential · Randomized experiment · Economic resources · Childcare services · Son preference

1 Introduction

China began to implement the "Three-Child Policy" and accompanying measures in June 2021 in response to its low fertility since the cessation of the "One-Child Policy" in 2016 (Zhai & Jin, 2023). Although the introduction of the new policy has provided greater space to meet the diverse reproductive needs of different social groups (Chen, 2021a, 2021b, 2023), recent studies suggest that fertility intention

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remains at a low level (Song & Zheng, 2021). Therefore, identifying which policy factors can promote China's fertility rate is of both practical and theoretical significance.

Fertility is the behavioral outcome (achieved fertility) of a psychological state (fertility ideals) (Ajzen & Klobas, 2013; Gu, 2011). Therefore, understanding fertility attitudes and norms should help predict future changes in fertility levels. In most surveys and empirical studies, fertility attitudes and norms are regarded as "fixed". In other words, it is a near consensus that an individual has only one ideal number of children at any given point in time. However, since fertility norms are affected by social environment and individual factors (Yu et al., 2021), when answering questions measuring fertility attitudes in social surveys, different individuals may hold different psychological predispositions and give fluid responses.

For example, when answering a question about desired family size, some individuals may base their responses on the majority of society, some may refer to only their surrounding social groups, and some may only respond on the basis of their own conditions. Simply put, an individual's views on fertility may not be stable and rather will change according to the combinations of different situations and factors that they take into account. Therefore, this study endeavors to reveal the variability in individuals' fertility attitudes and norms under different contexts, which will also help further our understanding of the mechanisms in the formation of fertility norms.

If individuals' fertility attitudes and norms are variable, what factors are associated with them? While many studies have analyzed the influence of different social determinants on childbearing attitudes and behaviors, the significance of childbearing for families—that is, is it an act of "investment" or "consumption"?—remains undetermined. If people expect to obtain returns from the "investment" of having children (Cleland & Wilson, 1987), such as increasing the family's labor force or meeting the need for elderly care in the future, then the demand for children will be lower for families with better economic status and more secure lives, while families with worse financial conditions will have more children so as to obtain needed returns. However, when children are considered consumer goods, fertility behavior will be directly constrained by family economic resources, and families with more resources will be more likely to have more children (Becker & Tomes, 1976).

Due to economic development, the establishment of a nationwide social security system, and the implementation of the family planning policy, traditional fertility values such as "raising children to provide for one's old age" (*yang'er fanglao*) and "more children, more happiness" (*duo zi duo fu*) have eroded in China. In addition, with the rising costs of childbirth, parenting, and education, it is likely that children have transformed from an investment good into a consumer good. Hence, this study will provide empirical evidence pertaining to the significance of childbearing for Chinese families by estimating how fertility attitudes and norms change with economic resources.

In addition to economic resources, past research has also explored the fertility-enhancing effects of maternity benefits, maternity leave, childcare services, and other support factors. However, based on cross-sectional observational data, researchers have compared differences between different groups, making it difficult to establish

the causal link between resources or policies and fertility. Capitalizing on a survey experiment, this study will estimate the causal effects of economic resources and access to support services at the individual level, which will be informative for the design and implementation of fertility-promoting policies in China. Additionally, although the family planning policy and socioeconomic development have gradually weakened the preference for sons in Chinese families (Hou et al., 2020), with the relaxation of the family planning policy, whether son preference continues to influence fertility decisions requires further analysis.

Using conjoint analysis based on a randomized experimental design, we employ the concept of fertility potential to capture fertility norms and examine factors influencing fertility. In this study, fertility potential is a relatively narrow concept that mainly refers to elasticity in people's fertility ideals and attitudes, rather than their ability to transform fertility intentions into fertility behaviors according to their physical, material, and other conditions. Specifically, in this study, fertility potential represents individuals' inherent fertility attitudes when faced with specific resource conditions (Karabchuk et al., 2021). It also reflects the internalization of social norms about fertility at the level of individual cognition, that is, perceptions of what fertility decisions people *should* make under different conditions. Compared with many other indicators used in past research, such as ideal number of children and fertility intention, fertility potential incorporates the varying resources and conditions faced by individuals in a randomized experiment. Reflecting the variability of fertility intentions under different resource conditions, it can also reveal the psychological mechanisms of individuals in forming fertility attitudes and norms.

In our conjoint analysis experiment, respondents were asked to rate an individual's likelihood of having children in different hypothetical situations (vignettes), and their ratings are considered as measures of fertility potential. The "anchoring vignettes" method has also been used to resolve the threshold comparability problem across different individuals (King & Wand, 2007). Moreover, compared with studies that only assess the influence of a single factor, the vignettes used in our conjoint analysis experiment are composed of multiple factors and are closer to actual social situations faced by individuals. Recent research has also adopted this method to explore how factors such as socioeconomic status, division of housework, access to childcare, and genetic diseases affect the ideal number of children and fertility intentions (Karabchuk et al., 2021; Pinar et al., 2018). Combined with experimental conjoint analysis, we can answer the question of which factors are more influential in shaping people's fertility attitudes when multiple resources and preferences are considered simultaneously (Hainmueller et al., 2014).

In summary, based on data from a conjoint analysis experiment, this article will address the following questions: (1) Does fertility potential vary at the individual level? (2) How do economic resources, childcare services, and son preference affect people's assessment of the potential for having a second and third child? (3) Are the factors influencing fertility potential heterogeneous among different social groups? The article is organized as follows: The next section reviews the existing literature and presents the analytical framework of the article; the third section introduces the data and the design of the conjoint analysis experiment; the fourth section presents

the main research results; the final section summarizes the article and discusses its policy relevance.

2 Analytical framework and research hypotheses

2.1 Variability in reproductive norms and fertility potential

An individual's attitudes toward childbearing can manifest in various forms. On the one hand, they could pertain to their own preferences and plans for childbearing, often measured by indicators such as their desired number of children and fertility intention. On the other hand, they can also encompass attitudes toward other people's childbearing behavior or the ideal family size at the societal level, which primarily reflects social fertility norms (Zheng, 2014). From the perspective of the formation of cognition processes, people's expectations and views on the fertility behaviors of others function as a "schema" guiding their own fertility planning and willingness to bear children. This is especially true for individuals who have yet to experience marriage or childbearing (Hayford, 2009). At the societal level, these expectations and attitudes are aggregated and expressed as social norms, which influence the fertility trends of a society (Bachrach & Morgan, 2015).

However, regardless of which indicator is used, previous research has implicitly assumed that individuals' fertility attitudes are fixed at the time of the survey. In other words, researchers typically collect only one response for each indicator of a respondent's fertility attitude in a given survey. In fact, people's responses to questions regarding the ideal number of children for society and other fertility norms are derived from their own understandings of abstract notions (Karabchuk et al., 2021). Consequently, different understandings may yield different answers. Previous studies have demonstrated that the formation of people's fertility norms is influenced by individual, family, cultural, institutional, and other factors. Perceptions of fertility change with the reference group. For example, when asked about the societal ideal number of children, some respondents may respond on the basis of groups to which they belong, projecting their own situation. Other respondents, however, will refer to the majority of society or some specific groups. In short, people's fertility attitudes and norms may vary when considering different factors and referring to different social groups. Therefore, we first propose the following hypothesis:

Hypothesis 1 At a given point in time, individuals' views on fertility norms vary with changes in resources and conditions.

If fertility norms are variable, we assume that the variation reflects the underlying cognitive and psychological models by which people relate their reproductive norms to other factors. In this study, we measure reproductive norms using respondents' evaluations of others' fertility potential. We define fertility potential as the tendency of individuals to change their fertility attitudes when faced with different resources availability and life conditions, reflecting the potential fertility outcomes under different scenarios. Based on different combinations of resources and conditions,

respondents can evaluate the fertility potential of others, that is, under which circumstances people should or should not have additional children. Doing so reveals the psychological mechanisms governing the formation of fertility norms.

Our approach improves on the efficiency and accuracy of traditional measurements of fertility attitudes. Recent studies have observed a diverging trend between fertility attitudes and fertility behaviors in China (Song & Alimire, 2021; Wang & Wang, 2022), indicating the limitations of traditional indicators of fertility attitudes, such as the desired number of children. Additionally, under the influence of "social desirability" and "herd mentality" (Sobotka & Beaujouan, 2014), Chinese people commonly report an ideal of two or three children in response to the current policy environment. In comparison, fertility potential, which is formed under specific conditions, measures not only fertility norms but also the variation of norms in response to situational changes; as such, it provides a more meaningful measurement of fertility intentions.

2.2 The impact of economic resources, access to childcare services, and gender preference on fertility potential

After completing the First Demographic Transition, China has entered a low-fertility regime and has begun to implement policies to promote fertility (Wu, 2020; Zhai & Jin, 2023; Zheng, 2021). In this study, we identify factors that may affect fertility potential in China. First, we explore the impact of economic resources on fertility potential to address the following question: does childbearing function as investment or consumption? Although previous research has explored the influence of individual economic resources on fertility intention and behavior in China, the conclusions are not consistent. On the one hand, because the vast majority of respondents choose "one" or "two" as the ideal/desired number of children in China (Wu, 2020; Yu et al., 2021), the limited variation in the dependent variable makes it difficult to evaluate the real impact of economic resources. On the other hand, since reproductive behavior is restricted by multiple factors such as physiology, technology, and policy, it may diverge from fertility attitudes. For example, even if individuals regard childbearing as an act of consumption and wish to have fewer children, without access to contraception childbearing may still occur. Similarly, some individuals regard childbearing as an investment but do not realize their fertility intention under the constraints of family planning policy or biological conditions. In contrast, the conjoint analysis of other people's fertility potential under different combinations of conditions can help estimate the causal effect of economic resources, thereby identifying the function of childbearing at the level of fertility norms in China.

In traditional Chinese society, the family was the primary unit of economic production. Having more children could improve a family's financial conditions by satisfying the labor force required for farming (Yu & Xie, 2022). Furthermore, in the absence of a social welfare system, parents would rely on their children when they become incapable of working. Having more children meant more security in one's old age. In that case, reproduction was an investment in the future, and children were regarded as an "investment good" (Ehrlich & Lui, 1991). However, alongside

socioeconomic development and cultural change, economic production, social security systems, and the rising costs of raising children have transformed the significance of childbirth for families. According to family economics theory (Becker & Tomes, 1976), children are durable consumer goods for the family, and their price includes parenting costs, time costs, and opportunity costs borne by parents who leave the workforce to raise children. Along with China's industrialization and modernization, the connotations of childbearing in family decision making have also changed. On the one hand, the establishment of the social security system has made individuals' pension resources more abundant (Ruan et al., 2021), reducing parents' reliance on their children for elderly care (Wang, 2016). As a result, the investment connotations of childbearing have been weakened. On the other hand, the costs of childbearing, childrearing, and education have been rising in China, leading to a decline in the economic benefits of having children. Several studies have shown that fertility is increasingly constrained by cost (e.g., Zhou & Yu, 2023; Zhuang et al., 2021). In particular, women, as the main bearers of the burden of childbearing, bear prominent care burdens and opportunity costs (Yu & Xie, 2018). Moreover, in China families are often expected to cover the costs of their children's marriage, which often include purchasing housing for newly married couples (Shi & Yang, 2021). Taken together, we argue that in today's China, the "investment" connotation of childbearing has gradually been replaced with that of "consumption". This also means that according to childbearing norms, the likelihood of a family having additional children depends largely on the extent of its economic resources. Therefore, the following hypothesis is proposed:

Hypothesis 2 Economic resources positively affect individuals' fertility potential.

As a collective family decision, the higher the cost, the lower the likelihood of childbearing, given the benefits remaining unchanged. If certain factors and resources can ameliorate the costs of childbearing, families will be more likely to have additional children. Previous research has shown that the cost of childcare significantly affects individuals' fertility intentions and behaviors (Fiori et al., 2013; Xue, 2016). At the family level, within-family childcare support, such as that provided by the child's grandparents, can effectively reduce the childcare responsibilities of parents of young children and increased fertility intention and achieved fertility (Fiori, 2011; Rindfuss et al., 2010; Wood & Neels, 2019). At the social level, fertility-support policies and childcare services can also effectively alleviate "work–family" conflict (Qu et al., 2022), reduce care costs, and thereby improve fertility intention, for women in particular (Li et al., 2021; Tian et al., 2020). Hence, regarding the availability of care resources, the following hypothesis is proposed:

Hypothesis 3 The more childcare resources that are available, the higher an individual's fertility potential.

Cultural preferences have long been important factors affecting fertility in China. Under the influence of Confucian culture, the continuation of the patrilineal bloodline was an important consideration. In addition, according to the traditional family

norm, sons still lived with their parents after they were married and assumed more responsibility than daughters for their parents' eldercare. The concept of "raising children to provide for one's old age" was widely accepted. Although the implementation of the family planning policy and the improvement of the social security system have weakened the traditional fertility norm of son preference (Hou et al., 2020), many empirical studies have still observed significant impacts of such a cultural preference on fertility. At the macro level, China's sex ratios at second and third parity are still unbalanced in favor of boys over girls (Jiang & Zhang, 2021); at the micro level, when the first child is a girl, families are more inclined to have a second child (Chen, 2021a, 2021b). In terms of fertility intention, son preference continues to exist, even in urban areas (Song et al., 2018). Therefore, even in the context of relaxed fertility policies, gender preference may still exert a lingering impact on fertility norms in Chinese families. We thus propose the following hypothesis:

Hypothesis 4 Under certain resource constraints, son preference will increase individual's fertility potential.

The influences of these various factors—childcare costs, socioeconomic status, economic resources, childcare services availability, and son preference—are likely to vary across social groups. Therefore, we will conduct further analysis to explore whether the effects of the above-mentioned factors vary by social groups.

2.3 Research design

In recent years researchers have increasingly studied fertility-related issues using randomized experimental research designs. Compared with traditional observational data, randomized experiments have two main advantages. First, randomized experimental methods can estimate unbiased causal effects. Limited by the length of the questionnaire and the difficulty of collecting all relevant data, it is difficult for a traditional survey to collect comprehensive information from respondents. When examining the effects of certain factors on fertility attitudes, some unobserved individual characteristics may lead to omitted-variables biases. In a randomized experiment, the influence of unobserved characteristics can be controlled, and scholars can estimate the causal effects of randomized experimental factors on fertility. Second, traditional measurements of fertility norms such as fertility intention are relatively general and abstract. As a result, it is not clear whether respondents have consistent understandings of survey questions or what factors are taken into account when responding to survey questions. In a randomized experiment combined with hypothetical scenarios, respondents are likely to consider only the conditions provided in the experiment, increasing the comparability of responses.

A recent study on Japan randomly assigned different hypothetical family policies to respondents in order to estimate the impact of awareness of family policies on people's willingness to marry and have children (Gong & Wang, 2022). In addition, Lappegår et al. (2022) randomly presented negative and positive economic prospects to Norwegian and Italian respondents and then asked about their fertility intentions, in order to understand how macroeconomic conditions affected their likelihood of

having children. Marshall and Shepherd (2018) used a randomized experiment that presented female college students in the US with statements related to career expectations and economic pressures before asking about their fertility intentions and analyzed the impact of these factors on groups with different religious beliefs. Karabchuk et al. (2021) used a conjoint analysis experiment to investigate how couples' socioeconomic status, division of housework, access to childcare, and other factors affected the ideal number of children of highly educated young people in Germany, Japan, Russia, the United Arab Emirates, and Ukraine.

In the Chinese context, some scholars have used randomized experiments in recent years to explore how fertility attitudes are affected by factors such as age of childbearing, government policies, and public opinion. Xing et al. (2019) conducted an experiment involving 151 Chinese childless female college students and found that perceived proximity to one's "childbearing deadline" increases unmarried women's desired number of children. Using an online survey, Zhang et al. (2021) randomly presented information on different policies and news to 303 respondents and found that family-oriented propaganda and fertility-incentivizing policies can significantly enhance willingness to have children. Other studies, instead of directly conducting experiments on fertility attitudes, have adopted a choice experiment method to explore the relationship between fertility and demand for infant care and childcare services and preferences for childbearing partner (Gao et al., 2020; Zhou & Yu, 2023).

Despite the abundant explorations of fertility using randomized experimental methods, there are several limitations of this approach. First, most previous studies based on randomized experiments only consider a single dimension. Usually, two or more values of the single factor are randomly assigned to the control group and the treatment group so that the influence of the single factor on people's fertility attitudes is ascertained by comparing the two groups. In comparison, this study's conjoint analysis design with multiple dimensions enables us to estimate the effects of different factors simultaneously. Second, most previous studies with experimental designs have used non-random samples or are only based on selected regions, resulting in limitations in external validity. In this study, this shortcoming is resolved by incorporating a randomized experiment module into a nationally representative social survey.

Therefore, drawing on the conjoint analysis method based on stated preference (Hainmueller et al., 2014), we explore the respondents' assessments of the likelihood of childbearing under different scenarios, which are combinations of different conditions in multiple dimensions that are of interest to our study. In a conjoint analysis design, respondents may assess their own behavioral preferences in a hypothetical situation or judge the tendencies of other people. Since fertility is limited by factors such as gender, age, and marital status, if the interviewees are asked to judge their own fertility potential in a hypothetical scenario, some would not be able to make an objective judgment due to the influence of personal factors. Therefore, this study uses the latter approach by asking respondents to assess the fertility potential of others so as to understand which factors are more important in affecting fertility norms.
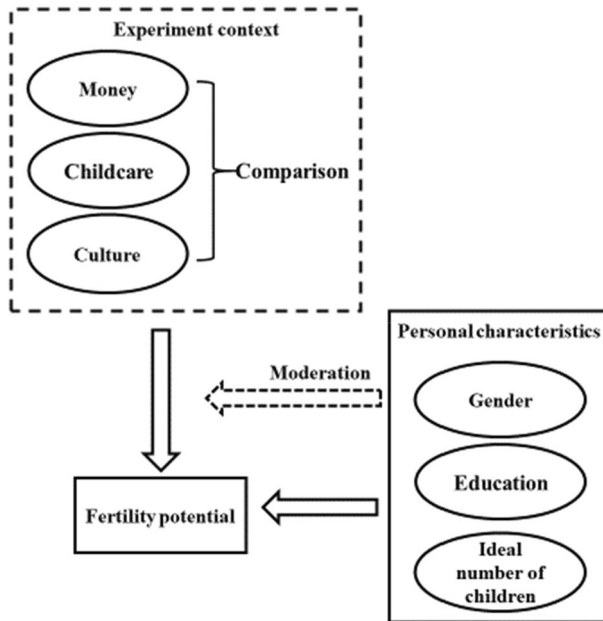
Fig. 1 Diagram of the analytical pathways

To sum up, the analytical framework of this study is shown in Fig. 1. We aim to reveal the changing patterns of fertility potential through a randomized experiment and explore relevant factors influencing fertility potential. In the randomized experimental scenarios, factors such as economic resources, childcare service availability, and the gender composition of existing children will be randomly assigned to compose a hypothetical profile. We will also estimate how personal characteristics such as gender, education, and fertility intention moderate the effects of the experimental factors on fertility potential.

3 Data and methods

3.1 Data

The data used in this study are drawn from 2021 the Chinese General Social Survey (CGSS 2021), implemented by the China Survey and Data Center of Renmin University of China. The Chinese General Social Survey was launched in 2003. It is China's longest nationally representative, comprehensive, and continuous survey project. CGSS 2021 covers various aspects of the individual and family information of the respondents, with a total sample of 8148 people. In the fertility intention module, we designed a conjoint analysis experiment to explore fertility potential. To our knowledge, it is also the first randomized experiment on fertility to be implemented in a nationally representative survey worldwide.

All respondents of CGSS 2021 participated in the experiment. We limit the analytic sample to adults aged 18–50. Although most research on fertility intention has primarily focused on reproductive-age women, we extend our exploration of fertility potential to men. As shown by previous studies, the fertility decision is jointly made by the husband and wife, and their fertility attitudes may affect each other (Qian & Jin, 2018). To gain a more inclusive understanding of fertility norms in China, our study explores both men's and women's evaluation of fertility potential. Moreover, the lower age limit of our sample is 18 years old, because CGSS only includes adult respondents. Following the practice of the 2020 China Census, we use 50 years old as the upper limit of the sample age. As a result, we do not follow the traditional definition of women's reproductive age, i.e., 15–49 years old. After excluding missing values, the final analyses of second-child and third-child fertility potential include 3119 and 3137 respondents, respectively.

3.2 Experimental methods

The randomized experiment in the CGSS2021 module on fertility intention adopted a stated preference design. Traditional observational surveys usually capture revealed preference, which reflects preferences that respondents have manifested through behaviors that have occurred. For example, in traditional fertility surveys, researchers learn about the characteristics of people who have given birth to two or three children, but they cannot accurately infer whether these characteristics are causally associated with giving birth to two or three children. A stated preference design helps to resolve this problem. By creating and assigning different hypothetical scenarios (vignettes), we can measure the unrevealed preferences of respondents in different experimental conditions and uncover potential cognitive and psychological patterns informing fertility norms (Johnston et al., 2017). Such a deeper understanding of the social determinants of fertility potential can help with the design and ex ante evaluation of public policies.

3.2.1 Experimental design

In our conjoint analysis experiment, we created vignettes with four dimensions: family annual income, availability of childcare from within the family (or "family childcare"), access to marketized childcare services, and gender composition of existing children. The "family annual income" factor reflects economic resources; "family childcare assistance" and "marketized childcare services" indicate the availability of care resources, which are directly related to fertility-support policies. We include the "gender composition of existing children" dimension to capture the potential effects of son preference.

The values of the four factors are shown in Table 1. According to the different values for the gender composition of existing children, in the second-child fertility

Table 1 Values of the factors in the vignettes

Factor	Values
Family annual income	50,000 yuan/150,000 yuan/500,000 yuan
Family childcare support	No family childcare support (parents care for child themselves)/ available family childcare support (grandparents or grandparents-in-law help care for children)
Marketized childcare services	There are low-cost, high-quality private kindergartens and nurseries close to home/only high- cost public or private kindergartens and nurseries close to home/low-cost, high-quality public kindergartens and nurseries close to home
Gender composition of existing child	Second-child fertility potential: already has a daughter/already has a son
	Third-child fertility potential: already has two sons/already has two daughters/already has a son and a daughter

potential experiment there are a total of 36 ($3\times2\times3\times2$) vignettes; in the third-child fertility potential experiment there are a total of 54 ($3\times2\times3\times3$) vignettes. In the fertility intention module of CGSS 2021, the vignettes were first generated and numbered based on the 36 and 54 potential combinations of the two experiments respectively. During the survey, the Computer-Assisted Personal Interviewing (CAPI) system generated random numbers, and then retrieved specific vignettes accordingly to display three questions: two questions about the potential for having a second child and one question about the potential for having a third child. Each respondent assessed the likelihood that the individual in the vignette should have a second or third child based on the specific situation. Figure 2 shows a random experimental question.

In the second-child-potential experiment, the percentages of the 36 vignettes was assigned varied from 2.2 to 3.2%, with a mean of 2.8%; in the third-child-potential experiment, the percentage of the 54 vignettes varied between 1.4 and 2.5%; the mean was 1.9%. To verify randomness in vignette assignments, we regressed each experimental variable on four important characteristics of the respondents: gender, age, education, and *hukou* (household registration) status. The coefficients were all insignificant, confirming the randomness of the assignment of the vignettes.

3.2.2 Variables

The dependent variable in this study is second-/third-child fertility potential, that is, the respondent's assessment of the likelihood of having a second/third child in the vignette. The rating range was 1–5 points. The higher the score, the greater the fertility potential. In order to interpret the results more intuitively, the scores are converted into continuous variables from 0 to 1 in subsequent analyses. Scores 1, 2, 3, 4, and 5 correspond to 0, 0.25, 0.5, 0.75, and 1 respectively.

Regarding the experimental variables, annual household income is a continuous variable, with values ranging from 50,000 to 500,000 yuan (in regression analyses, units of 100,000 yuan are used). Availability of family childcare

support is a dichotomous variable: 0 if parents take care of children themselves without the assistance of other family members, and 1 if their parents or parents-in-law help take care of the children. Access to marketized childcare services is a categorical variable: (1) there are low-cost, high-quality private kindergartens and nurseries close to home; (2) there are only high-cost public or private kindergartens and nurseries close to home; and (3) there are low-cost, high-quality public kindergartens and nurseries close to home. The gender of existing children is a categorical variable. In the assessment of second-child fertility potential, it is divided into two categories: those who already have a daughter and those who already have a son. In measuring third-child fertility potential, there are three categories: those who already have two sons, those who already have two daughters, and those who already have one son and one daughter.

In line with existing research, we also control the respondent's characteristics, including gender, education, logged personal annual income, *hukou* status, age, age squared, number of existing children, ideal number of children, and marital status. We also include province fixed effects.

3.2.3 Empirical strategy

In order to explore whether fertility potential is variable under different reference scenarios, we conduct analysis of variance (ANOVA). We then estimate the effects of economic resources, access to childcare, and gender preferences on fertility potential. By using the survey experiment method, randomization eliminates the possibility of confounding and thus allows for unbiased causal inference (Wang & Wang, 2022). In conjoint analysis experiments, unbiased effects of different factors can be estimated through OLS regression if the following conditions are met (Hainmueller et al., 2014): (1) In rating equivalent vignettes, respondents' ratings remain stable (no carryover effects) across each choice task and treatments given to a respondent in their other choice tasks do not affect their response in the current task; (2) the order in which different vignettes appear in the survey will not affect the respondent's rating (no ordering effects); (3) the assigned values of different factors in each vignette are completely random; (4) the value of a certain factor in the vignette is independent of the values of the other factors. Given the random design of the study, assumptions (3) and (4) are satisfied. For assumptions (1) and (2), responses to the first vignette should be satisfied. Thus, we analyze responses to the first vignette as a robustness check.

To sum up, this study uses OLS regression to estimate the causal effects of economic resources, access to childcare, and gender preferences on fertility potential. In the measurement of second-child fertility potential, since the respondents responded to two different random vignettes each, it is also possible to compare the two responses and consider the one with the higher score as the respondent's "choice", which resembles a discrete-choice experiment. Thus, we conducted a robustness check using a conditional logit model.

Another advantage of the conjoint analysis experiment is that with price factors added to the vignettes, we can calculate the respondent's "willingness to pay" (WTP) for different factors by comparing the effects of the price factor with other factors, thereby measuring the monetary value of different factors (Telser & Zweifel,

Ms. Wang, 32 years old, already has a daughter. Based on the circumstance given below, assess the likelihood she should have a second child. Assign a score of 1-5 (1=definitely should not have another child; 5=definitely should have another child).

Condition:

Family annual income	150,000 yuan
Availability of family childcare support	Parents or parents-in-law help with childcare
Access to marketized childcare	There are only high-cost public or private kindergartens and nurseries locally

Rating:

1	2	3	4	5

Fig. 2 Example experimental question

2002). In the experimental design, we treat family annual income as the price factor, and the prices people are willing to pay for care resources and gender preferences can thus be calculated based on the regression coefficients. The WTP approach can also evaluate the economic significance of these fertility-stimulating factors in real life. Based on the estimation results, we predict the extent of changes in fertility potential for different factors, providing forward-looking and targeted evidence for future fertility policies. Finally, we divide our sample according to three individual characteristics: gender, education level, and fertility intention. We explore whether the effects of factors on fertility potential differ across social groups.

4 Research results

4.1 The variability of fertility potential

Figure 3 shows the changes in respondents' evaluation of second- and third-child fertility potential in different vignettes. Each bar represents the mean value of the respondents' ratings under a certain combination of conditions in the random experiment. The red bars show the second-child fertility potentials for all 36 vignettes. The blue bars show the third-child fertility potentials for all 54 vignettes. We ranked the combinations from lowest to greatest according to the respondents' rating of their fertility potential. In terms of assessed second-child potential, the maximum value is 0.78; the minimum value is 0.23; and the mean is 0.52, which most closely corresponds to the following combination of factors: family annual income of 150,000 yuan, no family childcare support, there are high-quality and low-cost public childcare services close to home, and the individual already has a son. The maximum value of third-child potential is 0.56; the minimum is 0.07; and the mean is 0.29, which most closely corresponds to the following combination of factors: family annual income of 150,000 yuan, no family childcare support, there are high-quality and low-cost public childcare
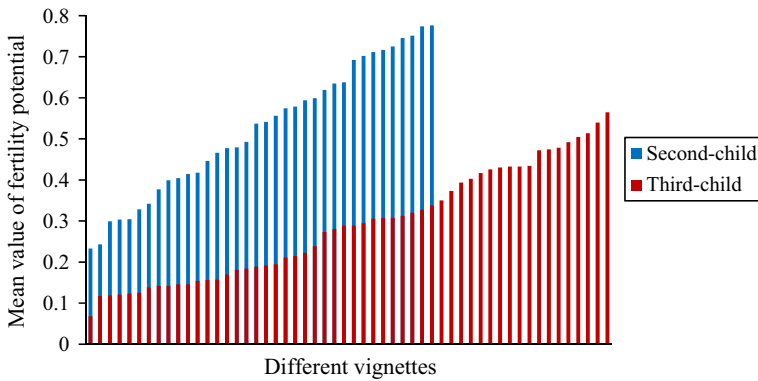
Fig. 3 The distribution for second- and third-child fertility potential. Since the vignettes for assessing second- and third-child potential were different, the overlapping parts in the figure do not mean that the same vignettes were used for the calculation of the potential for second and third children. For visual simplicity, this figure overlaps the two histograms to a certain extent

Table 2 ANOVA results for second- and third-child fertility potential

	Between-group difference	Within-group difference	R-squared	F value	P value
Panel A: Second-child potential					
Family annual income	132.603	605.528	0.180	682.69	<0.001
Family childcare support	11.179	726.953	0.015	95.89	<0.001
Marketized childcare service	12.274	725.858	0.017	52.72	<0.001
Gender composition of existing children	0.090	738.042	0.000	0.76	0.3828
Overall	155.854	582.278	0.211	277.97	<0.001
Panel B: Third-child potential					
Family annual income	49.598	289.398	0.146	268.56	<0.001
Family childcare support	1.768	337.228	0.005	16.43	<0.001
Marketized childcare service	1.710	337.286	0.005	7.94	<0.001
Gender composition of existing children	0.207	338.789	0.001	0.96	0.3843
Overall	53.221	285.775	0.157	83.25	<0.001

services close to home, and the individual already has one son and one daughter. Hypothesis 1 is supported by the results in Fig. 3. By showing that the respondents' ratings of fertility potential are different under different resource level and conditions, we verify the variability of fertility attitudes.

Based on the fertility potential values in different scenarios, we conducted variance analysis of the four experimental dimensions. The results are shown in Table 2. We can see that in terms of second- and third-child fertility potential, the differences between ratings are significant at the 0.001 level. Furthermore, the results of single-factor analyses for family annual income, family childcare

support, and marketized childcare services are all significant at the 0.001 level, showing that the fertility potential ratings vary by different values of the three factors. Our results reveal the variability of fertility norms at the personal level, and Hypothesis 1 is supported in terms of the potential for having a second/third child.

4.2 Factors inducing fertility potential

4.2.1 Estimates of factors influencing second- and third-child fertility potential

Table 3 shows the OLS regression results of factors affecting second-child fertility potential. Model 1 is the baseline model, which only includes the four experimental factors. Model 2 further includes the control variables. Comparing Model 2 and Model 1, we can see that the size and significance of the coefficients of the experimental factors do not change substantially after controlling for personal characteristics, which confirms the validity of the random experiment in this study. To compare the importance of the different experimental factors, standardized regression coefficients based on the results in Model 2 are provided in Table 3. The regression results show that higher family annual income, availability of family childcare support, and the availability of low-cost childcare services near the home lead to a higher potential for having a second child. Specifically, every 100,000-yuan increase in family annual income brings about a 0.07-point increase in the second-child-potential score when holding other factors constant, supporting Hypothesis 2. Compared to individuals without access to family childcare, the availability of family childcare increases the second-child-potential score by 0.088 point. Compared with only high-cost childcare services being available near the home, local access to low-cost public and private childcare services increases the second-child-potential score by about 0.097 point. Therefore, Hypothesis 3 is supported for second-child potential. Comparison of the standardized regression coefficients shows that access to marketized childcare services is more impactful than access to family childcare support on the potential for having a second child. The effect of the gender of the existing child on second-child fertility potential is not significant, that is, Hypothesis 4 is not supported, which means that under certain resource constraints son preference no longer affects people's evaluation of the possibility of having a second child.

Table 4 shows the OLS regression results of factors affecting third-child fertility potential, with Models 1 and 2 that are parallel to those in Table 3. The standardized regression coefficients based on Model 2 of Table 4 are also provided. For every 100,000-yuan increase in family annual income, the third-child-potential score increases by approximately 0.06 point. Thus Hypothesis 2 is supported for both second- and third-child fertility potential. In terms of the coefficients of access to childcare resources, the directions of the variables are the same for having a second child and a third child, but the magnitudes of the effects are different. The inducement effects of family childcare support and marketized childcare services are reduced for third-child potential. Access to family childcare support increases the

Table 3 OLS regression results of factors influencing second-child fertility potential

Variables	Model 1 Baseline model Second-child potential	Model 2 Baseline model + controls Second-child potential	Model 2 Standardized coefficient Second-child potential
Experimental factors			
Family annual income (100,000 yuan)	0.070***	0.070***	0.393
	(0.002)	(0.002)	
Availability of family childcare support (RG: No)			
Yes	0.091***	0.088***	0.127
	(0.009)	(0.008)	
Marketized childcare services (RG: Hhigh-cost public and private)			
Low-cost public	0.096***	0.097***	0.133
	(0.010)	(0.010)	
Low-cost private	0.094***	0.097***	0.132
	(0.011)	(0.011)	
Gender composition of existing child (RG: One son)			
One daughter	− 0.007	− 0.003	− 0.005
	(0.009)	(0.008)	
Respondent's characteristics			
Gender (RG: Male)			
Female		− 0.009	− 0.013
		(0.011)	
Educational level (RG: Junior high school or below)			
Senior high school		− 0.021	− 0.025
		(0.014)	
Junior college		− 0.023	− 0.023
		(0.017)	

Table 3 (continued)

Variables	Model 1 Baseline model Second-child potential	Model 2 Baseline model + controls Second-child potential	Model 2 Standardized coefficient Second-child potential
Bachelor's degree and above		−0.062*** (0.016)	−0.075
Logged personal annual income		−0.002 (0.001)	−0.020
Hukou status (RG: Agricultural)			
Urban		0.001 (0.011)	0.001
Age		0.006 (0.005)	0.158
Age-squared		−0.000 (0.000)	−0.082
No. of children at present		−0.001 (0.007)	−0.002
Ideal no. of children		0.055*** (0.007)	0.111
Marital status (RG: never married)			
Married		0.007 (0.019)	0.009
Divorced		−0.069* (0.032)	−0.030
Cohabiting		−0.042 (0.029)	−0.022

Table 3 (continued)

Variables	Model 1	Model 2	Model 2
	Baseline model	Baseline model + controls	Standardized coefficient
	Second-child potential	Second-child potential	Second-child potential
Widowed		− 0.134*	− 0.035
		(0.062)	
Province fixed effects	No	Yes	
N	6238	6238	
R^2	0.186	0.244	

***p < 0.001, **p < 0.01, * p < 0.05. Robust standard errors in brackets

Table 4 OLS regression results of factors influencing third-child fertility potential

Dependent variables	Model 1	Model 2	Model 2
	Baseline model	Baseline model + controls	Standardized coefficient
	Third-child potential	Third-child potential	Third-child potential
Experimental factors			
Family annual income (100,000 yuan)	0.062***	0.062***	0.393
	(0.003)	(0.003)	
Availability of family childcare support (RG: no)			
Yes	0.038**	0.039**	0.127
	(0.012)	(0.012)	
Marketized childcare services (RG: high-cost public and private)			
Low-cost public	0.057***	0.055***	0.133
	(0.015)	(0.015)	
Low-cost private	0.044**	0.041**	0.132
	(0.015)	(0.014)	
Gender composition of existing children (RG: Two sons)			
Two daughters	0.025	0.024	− 0.005
	(0.015)	(0.015)	
One son, one daughter	0.024	0.024	
	(0.015)	(0.015)	
Respondent's characteristics			
Gender (RG: Male)			
Female		− 0.026*	− 0.013
		(0.013)	
Educational level (RG: Junior high school or below)			
Senior high school		− 0.044*	− 0.025
		(0.017)	− 0.023

Table 4 (continued)

Dependent variables	Model 1 Baseline model Third-child potential	Model 2 Baseline model + controls Third-child potential	Model 2 Standardized coefficient Third-child potential
Junior college		− 0.040* (0.020)	− 0.075
Bachelor's degree and above		− 0.038 (0.020)	− 0.020
Logged personal annual income		0.002 (0.001)	0.001
Hukou status (RG: Agricultural)			
Urban		− 0.004 (0.014)	0.158
Age		− 0.003 (0.007)	− 0.082
Age-squared		0.000 (0.000)	− 0.002
No. of children at present		− 0.009 (0.009)	0.111
Ideal no. of children		0.039*** (0.009)	0.009
Marital status (RG: Never married)			
Married		− 0.023 (0.024)	− 0.030
Divorced		− 0.062 (0.039)	− 0.022

Table 4 (continued)

Dependent variables	Model 1	Model 2	Model 2
	Baseline model	Baseline model+controls	Standardized coefficient
	Third-child potential	Third-child potential	Third-child potential
Cohabiting		− 0.086*	− 0.035
		(0.037)	
Widowed		− 0.117	
		(0.061)	
Province fixed effects	No	Yes	
N	3137	3137	
R^2	0.139	0.168	

***p<0.001, **p<0.01, *p<0.05. Robust standard errors in brackets

Table 5 Willingness to pay for different experimental factors (unit: 10,000 yuan)

	Second-child potential	Third-child potential
Availability of family childcare support		
Yes	12.5	6.29
Marketized childcare		
Low-cost public	13.86	8.87
Low-cost private	13.86	6.61
Gender composition of existing children		
One daughter	− 0.46#	/
Two daughters	/	3.87#
One son, one daughter	/	3.87#

"#" indicates that the result is not statistically significant

third-child-potential score by 0.04 point; the access to low-cost public childcare service near the home increases the score by about 0.06 point; access to low-cost private childcare service near the home increases the score by about 0.04 point. Therefore, Hypothesis 3 is supported for third-child potential. With regards to third-child potential, Hypothesis 4 is once again not supported as the gender structure of the existing children has no significant impact.

In summary, the results of the evaluations of second- and third-child fertility potential support Hypotheses 2 and 3, that is, both additional economic resources and greater access to childcare services significantly increase fertility potential. Regarding childcare providers, both families and social institutions can enhance fertility potential. However, Hypothesis 4 was not supported. The gender composition of an individual's existing children does not significantly affect people's assessment of their fertility potential. In other words, according to fertility norms in today's China, son preference is no longer apparent.

4.2.2 Willingness to pay for factors influencing fertility potential

Based on the estimated results in Tables 3 and 4, we calculate willingness to pay in order to measure the importance and monetary equivalences of different factors for second- and third-child fertility potential. The results are shown in Table 5. First, in terms of second-child fertility potential, the inducement effect of access to family childcare support is equivalent to an increase in the family annual income of 125,000 yuan; in terms of third-child fertility potential, the inducement effect is only equivalent to an increase of around 63,000 yuan. Second, compared to family childcare support, individuals have a higher willingness to pay for low-cost childcare services. However, there was no notable difference in preference between public and private childcare institutions. For the second-child potential, respondents perceive that access to low-cost childcare services, public
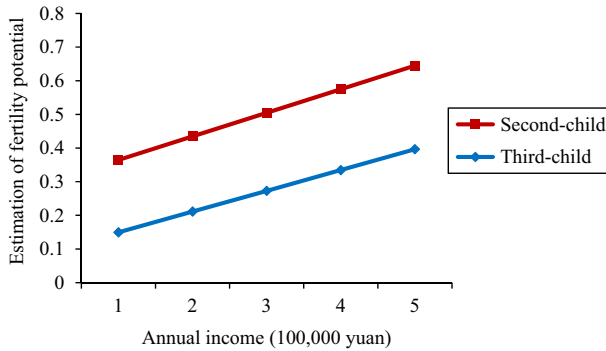
Fig. 4 Estimated effects of family annual income on second-/third-child potential. The values of other experimental factors are set as follows: availability of family childcare support = no; marketized childcare services = high-cost public and private; gender composition of existing children = one son (second-child potential)/two sons (third-child potential). For the control variables, the continuous variables take the mean value and the categorical variables take the value of the reference group

or private, is equivalent to an increase in family annual income of around 139,000 yuan. In other words, compared with a scenario in which only high-cost childcare institutions are available locally, if the government or private enterprises can provide lower-cost childcare services locally, the inducement effect on individual second-child fertility potential would be equivalent to an annual cash payment of 139,000 yuan. In terms of third-child fertility potential, although the availability of marketized childcare services still has a significant fertility-promoting effect, the willingness to pay is significantly lower than in the case of a second child. Low-cost public and private childcare services correspond to an increase in family annual income of 88,700 and 66,100 yuan respectively, which shows that the public childcare institutions are of more economic utility than private childcare institutions when it comes to third-child fertility potential.

We further present the predicted changes in people's assessment of the potential of having a second and third child along with different factors. In Figs. 3, 4, 5, the horizontal axes show different values of the experimental factors, and the vertical axes show estimated fertility potential.

Figure 4 shows how the potential for having a second/third child changes with the family annual income. It can be seen that the marginal effect of an increase in family annual income is similar for second- and third-child fertility potential. However, it is worth noting that since third-child fertility potential is low on average, it is difficult to be lifted to a high level even with a high annual income. In the absence of family childcare support and low-cost marketized childcare services, an increase in family annual income from 100,000 to 500,000 yuan increases the second-child-potential value from 0.3 to over 0.6, but can only increase the third-child-potential value to around 0.35.

Figure 5 shows the role of family childcare support in improving second-/third-child fertility potential. As shown in the figure, when family annual income is 150,000 yuan, there are only high-cost childcare services, and the individual
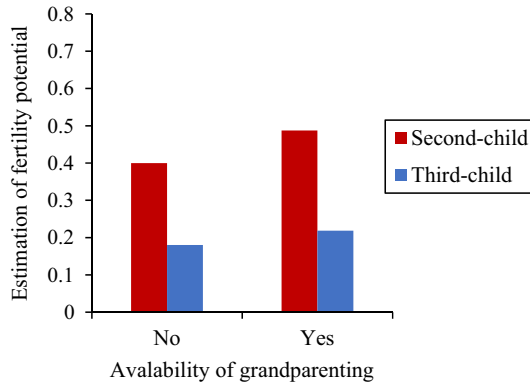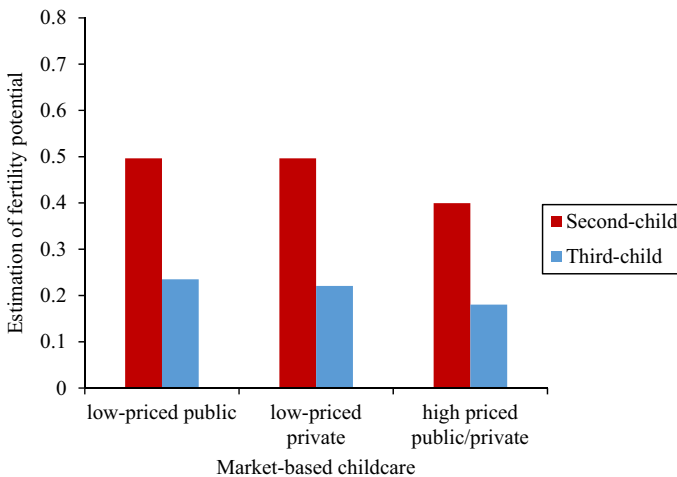
Fig. 5 Eestimated effects of family care support on second-/third-child potential. The values of other experimental factors are set as follows: family annual income = 150,000 yuan; marketized childcare services = high-cost public and private; gender composition of existing children = one son (second-child potential)/two sons (third-child potential). For the control variables, the continuous variables take the mean value and the categorical variables take the value of the reference group

Fig. 6 Estimated effects of marketized childcare on second-/third-child potential. The values of other experimental factors are set as follows: family annual income = 150,000 yuan; availability of family childcare support = no; gender composition of existing children = one son (second-child potential)/two sons (third-child potential). For the control variables, the continuous variables take the mean value and the categorical variables take the value of the reference group

already has a son, the second-child-potential value for those with available family childcare support is 0.48, compared to 0.39 for those without. The effect of access to family childcare support is limited for third-child fertility potential. When family annual income is 150,000 yuan, there are only high-cost childcare services, and the individual already has two sons, the third-child-potential value can only
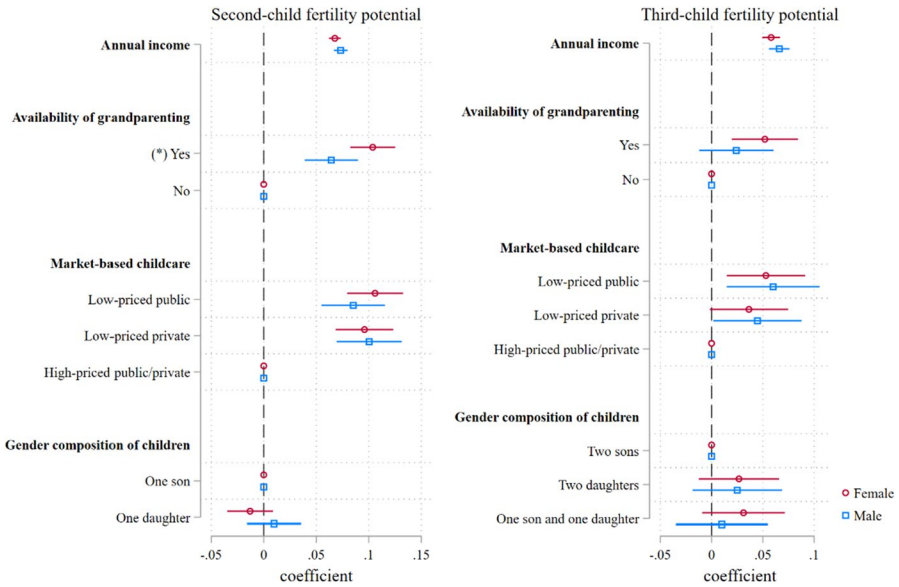
Fig. 7 Regression coefficients of factors influencing second-/third-child potential by gender. The points represent the coefficient values and the lines represent the 95% confidence intervals. A point without lines indicates that this is the reference group for that factor

be slighted improved by the availability of family childcare support, remaining at around 0.2.

Similarly, Fig. 6 shows the impact of access to marketized childcare services on fertility potential. When a family has an annual income of 150,000 yuan, does not have access to family childcare support, and already has a son, having access to low-cost childcare services increases the second-child-potential value by about 0.1 point. The stimulating effect of access to low-cost marketized childcare is relatively limited for third-child fertility potential, increasing the second-child-potential value by only 0.05 point. Notably, among the low-cost childcare services, the respondents showed a stronger preference for public childcare institutions, access to which increases the possibility of having a third child more than does access to private childcare institutions.

4.3 Heterogeneity in inducing factors of fertility potential across social groups

4.3.1 Gender differences

As the main bearers of the burden of childbearing, women encounter work–family conflict and parenting pressure in a more direct way. To capture the gender differences in fertility-enhancing factors, we analyze the fertility potential of men and women separately. The coefficients of regression based on male and female sub-samples are shown in Fig. 7, where dots represent the coefficient values and the
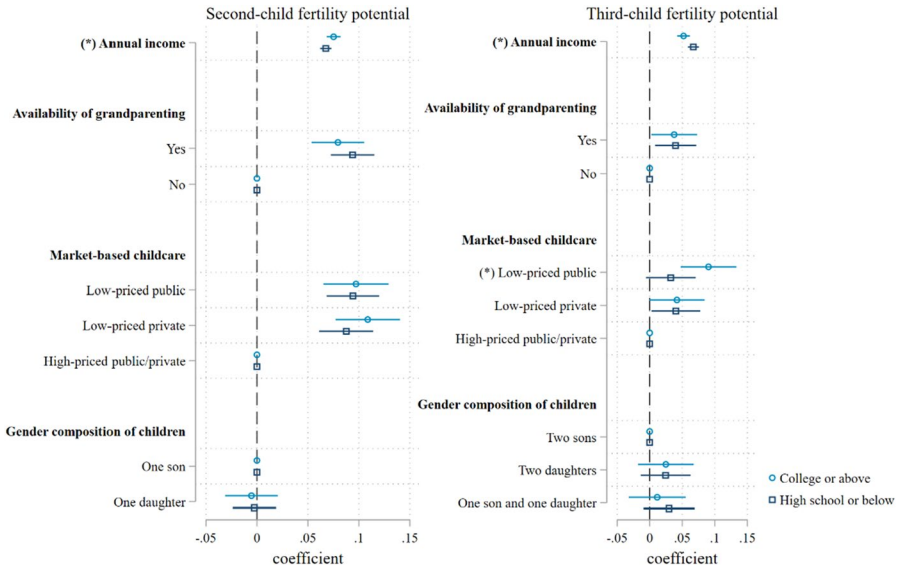
Fig. 8 Regression coefficients of factors influencing second-/third-child potential by level of education. The points represent the coefficient values and the lines represent the 95% confidence intervals. A point without lines indicates that this is the reference group for that factor

corresponding lines represent the 95% confidence intervals. For the test of differences between groups, we use seemingly unrelated regressions to test whether the differences between the coefficients of the subsamples are statistically significant. For variables with significant between-group differences, we distinguish them by marking an asterisk in front of the variable in the figure.

As shown in Fig. 7, there are no significant differences in the inducement effects of family annual income and marketized childcare service on the second-child fertility potentials of men and women. The effect of family childcare support is greater for women than for men, however. In terms of third-child fertility potential, there are no significant differences in all the four experimental factors between men and women. In general, both men and women evince a strong inducement effect from greater economic resources in the context of both second- and third-child fertility potential. The gender differences in the preference for family childcare support might be due to the gender division of labor within the family. As women shoulder more care work, they tend to place more value to family childcare than do men in the context of fertility decision-making.

4.3.2 Socioeconomic differentials

People with different socioeconomic statuses are limited by different constraints in fertility decision-making, and thus may have varying preferences for fertility-promoting resources. We use education as a proxy for individual socioeconomic status in this study. The sample is divided into two groups according to whether they had
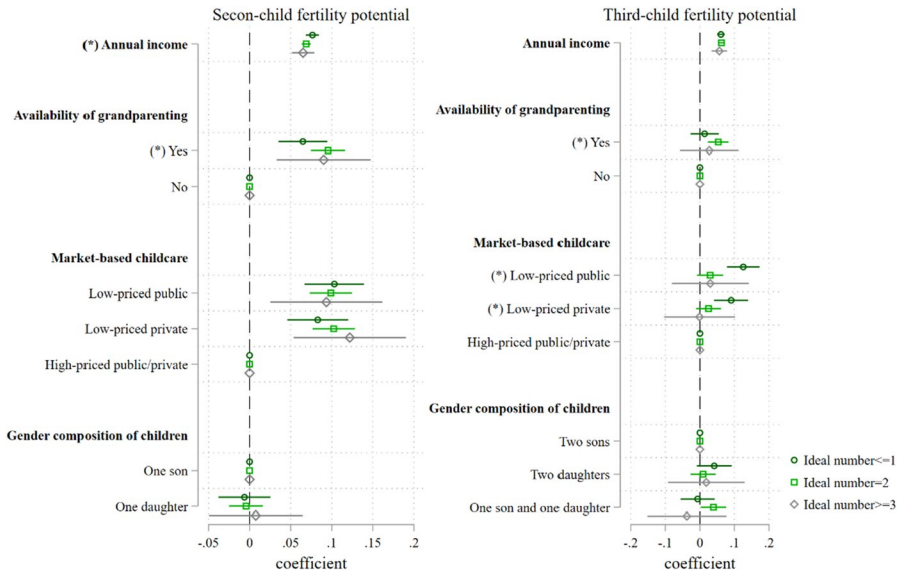
Fig. 9 Regression coefficients of factors affecting second-/third-child fertility potential by ideal number of children. The points represent the coefficient values and the lines represent the 95% confidence intervals. A point without lines indicates that this is the reference group for that factor

received higher education (that is, whether their education level was junior college or above). We estimate the effects of experimental factors on fertility potential based on the educational subsamples. The results are shown in Fig. 8.

In terms of second-child fertility potential, those with higher education place more importance on annual household income than those without higher education. However, for third-child fertility potential annual household income has a greater impact on the ratings of those without higher education. There are no significant differences in the impact of family childcare support on second- and third-child fertility potential across the two groups. Low-cost public childcare has a significantly larger effect on the assessed third-child potential of the highly educated compared to the group without higher education. Such differences may reflect cultural influences. People with lower socioeconomic status are more traditional and more likely to live in multigenerational households, leading to a stronger preference for family caregiving. In contrast, those with higher socioeconomic status are more modernized in their childcare attitudes and more adapted to market-oriented services.

4.3.3 Heterogeneities by fertility desire

The assessment of second- and third-child fertility potential also depends on respondents' own fertility desire. When respondents have a higher fertility desire, they may be more inclined to believe that others should also give birth to multiple children. According to the respondents' ideal number of children, we divide the

Table 6 Robustness check of factors affecting second-child fertility potential

Experimental factors	Conditional logit regression	OLS regression (first vignette only)
Family annual income (100,000 yuan)	0.675***	0.063***
	(0.031)	(0.003)
Availability of family childcare support (RG: No)		
Yes	0.757***	0.100***
	(0.087)	(0.012)
Marketized childcare services (RG: Hhigh-cost public and private)		
Low-cost public	0.757***	0.117***
	(0.105)	(0.015)
Low-cost private	0.809***	0.115***
	(0.107)	(0.015)
Gender composition of existing child (RG: One son)		
One daughter	− 0.018	− 0.019
	(0.087)	(0.012)
Control variables	No	Yes
N	3896	3119
Pseudo R^2	0.402	
R^2		0.239

***$p<0.001$, **$p<0.01$, *$p<0.05$. Robust standard errors in brackets

sample into three categories: "low desire" (less than or equal to 1), "medium desire" (2 children), and "high desire" (greater than or equal to 3). We apply regression analyses to the three subsamples, and the results are as shown in Fig. 9.

In assessing the potential for having a second child, annual family income has a greater impact on the low-desire group than on the medium- and high-desire groups. Compared with the low-desire group, within-family care has a larger impact on the medium- and high-desire groups. Regarding third-child fertility potential, there are no significant differences in the fertility-enhancing effects of annual household income across the three groups. Compared with the high-desire and low-desire groups, access to within-family childcare only has a significant impact on the assessment of third-child fertility potential for the medium-desire group. Low-cost public and private childcare services only have a significant effect on improving the assessed third-child fertility potential for the low-desire group.

4.4 Robustness check

As mentioned above, in our experimental design, in assessing second-child fertility potential each respondent evaluated two vignettes. Such a design allows for converting the conjoint analysis experiment into a discrete-choice experiment, which can be analyzed with a conditional logit model. Specifically, the vignette with the higher

rating is regarded as the respondent's "choice" among the two (if the ratings of the two vignettes are the same, the respondent is treated as not having made a choice, and the observation is excluded from the analysis). In a conditional logit model, because individual invariant factors are controlled, only the experimental variables need to be considered. The regression results, shown in Table 6, are consistent with the results of the conjoint analysis experiment. Family annual income, family childcare, and marketized childcare services all have a significant positive effect on fertility potential, while the gender of the individual's existing children has no significant effect.

In addition, we limit the analysis of second-child fertility potential to the respondents' answers for the first vignette in order to remove the carryover effect. As shown in Table 6, the OLS regression results are similar to the results in Model 2 of Table 3, supporting our main conclusions.

We also adopt different specifications of our dependent variable, i.e., the assessed fertility potential. First, the ratings of fertility potential were treated as ordinal variables, and an ordered logit model was used for analysis. Second, the fertility potential assessments were divided into two categories: high potential (greater than or equal to 0.75) and low potential (less than 0.75), and a logit model was used for analysis. In both robustness checks, the significance of the experimental factors and the direction of coefficients remain similar to the main results in Table 3 and Table 4. The results are not shown but are available upon request.

5 Discussion and conclusion

In order to gain a deeper understanding of China's fertility norms and fertility-enhancing factors, we use data from our conjoint analysis experiment in the 2021 China General Social Survey to explore people's assessment of the second- and third-child fertility potential of others.

First, the results reveal that fertility norms are indeed variable at the individual level. That is, under different external resource conditions, people's assessment of others' fertility potential will vary. Specifically, at the cognitive level, people's attitudes about how many children one should have and the likelihood of having children are shaped by underlying psychological schema; as a result, such attitudes vary across hypothetical scenarios and reference groups. We are not able to understand the situational diversity and variability of fertility norms and attitudes with traditional survey measurements. Therefore, future research on fertility attitudes and norms may benefit from adopting randomized experiments, anchoring vignettes, and other newly developed methods to better reveal the formation processes of and inner psychological mechanisms governing people's fertility concepts.

The analysis of the determinants of fertility potential shows that family annual income has a significant promoting effect on second- and third-child fertility potential, which is in line with the results of previous studies (Karabchuk et al., 2021). Moreover, the causal effect of family annual income is consistent across groups with different levels of education and fertility intentions. Our findings suggest that the function of childbearing has undergone a fundamental change in Chinese families.

Children are now regarded as a "consumption good" rather than an "investment good". As such, fertility decisions are largely constrained by the costs of childbirth and childcare. Consequently, we expect that differentiation by socioeconomic status in regard to giving birth to more than one child will be strengthened in the future in China.

Factors related to care resources, such as availability of family childcare support and marketized childcare services, can substantially increase fertility potential, but the effect is more pronounced for the second-child potential than that of the third child. Equivalent to a substantial increase in income, local access to low-cost childcare services has a larger positive effect on second-child fertility potential than family childcare support. Our findings indicate that Chinese people now prefer low-cost and high-quality marketized childcare services to family childcare, perhaps because the intervention of grandparents may lead to conflicts between generations in raising children (Xiao, 2014). With the implementation of China's delayed retirement policy, the availability of childcare provided by grandparents has also decreased, requiring more marketized childcare services. It is worth noting that the incentivizing effect of care resources on third-child potential is less than as that of economic resources.

Our results show that the gender composition of an individual's existing children has no significant impact on people's assessment of second- and third-child fertility potential, which is inconsistent with the findings of previous studies (Chen, 2021a, 2021b). Since this study focuses on individuals' assessments of others' reproductive potential, which are more reflective of reproductive norms, the results may differ from observations of fertility behavior. Nevertheless, our findings indicate that, at the level of Chinese fertility attitudes and norms, son preference is no longer a decisive factor in having an additional child. That is, parents are no longer expected to have an additional child in order to have a son.

We also explored the heterogeneities in the perceived effects of different fertility-enhancing factors across social groups. In general, women perceive family childcare support to be more important, while men emphasize the inducement effect of economic resources. We attribute these gender differences to the gender division of labor in childbearing and parenting. In addition, the influence of fertility-supporting factors varies at second and third parity. Compared with those of lower socioeconomic status, people with higher socioeconomic status consider economic resources to be more incentivizing in terms of second-child potential and low-cost marketized childcare services to be more so for third-child potential. For those with low fertility desire, economic resources play a stronger incentivizing role in second-child fertility potential; for those with high socioeconomic status, economic resources play a larger role in third-child fertility potential. Taken together, our findings suggest that economic resource constraints are the largest barrier to realizing the birth of the second and third children.

The findings of this paper provide some insights into the development of fertility-supporting policies in China. First, policies should highlight the importance of economic resources and pay more attention to the price of marketized childcare services. As shown in this study, family annual income has a significant enhancing effect on the assessment of fertility potential across all social groups. The potential

for having a second child can be improved to quite a high level by providing more family economic resources. Therefore, increasing the disposable income of reproductive-age groups through the provision of child subsidies, tax reductions, and affordable housing will effectively alleviate the steady decline in China's fertility rate. In terms of childcare provision, the price of marketized childcare services is the primary concern of Chinese people, rather than whether the service provider is public or private. In developing a system of universal childcare services, the Chinese government should devote more effort in lowering prices and improving the quality of childcare services. Private childcare providers should also be encouraged as long as the service that they provide is of high quality.

Second, the needs of women, who primarily undertake the burden of childbearing and childrearing, should be emphasized more in formulating fertility-promoting policies. Chinese women show a stronger preference for family childcare support than men, but the implementation of the delayed retirement policy has reduced the availability of grandparental childcare. Future policies could consider flexible retirement options for elderly people who provide childcare. It is also necessary for the state to encourage men to take on more childcare responsibilities, such as by extending the duration of paid paternity leave. Moreover, the Chinese government should consider targeted policies aiming at different social groups with various needs. In addition, it would be beneficial to promote the formation of a fertility-friendly atmosphere in society and enhance the fertility willingness of groups of childbearing age. Finally, the overall low assessment of the likelihood of having a third child is closely related to the low-fertility culture that has arisen in the context of family planning. Changing the anti-natalist culture and promoting a children-and-women-friendly social environment will also help increase fertility in China.

This study also has several limitations. Because we measure individuals' assessments of others' reproductive potential, we study the cognitive process of fertility norm formation at the societal level. However, how and to what extent individuals project and transform their attitudes into their own fertility plans and behaviors requires further exploration. In addition, limited by the experimental design and sample size, we focus on factors such as income and care services, neglecting other important factors affecting fertility such as work–family conflict, fertility-friendly culture, and spousal support. While the respondents in this study rated the fertility potential of others in hypothetical scenarios, future research could set experimental scenarios for respondents' own fertility plan. The value set for the experimental factors also needs to be improved. For example, we did not specify the exact prices of "low-cost" and "high-cost" childcare services, leaving it up to the respondents to interpret themselves. In future studies, scholars may pay more attention to the elasticity between the cost of childcare services and fertility attitudes. In sum, advancements in both measurements and analytical methods are needed to achieve a better understanding of fertility potential.

Data availability The data that support the findings of this study are openly available in Chinese National Survey Data Archive at http://www.cnsda.org/.

Declarations

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