Willingness to bear the first child among the Chinese childless population: a national survey study

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Abstract

Background Having a first child is a contributing factor to having a second or third child; however, current research focuses on second and third children, and the present study aims to investigate the intention to have a first child and its main influencing factors among the childless population aged 15–49 in China, as well as analysing the influencing factors by age group.

Method As part of the 'Survey on the Psychology and Behaviour of Chinese Residents', this survey was conducted on 6941 residents aged 15–49 in 32 provinces across China. The survey was conducted from 20 June to 31 August 2022.

Result Out of 6941 respondents, the mean score of willingness to have a first child (score range: 0–100) was 42.51. 17.33% of the respondents had no willingness to have a child (0), while 9.54% had a high willingness to have a child (100). Intention to have a first child seems to peak in the age group 30–34 years ($p < 0.0001$). Being male ($p < 0.000$, OR = 0.178), having siblings ($p1 < 0.035$, OR1 = 1.324; $p2 < 0.000$, OR2 = 1.995) and good family communication ($p < 0.003$, OR = 1.023), and high self-efficacy ($p = 0.001$, OR = 1.558) were associated with higher fertility intentions. Influential factors in the lower age group (15–24 years) were mainly related to family and social support, in the 25–29 years age group they were more related to personal, family and social, while in the 30–39 years age group they were related to economic stability such as property and marital status.

Conclusions The willingness to have a child is at a low to medium level among those of childbearing age who have not had children in China. There is a need to adopt a staggered policy for the younger age group to reduce perceived economic pressure, reduce occupational pressure on the age group, and increase childcare and occupational fertility friendly environments. In addition, there is a need for multisectoral economic compensation and educational district planning to alleviate the "don't want to save" and solve the "don't dare to give birth" problem. People who have had one child are more likely to want to have a second child, so the government and society need to do more to support the desire to have a child, thereby increasing the national fertility rate.

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Introduction

Against the backdrop of today's global demographic transition, China is experiencing unprecedented demographic challenges, in particular the continued low fertility rate, which has aroused widespread concern in all sectors of society [1]. China has always attached importance to population issues, and there have been major changes in fertility policies in these seventy years: from encouraging childbearing in 1949 to controlling the birth of one child in 1979, relaxing the birth of two children in 2013, relaxing the birth of three children in 2021, and the establishment of a fertility support system since 2021. Data show (National Bureau of Statistics, 2021, 2022, 2023) [2] that China's total fertility rate has fallen from about 6 before the 1970s, to about 2 in 1990, then to about 1.5 after 2010, to only 1.16 in 2021, and or <1.1 in 2022, and that in 2023 China's population has already had two consecutive years of negative growth, with a total fertility rate of around 1.0, only half of the generation replacement level of 1 (2.1), the second lowest in the world. In the past, the fertility rate with the effect of changes in fertility policy is obvious, family planning policy population decline, two-child policy in 2016, the phenomenon of fertility accumulation, there is a short-lived fertility increase, however, the comprehensive two-child policy is less than expected, the effect of the three-child policy has not yet appeared, failed to reverse China's downward trend in the birth of the population, the effect of the birth of the pile-up has been receding, the birth of the population has fallen for 6 years in a row since 2017 [3].

Fertility intention is considered to be a central predictor of fertility behavior change during periods of low fertility [4], Studies of low-fertility countries have shown that fertility intentions have a positive impact on predicting actual fertility and tend to be higher than actual fertility, and that the likelihood of a rebound in fertility is usually very low in the case of a large decline in familiar fertility intentions, and that fertility may even decline further [5]. In addition, studies have shown a stable relationship between fertility and fertility intentions, with the average number of children born being less than 0.3% different from the initial average fertility intention [6, 7]. Fertility intentions can be used as a basis for predicting fertility and are more accurate in the short run [8]. Research on fertility intentions is therefore extremely important in times of low fertility.

Fertility intentions have been in the forefront of fertility research since the concept of 'ideal family size' was first used in an opinion poll by the American scholar George Gallup in 1936 [9].Subsequently, the ideal number of children, desired family size [10], and fertility intention or intended family size have evolved [11], in addition, the conceptual system of fertility intention also includes the timing of childbearing, gender preferences for children, and consistency of couple (partner) fertility intentions. But overall the research mainly focuses on the exploration of the number of children. For example, the 2017 China Fertility Survey of the National Health Commission and the 2019 National Population and Family Dynamics Monitoring Survey mainly investigated the ideal number of children and the intended number of children among Chinese women of childbearing age [12]. After the implementation of the universal two-child policy and three-child policy in China, most studies have focused on the willingness to have two or three children [13, 14], which helps to predict the future family size and measure the potential of population growth. However, studies investigating the average strength of fertility intentions among women of childbearing age 15–49 overestimate the fertility intentions of women of late childbearing age, and surveying women's intentions alone does not accurately predict actual behaviour. In addition, data suggest that the increased incidence of late marriage and infertility (categorised as physiological passive choice and active choice not to have children) is partly due to delayed first attempts at childbearing behavior [15]. If women delayed conception until age 35 or 40, 14 and 34.8%, respectively, would remain childless [16]. Therefore, fertility intention studies are extremely important in assessing fertility and reducing the incidence of infertility nowadays.

The core reason for the current sharp decline in fertility is the decline in the one-child fertility rate, specifically the age at first birth, which has risen to 27.9 years, and in economically developed regions such as Shanghai, where the average age at first birth in 2023 will have risen to 31.66 years [17]. Data from the Seventh National Population Census of the National Bureau of Statistics show that China's total fertility rate will be 1.3% in 2020 [18]. In addition, studies have shown that since 2012, the total fertility rate for first births has declined from 0.88 in 2011 to 0.67 in 2016, and that there have been periodic changes in the proportion of first and second births, i.e. an increase in the number of second births and a year-on-year decrease in the number of first births, and that an increase in the number of second births has mitigated the pressure of the decrease in first births resulting in fewer births [19]. With the total fertility rate declining and the proportion of two-children rising, it is particularly important to focus on the willingness of the childless population to have a first child in order to facilitate the transformation of the low fertility situation. In terms of reproductive decision-making, the transition from no children to one child is increasingly difficult, and on that basis, the progression from one to two children is equally

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challenging. Although most individuals may ultimately choose to have a first child, this decision is often delayed and more burdensome. In particular, the negative experiences of having and raising a first child, such as the stress of childcare, strained educational resources, and reduced quality of life, have been widely recognised as key factors hindering families' willingness to have further children. These negative experiences not only weaken the positive expectations of individuals as well as families in childbearing, but also may have a dampening effect on fertility intentions at the broader social level, thus exacerbating the decline in fertility indeed. Therefore, improving the environment for one-child births and enhancing the wellbeing of families has become a social issue that requires urgent attention and resolution.

Therefore, the focus of this study shifted from the number of children to the degree of willingness to have one child among the childless population nationwide. After China began to build a fertility support system, we conducted a timely national cross-sectional study to assess the strength of women's and men's fertility intentions, as well as related factors and differences between groups, to unearth the factors affecting different groups, and to make targeted policy recommendations based on the differences.

Materials and methods

Survey design, population and sampling

The data for this study came from the Psychology and Behavior Investigation of Chinese Residents database. The present study was carried out across an extensive geographical expanse within China, encompassing 148 cities, 202 districts, 390 townships, towns, and streets, as well as 780 communities and villages, between June 20th and August 31st, 2022. The survey utilized a multistage sampling strategy to guarantee the representativeness and generalizability of the accumulated data. For the first sampling stage, four directly administered municipalities (Beijing, Tianjin, Shanghai, Chongqing) were directly included in this study. All 22 provinces and 5 autonomous regions of China were encompassed. The determination of the number of cities sampled in each province or autonomous region depended on its population size. Using a random number table approach, 2–12 cities were randomly selected, resulting in a total of 148 cities. For the second sampling stage, in the sampling of cities, each city selected 6 rural communities and 4 urban communities, resulting in a total of 468 rural communities and 312 urban communities, with a total of 780 communities. For the third sampling stage, residents from each community were selected using a quota sampling method based on gender and age. This required a 1:1 gender ratio and an age distribution aligning with the

proportions from the Seventh National Population Census [20]. The detailed application of the quota method has been thoroughly documented in a preceding investigation by Wang and colleagues [21]. This study was registered in the China Clinical Trial Registry (registration no ChiCTR2200061046).

The study employed the web-based Questionnaire Star platform for questionnaire distribution. Participants were eligible if they were Chinese nationals aged 12 years or older, voluntarily participating, comprehending each questionnaire item, and completing the questionnaire independently. For those with limited mobility but intact cognitive function, investigators conducted one-on-one interviews, offering necessary assistance without influencing responses, thereby ensuring inclusivity and data integrity.

The initial PBICR survey involved 21,916 participants. The process of data filtering in this study is shown in Fig. 1, after excluding samples that didn't belong to the age bracket of the childless group (age < 14 or age > 50), those who already had one or more children, and those who had errors in logic, a total of 6,941 questionnaires were retained. Respondents were mainly in the 15–19 (33.94%), 20–24 (29.48%) and 25–29 (20.93%) age ranges, while fewer were in the 30–34 (9.58%), 35–39 (3.23%) and 40–49 (2.84%) age ranges.

Ethics approval and informed consent

This study was approved by the Ethics Research Committee of the Health Culture Research Center of Shaanxi (number JKWH-2022-02). Informed consent was obtained from all participants. All data were collected anonymously and kept confidential.

Data collection

This study aims to build on previous research by integrating variables at three levels [22, 23]: individual decision-making, family system, and macro-environment. At the level of individual decision-making, this study examined demographic characteristics (gender: male, female; age groups: 15~19, 20~24, 25~29, 30~34, 35~39, 40~49; number of siblings; occupational status: employed, student, and unemployed) as well as perceptions of resources, the latter of which were measured by the Neighborhood Self-Efficacy Scale (NGSES, which is used to measure the Theory of Planned Behavior's "perceived behavioral control") were assessed.

At the family system level, this study analyzed family structure and resources, including literacy level (junior high school and below, high school and secondary school, and college and above, reflecting the cost of education and gender role conflict [24]), type of household (agricultural or non-agricultural, reflecting the urban–rural
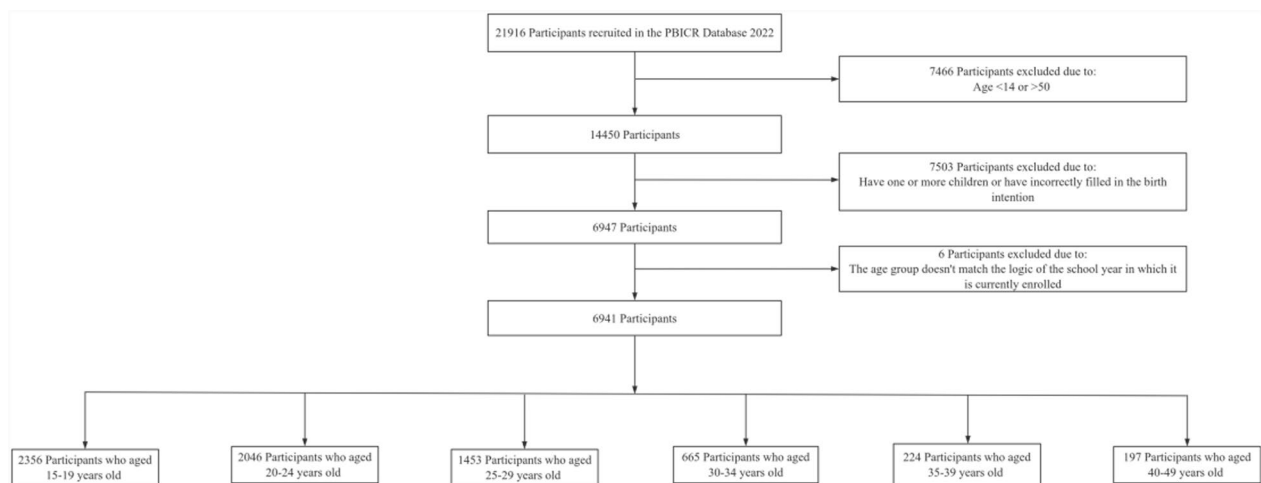
Fig. 1 Flow chart of sample selection

welfare difference), and the number of properties (no property, 1–2 properties, or 3 or more properties, demonstrating the impact of asset accumulation on fertility security). Family functioning was also considered, including family health (measured using the FHS-SF scale), quality of family communication (assessed by the FCS-10 scale, both of which are based on social capital theory exploring intergenerational support and buffering mechanisms for parenting stress).

The macro-environmental level focuses on the geographic and policy environment, including the type of residence (rural or urban), the level of economic development in the region (eastern, central, and western regions, reflecting regional developmental imbalances and differences in service provision), and perceived social support (assessed using the PSSS scale, which is based on ecosystem theory to assess the availability of community support).

The dependent variable is the strength of respondents' fertility intentions (0–100, the higher the score the stronger the intention). According to the questionnaire's logical jump design, only the childless group is required to answer this question, which echoes the decision-making mechanism that focuses on observing potential childbearing groups.

The new general self-efficacy scale-short form (NGSES-SF scale)

Previous research has shown that there is a relationship between self-efficacy and fertility intentions, with the number of children affecting self-efficacy, and this study included self-efficacy with the aim of exploring whether self-efficacy affects fertility intentions [25]. The GSES scale is a commonly used unidimensional scale to measure self-efficacy, developed by two scholars, Schwarzer and Jerusalem, in 1995, with a total of 10 entries [26],but because the GSES scale has problems such as low content validity, scholars such as Chen G developed an NGSES scale [27], which consists of eight entries but still suffers from problems such as insufficient explanatory power of the entries. Therefore, the scale used to measure self-efficacy in this study was the NGSES-SF scale developed by Fei Wang and other Chinese scholars [28]. The NGSES-SF has been widely used to measure self-efficacy because it is simplified to three entries based on the eight items of the NGSES scale and has higher reliability and validity than the NGSES scale [29]. NGSES-SF scale consists of three entries: "When facing difficult tasks, I am certain that I will accomplish them." "I will be able to successfully overcome many challenges." and "I am confident that I can perform effectively on many different tasks." Each entrie scored on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The total score of the scale ranges from 3 to 15, with higher scores indicating higher self-efficacy among respondents. The Cronbach's α coefficient of the scale was 0.931.

The family health scale-short form (FHS-SF scale)

The FHS-SF scale was developed by scholars such as Crandall and Weiss-Laxer [30], Chinese scholars translated the scale into Chinese and tested it to prove that the scale has good reliability and validity [31]. The scale consists of four dimensions: family/social/emotional health processes (A1, A2, A5), family healthy lifestyle (A3 and A4), family health resources (A6, A9, and A10), and family external social support (A7 and A8), with a total of 10 entries, each of which is scored on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The total score

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of the scale ranges from 10 to 50, with higher scores indicating higher levels of family health among respondents. The Cronbach's α coefficient of the scale was 0.869.

The family communication scale (FCS-10 scale)

The FCS-10 scale is a widely used measure of positive levels of communication between family members and has been shown to have good reliability and validity in the existing literature [32]. The scale has a unidimensional structure, consisting of 10 entries, each of which is scored on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The total score of the scale ranges from 10 to 50, with higher scores indicating higher levels of family communication among respondents. The Cronbach's α coefficient of the scale was 0.969.

Perceived social support scale (PSSS scale)

The PSSS scale was developed by Zimet and other scholars [33]. Then,Yunchou Wu and other scholars simplified the PSSS scale and proved that the scale has good reliability and validity [34]. The scale consists of three dimensions: family support (A1), friend support (A2), and other significant support (A3), with a total of 3 entries, each of which is scored on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). The total score of the scale ranges from 3 to 21, with higher scores indicating higher levels of social support among respondents. The Cronbach's α coefficient of the scale was 0.879.

Statistical analysis

Data analysis were mainly conducted using two software: SPSS 26.0 and RStudio, and all comparisons were two-tailed, with *p*-value < 0.05 considered statistically significant difference. In this study, descriptive analyses of socio-demographic characteristics (such as respondents 'gender, education level, occupational status, marital status), scores on respondents' scales, and the fertility intentions of all respondents were conducted using SPSS26.0 software, and in the descriptive analysis, respondents' fertility intentions were focused on respondents with different socio-demographic characteristics, and were compared using $\bar{x} \pm s$ to determine whether fertility intentions were differed between gender and age group. In the process of analysing the distribution of fertility intentions in the overall population, it was found that nearly one-fifth of the group without fertility intentions for the time being, so the influencing factors among the group without fertility intentions, the high fertility intentions group and the above medium fertility intentions group were analysed using binary logistic regression. At the same time, it was found that the variable of age group was not simply positively or negatively correlated with fertility intentions. Therefore, in order to further explore the differences in fertility intention among different age groups, RStudio was used to carry out the analysis of variance (ANOVA) and plot the LSD visualisation results, and the results of two-by-two comparison of fertility intention of each age group were obtained. In order to exclude the bias of the results caused by the artificial dividing, the present study purposely didn't divide age artificially, and age group was treated as a continuous variable. With the help of the restricted cubic spline, the non-linear relationship between age and fertility intention is revealed (roughly inverted V shape), and the overall trend is similar to that of the results of the grouping of age. Finally, in order to explore the influencing factors of fertility intention of different age groups, the data were divided into six groups according to the age groups of the interviewees, which were then analysed using multiple linear regression in SPSS26.0 software to identify the influencing factors of fertility intention for each of the six age groups.

Results

Socio-demographic characteristics of the participants

A total of 6941 samples were included in this study and the socio-demographic characteristics of the participants were analysed descriptively and the results are shown in Appendix 1. The sample consisted of 3543 (51.04%) male respondents and 3398 (48.96%) female respondents. The majority of respondents (70.06%) had the education level of college degree and above, 4402 (63.42%) respondents were currently in the student status, 1990 (28.67%) respondents were employed, 5181 (74.64%) respondents' usual place of residence in the last three months was in an urban area, 2956 (42.59%) respondents had a per capita monthly income of the household ≤4000 yuan, 88.50% of the respondents are unmarried, 10.86% of the respondents are married, 3545 (51.07%) of the respondents own only one property, 3150 (45.38%) of the respondents don't have siblings, nearly three quarters (77.06%) of the respondents do not have pets at home. The age group distribution of the respondents is relatively uneven, with 5855 (84.35%) respondents in the age group of 15–29 years old, and only 1086 (15.65%) respondents in the age group of 30–49 years old, showing a younger trend in the sample.

6941 respondents had a mean scores of 10.76 ± 2.41 for self-efficacy scale (NGSES-SF scale), 5.72 ± 2.90 for family health scale (FHS-SF scale), 37.13 ± 8.80 for family communication scale (FCS-10 scale), 7.52 ± 3.91 for intimate partner violence scale, 21.47 ± 4.46 for media exposure scale, and 15.14 ± 3.80 for perceived social support scale (PSSS scale).

Fertility intentions of the childless group among the study samples

Among a total sample of 6941 individuals who have not yet bear their first child, the average intentions to bear the first child is 42.51 ± 33.47 points, with a median of 41.00 points. Among them, 1203 respondents (17.33%) currently have no intention to bear the first child (0 points), 315 respondents (4.54%) have a moderate intention to bear the first child (50 points), and 662 respondents (9.54%) have an extremely strong intention to bear the first child (100 points). The average intentions to bear the second child is 13 (0, 47) points, with 2386 respondents (34.38%) currently having no intention to bear the second child (0 points). Among those with an extremely strong intention to bear the first child, 280 respondents account for 90.32% of the total sample with an extremely strong intention to bear the second child (310 respondents). The average intentions to bear the third child is 0 (0, 12) points. A total of 3624 respondents currently have no intention to bear the third child (0 points). Among those with an extremely strong intention to bear the third child, 79.29% of the respondents (140) also have an extremely strong intention to bear both the first and second child.

Among the 1203 individuals with no fertility intentions, the proportion of females (60.27%) was significantly higher than that of males (39.73%). At the same time, the proportion of individuals with non-agricultural household registration (62.93%) was significantly higher than that of individuals with agricultural household registration (37.07%). Nearly three-quarters (73.48%) of those with no fertility intentions are currently in the student stage. The largest number of individuals with no fertility intentions fall within the age groups of 15–19 and 20–24, accounting for 41.48% and 33.25% of the total sample, respectively. Among the 1203 individuals with no fertility intentions, the majority (93.77%) are unmarried. The educational level of individuals with no fertility intentions is generally high, with 68.16% holding a college degree and above, 28.93% having a senior high school and technical secondary school diploma, and only 2.91% having a middle school and below.

The mean fertility intention of male respondents was significantly higher than the mean fertility intention of female respondents. In this study, The mean fertility intentions scores for childless women was 34.63 ± 30.64, with a median scores of 30.00. Among the 3,398 childless female, 725 (21.3%) respondents demonstrated without intentions to have children (0 points for intentions to bear the first child), while 163 (4.8%) respondents demonstrated very strong desire to have children (100 points for intentions to bear the first child). The mean scores of fertility intention among respondents aged 15–19 years old and 20–24 years old were 36.69 ± 32.11 and 39.14 ± 33.10 points, which are lower than the mean score of fertility intentions of the overall sample. The mean scores of fertility intentions of respondents aged 25–29, 30–34 and 35–39 are 50.50 ± 33.05, 53.85 ± 33.31 and 53.85 ± 33.52 points respectively, which are much higher than the mean scores of fertility intention of the overall sample, while the mean scores of fertility intentions of respondents aged 40–49 is 37.16 ± 33.35 points, which is lower than the mean scores of fertility intentions of the overall sample.

Analysis of the factors influencing the differences in fertility intentions between different levels of fertility intentions group

In the descriptive analysis of the fertility intentions of the whole population, we found that nearly one fifth (17.33%) of the population had without fertility intentions(with a fertility intentions of 0 points), which is much larger than the number of people with medium fertility intentions (4.54%) (with a fertility intentions of 50 points) and high fertility intentions (9.54%) (with a fertility intentions of 100 points). Therefore, we focus on the group without fertility intentions for the time being, and conduct regression analyses on the group without fertility intentions for the time being (fertility intentions of 0 points) and the group with high fertility intentions (fertility intentions of 100 points) and the group with above medium fertility intentions (fertility intentions of 50 points or more) to investigate the factors influencing the differences in fertility intentions between the groups of different fertility intentions levels.

Firstly, independent samples *t*-tests were conducted on the four continuous variables (family communication, intimate partner violence, perceived social support and media exposure) of different populations, and chi-square tests were conducted on the fourteen categorical variables (gender, age group, education level, occupational status, household register, place of residence, living region, marital status, per capita monthly income of the household, whether you have pets at home, number of siblings, number of properties owned, self-efficacy and family health) to exclude non-significant influencing factors ($p < 0.20$), and retain the factors that significantly influence fertility intentions of the different in the univariate analysis. The results are shown in Appendix 2 and Appendix 3. In the univariate analysis of the group without fertility intentions for

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the time being and the group with high fertility intention, we excluded the six variables of intimate partner violence, media exposure, household register, living region, whether you have pets at home and number of properties. In the univariate analysis of the group without fertility intentions for the time being and the group with above medium fertility intentions, we excluded the two variables of household register and living region. Meanwhile, in order to ensure the robustness of the model, we carried out the multicollinearity diagnosis, and the results showed that the VIF value of each variable was less than 5, which proved that the regression model didn't have the interference of multicollinearity. Subsequently, we conducted binary logistic regressions for the group without intentions to bear one child for the time being and the group with high intentions to bear one child and the group with above medium intentions to bear one child, the results are shown in Tables 1 and 2.

An analysis of the factors affecting the differences in fertility intentions between the without fertility intentions group and the high fertility intentions group based on binary logistic regression

According to Table 1, we found statistically significant differences in seven variables: gender, occupational status, marital status, number of siblings, age group, self-efficacy and family communication between the group without intentions to bear the first child for the time being and the group with high intentions to bear the first child, with female's intentions to bear the first child significantly lower than males($p = 0.000, OR = 0.178$), Fertility intentions are significantly lower in the unemployment group than in the employed group ($p = 0.027, OR = 0.615$), fertility intentions are significantly higher in the married group than in the unmarried group ($p = 0.000, OR = 4.271$), and fertility intentions are significantly higher in the group with one or two siblings than in the group without siblings ($p_1 = 0.035, OR_1 = 1.324; p_2 = 0.000, OR_2 = 1.995$). Age is a special factor, and the differences in fertility intentions between different age groups are more complex, as shown by the fact that the fertility intentions of people in the age groups 25–29 and 30–34 are significantly higher than those of people in the age group 15–19 ($p_1 = 0.002, OR_1 = 1.928; p_2 = 0.010, OR_2 = 1.972$), while fertility intentions of those in the age group of 40–49 are significantly lower than those in the age group of 15–19 ($p = 0.000, OR = 0.232$). Fertility intentions are significantly higher in the high self-efficacy groups than in the low self-efficacy groups ($p = 0.001, OR = 1.558$). The continuous variable of family communication is positively correlated with fertility intentions: the more harmonious the family communication, the higher the fertility intention of the group ($p = 0.003, OR = 1.023$).

An analysis of factors affecting the difference in fertility intentions between the without fertility intentions group and the medium fertility intentions and above group based on binary logistic regression

According to Table 2, we find that the group without fertility intentions and the group with above medium fertility intentions also have statistically significant differences in exactly the same seven variables: gender, occupational status, marital status, number of siblings, age group, self-efficacy and family communication. Female's fertility intentions are significantly lower than male's ($p = 0.000, OR = 0.366$), and fertility intentions who are unemployment are significantly lower than those who are employed ($p = 0.000, OR = 0.561$). the married group had significantly higher fertility intentions than the unmarried group ($p = 0.000, OR = 2.115$), and those with one or two siblings had significantly higher fertility intentions than those without siblings ($p_1 = 0.000, OR_1 = 1.373, p_2 = 0.000, OR_2 = 1.623$). Fertility intentions are significantly higher in the 25–29, 30–34 and 35–39 age groups than in the 15–19 age group ($p_1 = 0.000, OR_1 = 1.922, p_2 = 0.000, OR_2 = 2.087, p_3 = 0.008, OR_3 = 2.135$), the fertility intentions of the age group of 40–49 years old is significantly lower than that of the age group of 15–19 years old ($p = 0.050, OR = 0.618$), and the fertility intention of the group with high self-efficacy is significantly higher than that of the group with low self-efficacy ($p = 0.043, OR = 1.189$), and the continuous variable of family communication remains positively correlated with the fertility intention: the more harmonious the family communication, the higher the fertility intention of the group ($p = 0.000, OR = 1.019$). The variables that differ from the previous regression are the number of properties owned and perceived social support, which are newly introduced. The fertility intention of those who own a property is significantly higher than that of those who without own a property ($p = 0.004, OR = 1.357$), and perceived social support is significantly positively correlated with fertility intentions ($p = 0.000, OR = 1.019$): the higher the perception of perceived social support the higher the fertility intentions of the population.

The above significant influencing factors affecting the differences in fertility intentions among different levels of fertility intentions group have a strongly high degree of overlap, which proves the stability and reliability of the influencing factors leading to the group of people without temporary fertility intentions uncovered in this study.

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Table 1 Binary logistic regression results for the group without intentions to bear the first child and the group with high intentions to bear the first child

Categories	B (SE)	Wald	Df	P	OR	95% CI	
						Lower	Upper
Constant	−1.571 (0.465)	11.416	1	0.001	0.208	0.208	
Gender							
Male (Ref)							
Female	−1.725 (0.123)	197.722	1	0.000	0.178	0.140	0.227
Occupational status		5.526	2	0.063			
Employed (Ref)							
Student	−0.295 (0.194)	2.300	1	0.129	0.745	0.509	1.090
Unemployment	−0.486 (0.219)	4.912	1	0.027	0.615	0.400	0.945
Education level		0.249	2	0.883			
Middle school and below (Ref)							
Senior high school and technical secondary school	−0.137 (0.322)	0.181	1	0.670	0.872	0.464	1.639
College degree and above	−0.152 (0.307)	0.245	1	0.620	0.859	0.471	1.567
Place of residence							
Rural (Ref)							
Urban	0.102 (0.136)	0.561	1	0.454	1.108	0.848	1.447
Marital status		45.216	2	0.000			
Unmarried (Ref)							
Married	1.452 (0.216)	45.200	1	0.000	4.271	2.797	6.521
Divorced or Widowed	0.705 (0.663)	1.131	1	0.288	2.023	0.552	7.414
Number of siblings		15.387	3	0.002			
0 (Ref)							
1	0.281 (0.133)	4.459	1	0.035	1.324	1.020	1.718
2	0.691 (0.184)	14.156	1	0.000	1.995	1.392	2.859
≥3	0.357 (0.212)	2.831	1	0.092	1.430	0.943	2.168
Per capita monthly income of the household							
≤4000 (Ref)							
≥4001	−0.074 (0.117)	0.403	1	0.526	0.929	0.739	1.167
Age group		38.959	5	0.000			
15–19 (Ref)							
20–24	0.096 (0.145)	0.437	1	0.509	1.101	0.828	1.464
25–29	0.656 (0.213)	9.506	1	0.002	1.928	1.270	2.926
30–34	0.679 (0.263)	6.666	1	0.010	1.972	1.178	3.303
35–39	0.365 (0.376)	0.944	1	0.331	1.440	0.690	3.008
40–49	−1.462 (0.414)	12.470	1	0.000	0.232	0.103	0.522
Family health		2.225	2	0.329			
Poor family health (Ref)							
Moderate family health	−0.211 (0.150)	1.988	1	0.159	0.809	0.603	1.086
Excellent family health	−0.081 (0.203)	0.157	1	0.692	0.923	0.620	1.374
Self-efficacy							
Low self-efficacy (Ref)							
High self-efficacy	0.444 (0.135)	10.866	1	0.001	1.558	1.197	2.029
Family communication	0.023 (0.008)	9.137	1	0.003	1.023	1.008	1.039
Perceived social support	0.032 (0.017)	3.351	1	0.067	1.032	0.998	1.067

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Table 2 Binary logistic regression results for the group without intentions to bear the first child and the group with above medium intentions to bear the first child

Categories	B (SE)	Wald	Df	P	OR	95%CI	
						Lower	Upper
Constant	−0.630 (0.378)	2.783	1	0.095	0.533		
Gender							
Male (Ref)							
Female	−1.004 (0.076)	174.210	1	0.000	0.366	0.315	0.4325
Occupational status			13.753	2	0.001		
Employed (Ref)							
Student	−0.256 (0.136)	3.562	1	0.059	0.774	0.593	1.010
Unemployment	−0.579 (0.158)	13.453	1	0.000	0.561	0.411	0.764
Education level			0.298	2	0.862		
Middle school and below (Ref)							
Senior high school and technical secondary school	−0.093 (0.230)	0.163	1	0.686	0.911	0.581	1.430
College degree and above	−0.053 (0.222)	0.058	1	0.810	0.948	0.613	1.466
Whether you have pets at home							
Yes (Ref)							
No	0.149 (0.086)	2.977	1	0.084	1.161	0.980	1.375
Place of residence							
Rural (Ref)							
Urban	0.057 (0.090)	0.405	1	0.525	1.059	0.887	1.264
Marital status			22.274	2	0.000		
Unmarried (Ref)							
Married	0.749 (0.163)	21.165	1	0.000	2.115	1.537	2.910
Divorced or widowed	−0.195 (0.447)	0.191	1	0.662	0.822	0.342	1.975
Number of siblings			21.221	3	0.000		
0 (Ref)							
1	0.317 (0.086)	13.588	1	0.000	1.373	1.160	1.625
2	0.484 (0.127)	14.628	1	0.000	1.623	1.266	2.081
≥3	0.202 (0.144)	1.981	1	0.159	1.224	0.924	1.623
Number of properties owned			8.406	3	0.038		
0 (Ref)							
1	0.306 (0.106)	8.364	1	0.004	1.357	1.103	1.670
2	0.223 (0.124)	3.232	1	0.072	1.250	0.980	1.594
≥3	0.225 (0.148)	2.295	1	0.130	1.252	0.936	1.674
Per capita monthly income of the household							
≤4000 (Ref)							
≥4001	0.142 (0.080)	3.127	1	0.077	1.152	0.985	1.348
Age group			43.133	5	0.000		
15–19 (Ref)							
20–24	0.105 (0.089)	1.386	1	0.239	1.111	0.932	1.324
25–29	0.653 (0.146)	19.910	1	0.000	1.922	1.442	2.560
30–34	0.736 (0.187)	15.447	1	0.000	2.087	1.446	3.012
35–39	0.758 (0.287)	7.004	1	0.008	2.135	1.217	3.743
40–49	−0.482 (0.246)	3.845	1	0.050	0.618	0.382	1.000
Family health			7.479	2	0.024		
Poor family health (Ref)							
Moderate family health	0.097 (0.096)	1.023	1	0.312	1.102	0.913	1.330
Excellent family health	−0.233 (0.139)	2.810	1	0.094	0.792	0.603	1.040

An exploration of the relationship between age and fertility intentions based on ANOVA and restricted cubic spline curve

In the process of descriptive and regression analyses of fertility intentions of different populations, we found that age is an important and complex factor affecting the level of fertility intentions of populations, and age with fertility intentions of populations are not simply and continuously positively or negatively correlated, so in the subsequent study we focused on testing whether there is a significant difference in the fertility intentions of populations of different ages by ANOVA. The results of the ANOVA test showed a p-value of 0.665 ($p > 0.050$), which satisfies the homogeneity of variance, followed by the overall significance test between groups, which showed a *p*-value of 0.000 ($p < 0.050$), indicating that fertility intentions are not entirely consistent between different age groups, and there are significant differences between them, so it is necessary to further carry out post-hoc testing of the differences in fertility intentions between different age

Table 2 (continued)

Categories	B (SE)	Wald	Df	P	OR	95%CI	
						Lower	Upper
Self-efficacy							
Low self-efficacy (Ref)							
High self-efficacy	0.173 (0.086)	4.092	1	0.043	1.189	1.005	1.406
Family communication	0.019 (0.005)	13.090	1	0.000	1.019	1.009	1.030
Media exposure	−0.008 (0.010)	0.658	1	0.417	0.992	0.974	1.011
Perceived social support	0.049 (0.013)	13.482	1	0.000	1.050	1.023	1.078
Intimate partner violence	0.003 (0.010)	0.074	1	0.786	1.003	0.983	1.023

Table 3 LSD multiple test results (T-value and *p*-value)

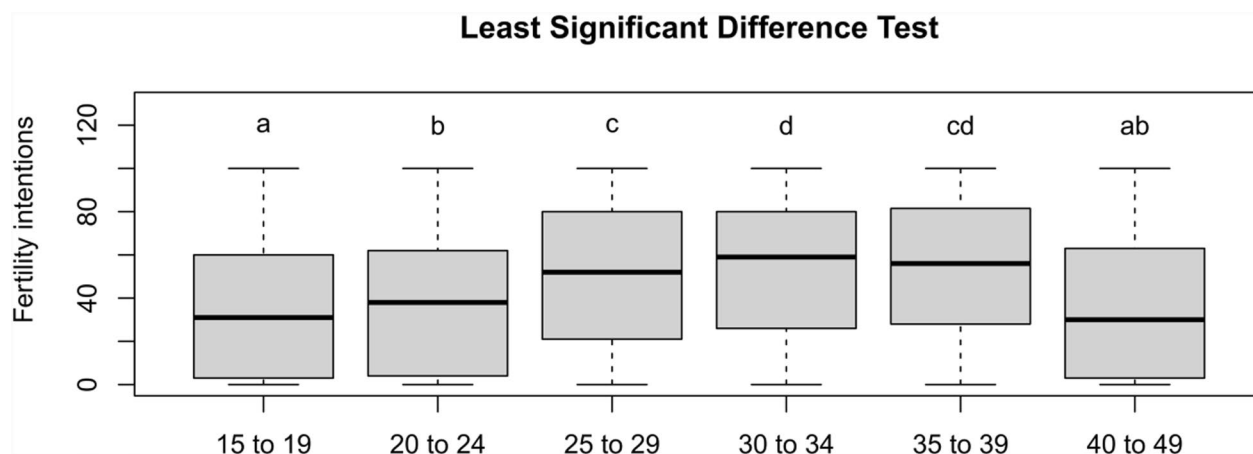| T-value (*p*-value)	15–19	20–24	25–29	30–34	35–39	40–49
15–19	–					
20–24	2.475 (0.013*)	–				
25–29	12.626 (0.000***)	10.097 (0.000***)	–			
30–34	11.913 (0.000***)	10.043 (0.000***)	2.177 (0.030*)	–		
35–39	7.483 (0.000***)	6.371 (0.000***)	1.421 (0.155)	0.001 (0.999)	–	
40–49	0.195 (0.846)	−0.809 (0.419)	−5.357 (0.000***)	−6.271 (0.000***)	−5.209 (0.000***)	–

Fig. 2 LSD multiple test visualisation results

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groups. Since homogeneity of variance was satisfied, the LSD method was used for post-hoc testing results, as shown in Table 3 and Fig. 2. Combining Table 3 and Fig. 2, it can be seen that there is a significant difference in fertility intentions between those aged 15–19 with those aged 20–24, 25–29, 30–34, and 35–39, and there is no significant difference in fertility intentions between those aged 15–19 with 40–49 (*p=0.846*); there is a significant difference in fertility intentions between those aged 20–24 with those aged 25–29, 30–34, and 35–39, and no significant difference in fertility intentions between those aged 20–24 with 40–49 (*p=0.419*); there is a significant difference in fertility intentions between those aged 25–29 with 30–34 and 40–49, and no significant difference in fertility intentions between those aged 25–29 with 35–39 (p=0.155); there is a significant difference in fertility intentions between those aged 30–34 with 40–49, and no significant difference in fertility intentions between those aged 30–34 with 35–39 (*p=0.999*); there is a significant difference in fertility intentions between those aged 35–39 with 40–49.

Subsequently, we considered that gender and marital status might have a significant impact on fertility intentions. Therefore, after exploring the relationship between age and fertility intentions in the overall population, we conducted separate analysis for males and females, as well as for married and unmarried individuals. The specific results are shown in Attached Figs. 1 to 4.

The relationship between age and fertility intentions among females is similar to the trend observed in the overall population. Significant differences in fertility intentions were found between females aged 15–19, 20–24, 25–29, and 30–34. And there were no significant differences in fertility intentions between females aged 35–39 and those aged 25–29 (*p=0.607*) or 30–34 (*p=0.510*). Additionally, no significant differences were observed between females aged 40–49 and those aged 15–19 (*p=0.605*) or 20–24 (*p=0.736*). On the other hand, the relationship between age and fertility intentions among males showed some differences. There was no significant difference in fertility intentions between males aged 15–19 and 20–24 (*p=0.363*), and no significant differences were found among males aged 25–29, 30–34, and 35–39. However, males aged 40–49 showed significant differences in fertility intentions compared to all other age groups.

Among married individuals, there were no significant differences in fertility intentions between those aged 15–19 and 20–24 (*p=0.072*) or 40–49 (*p=0.311*).
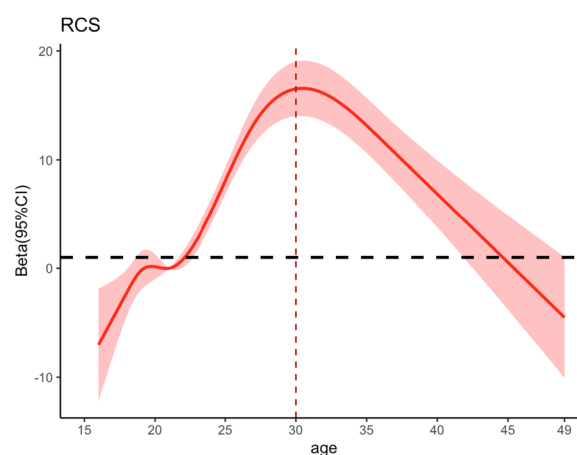

Fig. 3 Restricted cubic spline curve

Similarly, no significant differences were observed among married individuals aged 25–29, 30–34, and 35–39. Among unmarried individuals, there were also no significant differences in fertility intentions among those aged 25–29, 30–34, and 35–39. However, a significant difference in fertility intentions was observed between unmarried individuals aged 15–19 and 20–24.

Meanwhile, in order to investigate the relationship between age and fertility intentions without artificial deviding of age groups, this study used restricted cubic spline (AIC criterion, 5 nodes) to investigate the relationship between age and fertility intention without artificial dividing of age groups using age as a continuous variable. The restricted cubic spline plot (Fig. 3) shows a nonlinear relationship between age and fertility intentions ($p < 0.0001$), which is roughly in the shape of an inverted V: fertility intentions increases firstly and then declines rapidly with age, the highest peak (the turning point) of fertility intentions occurs in the group of people around 30–34 years old. This is consistent with the results of artificially dividing age groups, further proving the reliability of this study's age groups dividing.

Comparison of the influencing factors about the level of fertility intentions among the childbearing age who have not bear the first child group in different age groups

This study used multiple linear regression modelling to compare the factors influencing the level of fertility intentions in different age groups of childless childbearing age groups in China. Before constructing the formal multiple linear regression model, a t test was used for six binary independent variables (gender, household register,

place of residence, per capita monthly income of the household, whether you have pets at home and self-efficacy), an F test was used for seven multicategorical independent variables (education level, occupational status, living region, marital status, number of siblings, number of properties owned and family health), and correlation analysis was used for four continuous independent variables (family communication, intimate partner violence, perceived social support and media exposure) for each of the six age groups. Non-significant influences were excluded, while those that had a significant effect on fertility intentions in each age group in the univariate analysis were retained ($p < 0.20$) as shown in Appendix 4.

After completing the univariate analysis, in order to ensure the stability and accuracy of the multiple linear regression model, a multicollinearity diagnosis was conducted on the variables retained for each age group. The results showed that, except for the 20–24 age group, all variables in the other groups had VIF values < 5, passing the multicollinearity diagnosis. In the 20–24 age group, the variable representing education level exhibited excessive multicollinearity. Therefore, it was removed, and the multicollinearity of the model was re-evaluated, after which it passed the multicollinearity diagnosis.

Subsequently, a multiple linear regression was conducted separately on the six groups of data to identify the influencing factors that significantly affect fertility intentions across different age groups (selection criterion: $p < 0.05$) and the final result is as shown in Table 4, gender, perceived social support, self-efficacy, family communication, occupational status, marital status, number of properties owned, household register and number of siblings are the nine main influencing factors on fertility intentions across various age group.

According to Table 4, gender, marital status and occupational status are the three most common factors influencing fertility intentions across all age groups. Among the six age groups, gender consistently emerges as a primary factor affecting fertility intentions, with males exhibiting significantly higher fertility intentions than females in all age groups. Marital status is a significant factor for the 25–29, 30–34, and 35–39 age groups, which represent the main childbearing populations. In these three age groups, married individuals show significantly higher fertility intentions compared to unmarried individuals. Occupational status primarily influences the fertility intentions of the 25–29, 30–34, and 35–39 age groups who have not bear the first child. Perceived social support is one of the main factors influencing fertility intentions in the younger age groups of 15–19 ($p < 0.001$, $\beta = 0.105$) and 25–29 ($p = 0.043$, $\beta = 0.070$). In these two age groups, perceived social support exhibits a positive correlation with fertility intentions, meaning that individuals with higher perceived social support tend to have higher fertility intentions. Self-efficacy primarily affects the fertility intentions of the two youngest age groups, 15–19 ($p = 0.001$, $\beta = 0.073$) and 20–24 ($p = 0.015$, $\beta = 0.061$). There is a positive correlation between self-efficacy and fertility intentions, indicating that individuals with higher self-efficacy tend to have higher fertility intentions. Family communication shows a positive correlation with fertility intentions, particularly in the 20–24 ($p = 0.002$, $\beta = 0.083$) and 25–29 ($p < 0.001$, $\beta = 0.122$) age groups. In these groups, higher levels of family communication are associated with higher fertility intentions. The number of properties owned mainly influences the fertility intentions of the 20–24 and 30–34 age groups, with individuals owning at least one property showing higher fertility intentions compared to those without property. Household register is one of the main factors influencing fertility intentions in the 30–34 age group ($p = 0.035$, $\beta = -0.087$), with non-agricultural households exhibiting lower fertility intentions than agricultural households. The number of siblings is a significant factor for the 25–29 age group, with individuals having two siblings showing significantly higher fertility intentions than those without siblings.

Discussion

Based on data from the 2022 cross-sectional survey of China's childless population of childbearing age, this study reveals the age-dynamic characteristics of fertility intentions and their influencing factors. Gender, perceived social support, self-efficacy, family communication, occupational status, marital status, number of properties owned, household registration, and number of siblings are the main influencing factors of fertility intentions in different age groups. Unlike previous literature that focused on the willingness to have two and three children [13, 35]. This study found significant specificity in the mechanisms that shape the decision to have a first child. The mean fertility intention score (42/100) for the childless first child in this study was in the lower quartile according to the distribution of the sample (25% quartile = 38), and when converted to a 5-point scale (2.6), it was close to the "low" level, with only 9% of the childless population expressing a strong desire to have a child (100 points).

Table 4 Results of multiple linear regression of factors affecting fertility intentions of childless childbearing age groups in different age groups [β(95%CI)]

Variables	15–19	20–24	25–29	30–34	35–39	40–49
Gender (Ref: Male)						
Female	−0.301 (−21.983 ~ −16.935)***	−0.236 (−18.539 ~ −12.771)***	−0.189 (−15.791 ~ −9.205)***	−0.143 (−14.995 ~ −4.601)***	−0.209 (−24.025 ~ −5.694)**	−0.149 (−20.923 ~ −0.522)*
Household register (Ref: agricultural)						
Non-agricultural	0.011 (−2.822 ~ 4.209)	–	–	−0.087 (−11.162 ~ −0.403)*	–	–
Occupational status (Ref: Employed)						
Student	–	–	−0.063 (−10.121 ~ −1.025)*	−0.008 (−9.662 ~ 7.876)	−0.014 (−17.788 ~ 14.401)	0.176 (2.388 ~ 27.545)*
Unemployment	–	–	−0.109 (−15.485 ~ −5.502)***	−0.096 (−15.461 ~ −1.803)*	−0.063 (−16.746 ~ 6.053)	−0.059 (−14.883 ~ 6.340)
Education level (Ref: Middle school and below)						
Senior high school and technical secondary school	–	–	0.040 (−4.701 ~ 13.559)	–	–	–
College degree and above	–	–	−0.008 (−8.704 ~ 7.222)	–	–	–
Whether you have pets at home (Ref: Yes)						
No	–	–	0.039 (−0.729 ~ 6.613)	0.055 (−1.493 ~ 10.028)	0.077 (−4.065 ~ 16.394)	–
Place of residence (Ref: Rural)						
Urban	−0.016(−4.798 ~ 2.464)	–	0.049(−0.090 ~ 8.113)	–	–	–
Living region (Ref: Eastern region)						
Central region	–	−0.006 (−4.146 ~ 3.223)	−0.007 (−−4.887 ~ 3.791)	0.049 (−2.824 ~ 10.483)	−0.077 (−18.067 ~ 5.476)	–
Western region	–	−0.034 (−5.544 ~ 0.908)	0.023 (−2.250 ~ 5.345)	−0.037 (−8.378 ~ 3.448)	0.006 (−9.844 ~ 10.725)	–
Martial status (Ref: Unmarried)						
Married	–	0.042 (−0.060 ~ 24.194)	0.160 (8.713 ~ 16.937)***	0.204 (8.304 ~ 19.746)***	0.256 (7.499 ~ 27.607)***	–
Divorced or widowed	–	−0.007(−73.225 ~ 51.823)	0.034 (−9.476 ~ 52.143)	−0.016 (−29.442 ~ 18.835)	0.025 (−16.215 ~ 23.655)	–
Number of siblings (Ref:0)						
1	0.010 (−2.271 ~ 3.580)	–	0.032 (−1.426 ~ 6.107)	0.043 (−2.893 ~ 9.010)	–	–
2	0.030 (−1.278 ~ 7.371)	–	0.085 (3.333 ~ 13.329)***	0.035 (−4.207 ~ 10.506)	–	–
≥3	−0.029 (−8.321 ~ 1.463)	–	0.035 (−2.137 ~ 11.430)	0.075 (−0.615 ~ 18.431)	–	–
Number of properties owned (Ref:0)						
1	0.013 (−2.929 ~ 4.609)	0.057 (−0.520 ~ 8.050)	0.063 (−0.116 ~ 8.638)	0.118 (1.239 ~ 14.962)*	0.099 (−5.252 ~ 18.611)	–
2	0.026 (−2.393 ~ 6.081)	0.070 (0.403 ~ 9.925)*	0.009 (−4.870 ~ 6.534)	0.038 (−5.365 ~ 13.222)	−0.032 (−18.281 ~ 12.394)	–
≥3	0.031 (−2.060 ~ 7.956)	0.064 (0.778 ~ 12.197)*	0.014 (−5.528 ~ 9.037)	0.043 (−5.426 ~ 16.436)	−0.005 (−22.728 ~ 21.072)	–
Per capita monthly income of the household (Ref: ≤4000)						
≥4001	0.034 (−0.478 ~ 4.868)	−0.012 (−3.849 ~ 2.229)	–	–	0.061 (−5.535 ~ 14.101)	–
Family health(Ref: Poor family health)						
Moderate family health	0.007 (−2.786 ~ 3.646)	0.010 (−3.050 ~ 4.447)	−0.006 (−4.765 ~ 3.930)	−0.008 (−7.611 ~ 6.491)	0.165 (−0.515 ~ 22.694)	−0.047 (−15.461 ~ 9.041)
Excellent family health	−0.002 (−5.161 ~ 4.834)	−0.041 (−10.133 ~ 1.005)	−0.038 (−9.390 ~ 2.169)	−0.026 (−11.571 ~ 6.646)	0.092 (−6.145 ~ 23.589)	0.026 (−12.499 ~ 16.756)
Self-efficacy (Ref: Low self-efficacy)						
High self-efficacy	0.073 (1.829 ~ 7.545)***	0.061 (0.794 ~ 7.292)*	0.043 (−1.060 ~ 6.803)	0.002 (−6.239 ~ 6.483)	0.016 (−9.320 ~ 11.496)	0.053 (−6.979 ~ 14.089)

Table 4 (continued)

Variables	15–19	20–24	25–29	30–34	35–39	40–49
Family communication	0.032 (−0.059~0.294)	0.083(0.110~0.511)**	0.122 (0.219~0.726)***	0.041 (−0.250~0.563)	−0.119 (−1.102~0.211)	0.093 (−0.295~0.969)
Intimate partner violence	−0.023 (−0.552~0.160)	−0.023 (−0.640~0.208)	–	0.004 (−0.558~0.614)	−0.110 (−2.056~0.218)	–
Perceived social support	0.105 (0.487~1.377)***	0.010 (−0.423~0.600)	0.070 (0.020~1.146)*	0.048 (−0.558~1.323)	0.049 (−1.046~1.897)	–
Midia exposure	−0.019 (−0.467~0.182)	0.042 (−0.053~0.704)	–	0.049 (−0.331~1.036)	–	–

p < 0.001***, *p* < 0.01**, *p* < 0.05*

First, the consistency of the childless-willingness group requires special attention. It is noteworthy that 17% of respondents said they did not want children (0%), which is close to the 20% of the childless population in European countries [36], suggesting that low fertility intentions may have become a common feature of the childless population in China. The fact that 73.4% of the study sample were students, and that they had no plans to have children, may be a reflection of the fact that fertility issues have not yet entered into their life-course planning [37], rather than a substantial resistance to having children. This finding is corroborated by studies of college students' attitudes toward marriage and parenthood: the main reason for college students' low fertility intentions is their perceived resistance to marriage and parenthood, and the fertility attitudes of individuals in early adolescence are significantly malleable [38]. It is worth noting that 35.4% of the 25–49 year olds chose not to have children, and 23.7% of them were married, which suggests that we need to differentiate between "active childlessness" and "conditioned childlessness",which is theoretically related to the mechanism of "delayed-abandonment". In China, according to the latest 2020 census, the proportion of childless women aged 49 has reached 5.16%, with a significant increase in childlessness [39], partly related to infertility (18%) [40] and partly due to the phenomenon of voluntary childlessness. People who are voluntarily childless believe that although children are an important part of the regeneration of society, they are not an inevitable part of the family at this juncture in history, and that one of the ways in which people can strike a balance between work and family is to have fewer children. Most childlessness is a gradual process that occurs over time, which is the ultimate result of delaying the decision to have children. The consequences of delaying childbearing may lead couples to give up childbearing [41].

Secondly, the decision-making mechanism of the first-child decision deserves to be analyzed in depth. This study found that 9.54% of the respondents had an extremely strong will to have one child. Respondents with extremely strong willingness to have one child accounted for 90.32% of the total sample with extremely strong willingness to have a second child. Among the respondents with very strong will to have a third child, 79.29% of the respondents have the will to have both one and two children. This suggests that when individuals or families make decisions about childbearing, they are more likely to make preliminary judgments about the costs and benefits of childbearing based on information they have before giving birth, and that perceived pressures impede childbearing behaviors, yet there is a discrepancy between the expected and actual costs of childbearing that occur. It has also been shown that the experience of having one child significantly increases the number of children a woman wants to have [42], and that women who have one child are more likely to want a second [43]. This section examines one-child fertility intentions at the individual, family and macro levels.

At the individual level, gender is a key factor influencing the willingness to have one child, with males showing higher willingness to have children than females, which is consistent with most previous studies [44, 45], and the difference is significant across all age groups. Men's intentions are also generally higher than women's in two- and three-child intention studies [46], a finding that may be related to traditional gender role expectations and sociocultural contexts in which women face multiple identity considerations [47, 48]. Evidence suggests that more children for women means more challenges and

threats to job stability and career advancement [49]. In addition, in terms of gender, the sex of the first child may have a significant impact on fertility intentions. In traditional Chinese fertility culture, families generally have a "boy preference" [50]. If the first child is a girl, the family is more likely to continue childbearing until a boy is born [51]. Studies have shown that in traditional Chinese fertility culture, families generally have a "boy preference". If the first child is a girl or if the first two children are girls, the willingness to have more children is stronger [52].

This study systematically describes the "inverted v" age distribution pattern of one-child intention, i.e., the peak of male fertility intention occurs at the age of $30 \sim 34$ years, and the peak of female fertility intention occurs at the age of $25 \sim 29$ years, which is in line with the NSO data on age-specific fertility rates of women of childbearing age, and is earlier than that of neighboring countries in East Asia (Japan and South Korea) [53]. Same as NBS and similar to other OCED countries (28–30 years). This difference may be related to intergenerational family support, alleviation of fertility anxiety and burnout among young people in China. The present study further shows that having one child in the 25–29 and 30–34 age groups is significantly higher than those who are 15–19, while fertility intentions are lowest in the age group of 40 to 49 years old. This is in line with the findings of the US study that the willingness to have a child or additional children decreases significantly with age among both women and men, with the largest decrease in the age groups 35–39 and 40–44 years, and men are more likely to intend to have a child or additional children even in their 40 s as compared to women [54], and the study on the willingness to have a second and third child shows that the willingness to have a second child decreases in the women's age > 35 years [55]. This may be related to fertility, which declines after the age of 35.

Fertility intentions are significantly higher in the group with an employed status than in the group with an unemployed and freelance status, mainly affecting the 25–29, 30–34 and 35–39 age groups who have not had their first child. Some studies have shown that unemployment is a factor in men's refusal to have three children [56]. The cost of childbearing and relative economic security may be taken out of the equation, leading the stably employed group to believe they can afford to start a family. However there is also research to suggest that women who are self-employed home buyers would be more willing to have a third child * MERGEFORMAT. Intention to have one child was significantly higher in the high self-efficacy group than in the low self-efficacy group. Self-efficacy mainly affects the willingness to have a child in the two youngest age groups, 15–19 and 20–24. Intention to have one child was significantly higher in the high self-efficacy group than in the low self-efficacy group. Self-efficacy mainly affects the willingness to have a child in the two youngest age groups, 15–19 and 20–24. Self-assessments of self-efficacy in the younger age groups were optimistic. Self-assessments of working adults are likely to be rigorous and objective, given the difficulties that may be involved in group activities in the workplace [57]. Therefore self-efficacy differences in the lower age group were significant.

People with high self-efficacy are more persistent in the face of challenges [58], and it has also been shown that men's self-efficacy hardly changes when they go from no children to one child, but increases significantly when they have two children. In contrast, women's self-efficacy is lowest when they have one child and improves significantly only when they have two children [25].

At the family level, the willingness to have a child is higher when married than when unmarried. Marital status is an important influence in the 25–29, 30–34 and 35–39 age groups, with married individuals showing stronger fertility intentions. Young and middle-aged adults in this age group are in the stage of marriage where relationship stability has a clear and important role in the realization of one-child intentions [59], and studies have shown that cohabitation or being married increases couples' fertility intentions [60, 61]. However, intentions to have one or more children are highest among unmarried people in the U.S., while intentions are lower among people in cohabiting relationships.

The present study shows a positive correlation between family communication and fertility intentions, especially in the 20–24 and 25–29 age groups in the proximity of fertility decision-making. In these groups, higher levels of family communication are associated with higher fertility intentions. However, it has also been shown that harmonious family communication reduces fertility intentions for one child, but promotes fertility for two and three children [62]. The reasons for this are mainly intergenerational support, with cohabitation with parents or in-laws increasing the accessibility of child care needs and sharing the costs of parenting to a certain extent, and a stronger willingness to have a second child [63], making the positive effect

of the experience of having a first child on the number of births a woman wishes to have more pronounced.

The number of siblings was associated with the intention to have one child, which was significantly higher in the group with siblings than in the group without siblings, and was associated in the age group 25–29 years. At the same time, the study found an association between being an only child and lower fertility intentions [64]. Family size of origin is associated with later-life fertility for both men and women [65], yet there are also long-term studies that suggest that the intergenerational transmission of childbearing decreases the strength of this relationship [66].

People who own at least one property show a higher willingness to have a child than those who do not, and the number of properties owned mainly affects the 20–24 and 30–34 age groups, which is similar to the findings of the study [67]. A study in South Korea showed that reducing the burden of housing costs by providing families with public rental housing did not have a positive impact on fertility intentions [68]. Real estate is not only a source of income for living conditions and finances, but in the Chinese cultural context, it is also associated with educational resources, with school allocation depending to a certain extent on the location of the property, and therefore some parents are indebted to acquire property. In this study, household registration is one of the main factors influencing the willingness to have one child for the 30–34 year old cohort, with non-agricultural households having lower fertility intentions than agricultural households. This may reflect the influence of traditional values and policy orientations in rural areas on fertility behavior. Some research suggests that families with an agricultural hukou are more likely to have a second child. In this study the difference of education level's in the intention to have one child is not significant. However there are studies that show that higher education level is the main barrier to having one more child in two and three child studies, however studies in the United States have shown that the intention to have a child or more children is significantly related to education, and that women with a college degree show a higher intention to have a child or more children [54]. Studies have also shown that education level is not related to the intention to have more children [69].

In terms of macro-environment, comprehending social support was significantly and positively correlated with fertility intentions in the age groups of 15 ~ 19 and 25 ~ 29, suggesting that the influence of social network support on young people's fertility attitudes cannot be ignored [70]. Building a fertility-friendly society further promotes fertility intentions. In this study, the difference in fertility intentions for one child by type of residence (rural or urban) is not significant, however, it has been shown that farmers who choose to move will increase their fertility intentions if they choose not to move. For rural residents who choose not to move, willingness to move will decrease if they choose to do so [71]. With urbanization, the need for fertility support for rural residents on the move deserves attention.

Conclusion

The willingness to have a child is at a low to medium level among those of childbearing age who have not had children in China. The main influencing factors may be gender, perceived social support, self-efficacy, family communication, occupational status, marital status, number of assets owned, household registration and number of siblings. Moreover, self-efficacy, family communication and social support are the factors influencing the birth of a child among the younger (15–24) childbearing age group, while the birth of a child among the older (25–34) childbearing age group is influenced by occupational and economic factors, and the birth of a child among the 35–49 year olds is influenced by fewer factors, mainly gender, and men's willingness to give birth to a child is high. Therefore there is a need to adopt a staggered policy for the younger age group to reduce perceived economic pressure, reduce occupational pressure on the age group, and increase childcare and occupational fertility friendly environments. In addition, there is a need for multisectoral economic compensation and educational district planning to alleviate the "don't want to give birth" and solve the "don't dare to give birth" problem. People who have had one child are more likely to want to have a second child, so the government and society need to do more to support the desire to have a child, thereby increasing the national fertility rate.

Appendix 1

See Table 5.

Table 5 Descriptive analysis of socio-demographic characteristics

Variables	Chinese childless population (n = 6941)	One child fertility intention (mean ± SD)	Statistics	*p* value
Gender			19.790[a]	<0.001
Male	3543 (51.04%)	50.07 ± 34.33		
Female	3398 (48.96%)	34.63 ± 30.64		
Age group			58.704[b]	<0.001
15 ~ 19	2356 (33.94%)	36.69 ± 32.11		
20 ~ 24	2046 (29.48%)	39.14 ± 33.10		
25 ~ 29	1453 (20.93%)	50.50 ± 33.05		
30 ~ 34	665 (9.58%)	53.85 ± 33.31		
35 ~ 39	224 (3.23%)	53.85 ± 33.52		
40 ~ 49	197 (2.84%)	37.16 ± 33.35		
Education level			11.814[b]	<0.001
Middle school and below	250 (3.60%)	48.22 ± 34.36		
Senior high school and technical secondary school	1828 (26.34%)	39.63 ± 33.27		
College degree and above	4863 (70.06%)	43.30 ± 33.43		
Occupational status			119.189[b]	<0.001
Employed	1990 (28.67%)	51.99 ± 33.00		
Student	4402 (63.42%)	38.27 ± 32.65		
Unemployment	549 (7.91%)	42.21 ± 34.74		
Household register			0.370[a]	0.712
Agricultural	2624 (37.80%)	42.71 ± 33.39		
Non-agricultural	4317 (62.20%)	42.40 ± 33.53		
Living region			1.079[b]	0.340
Eastern region	2542 (36.62%)	42.19 ± 33.34		
Central region	1687 (24.30%)	41.85 ± 33.98		
Western region	2712 (39.07%)	43.23 ± 33.28		
Place of residence			−3.742[a]	<0.001
Rural	1760 (25.36%)	39.97 ± 32.90		
Urban	5181 (74.64%)	43.38 ± 33.63		
Marital status			117.716[b]	<0.001
Unmarried	6143 (88.50%)	40.41 ± 32.85		
Married	754 (10.86%)	59.88 ± 33.29		
Divorced or widowed	44 (0.63%)	38.70 ± 36.09		
Per capita monthly income of the household			−5.291[a]	<0.001
≤4000	2956 (42.59%)	40.05 ± 33.42		
>4000	3985 (57.41%)	44.34 ± 33.40		
Whether you have pets at home			−2.216[a]	0.027
Yes	1592 (22.94%)	40.88 ± 33.55		
No	5349 (77.06%)	43.00 ± 33.44		
Number of siblings			2.453[b]	0.061
0	3150 (45.38%)	42.62 ± 33.62		
1	2378 (34.26%)	42.03 ± 32.99		
2	856 (12.33%)	44.91 ± 33.44		
≥3	557 (8.02%)	40.30 ± 34.58		
Number of properties owned			10.095[b]	<0.001
0	1088 (15.67%)	38.05 ± 33.27		
1	3545 (51.07%)	44.15 ± 33.19		
2	1573 (22.66%)	41.44 ± 33.55		
≥3	735 (10.59%)	43.52 ± 34.31		
Self-efficacy			−11.306[a]	<0.001

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Table 5 (continued)

Variables	Chinese childless population (n = 6941)	One child fertility intention (mean ± SD)	Statistics	*p* value
Low self-efficacy	3596 (51.81%)	38.17 ± 32.39		
High self-efficacy	3345 (48.19%)	47.19 ± 33.99		
Family health			26.756[b]	<0.001
Poor family health	2294 (33.05%)	38.36 ± 33.04		
Moderate family health	3831 (55.19%)	44.41 ± 33.15		
Excellent family health	816 (11.76%)	45.26 ± 35.10		
Family communication			0.153[c]	<0.001
Intimate partner violence			−0.056[c]	<0.001
Perceived social support			0.136[c]	<0.001
Media exposure			0.038[c]	0.002

[a] T-value

[b] F-value

[c] Spearman's rank correlation coefficient

Appendix 2

See Table 6.

Table 6 Independent samples T-test results for continuous variables

Comparison of group with different fertility intentions	Continuous variables	Mean (SD)	Mean difference (95% CI)	T-Statistics (df)	Statistical significance
Without fertility intentions group and high fertility intentions group	Family communication	35.57 (9.831)^0 38.97 (9.544)^1	−3.402 (−4.325, −2.478)	−7.224 (1863)	0.000
	Intimate partner violence	7.61 (3.858)^0 7.69 (4.354)^1	−0.080 (−0.477, 0.318)	−0.393 (1229.366)	0.694
	Perceived social support	14.65 (3.961)^0 15.49 (4.486)^1	−0.837 (−1.246, −0.428)	−4.017 (1225.902)	0.000
	Media exposure	21.41 (4.708)^0 21.68 (5.184)^1	−0.272 (−0.749, 0.204)	−1.121 (1255.036)	0.262
Without fertility intentions group and above medium fertility intentions group	Family communication	35.57 (9.831)^0 38.49 (8.340)^1	−2.915 (−3.543, −2.287)	−9.100 (1903.817)	0.000
	Intimate partner violence	7.61 (3.858)^0 7.36 (3.842)^1	0.247 (−0.009, 0.504)	1.894 (4327)	0.058
	Perceived social support	14.65 (3.961)^0 15.65 (3.702)^1	−0.997 (−1.256, −0.738)	−7.555 (2056.440)	0.000
	Media exposure	21.41 (4.708)^0 21.65 (4.340)^1	−0.242 (−0.549, 0.065)	−1.548 (2033.126)	0.122

Appendix 3

See Table 7.

Table 7 Chi-square test results for catergorical variables

Catergorical variables	Without fertility intentions group (%)	High fertility intentions group (%)	χ^2	*p*	Without fertility intentions group (%)	Above medium fertility intentions group (%)	χ^2	*p*
Gender			217.500	0.000			175.611	0.000
Male	478 (48.93%)	499 (51.07%)			478 (19.77%)	1940 (80.23%)		
Female	725 (81.64%)	163 (18.36%)			725 (37.94%)	1186 (62.06%)		
Age group			141.481	0.000			167.203	0.000
15–19	499 (74.81%)	168 (25.19%)			499 (35.95%)	889 (64.05%)		
20–24	400 (70.42%)	168 (29.58%)			400 (32.41%)	834 (67.59%)		
25–29	179 (51.00%)	172 (49.00%)			179 (18.21%)	804 (81.79%)		
30–34	64 (38.10%)	104 (61.90%)			64 (13.94%)	395 (86.06%)		
35–39	20 (35.71%)	36 (64.29%)			20 (13.33%)	130 (86.67%)		
40–49	41 (74.55%)	14 (25.45%)			41 (35.65%)	74 (64.35%)		
Education level			10.174	0.006			12.585	0.002
Middle school and below	35 (53.03%)	31 (46.97%)			35 (21.21%)	130 (78.79%)		
Senior high school and technical secondary school	348 (69.46%)	153 (30.54%)			348 (31.49%)	757 (68.51%)		
College degree and above	820 (63.17%)	478 (36.83%)			820 (26.81%)	2239 (73.19%)		
Occupational status			110.329	0.000			131.746	0.000
Employed	220 (45.55%)	263 (54.45%)			220 (16.30%)	1130 (83.70%)		
Student	884 (72.46%)	336 (27.54%)			884 (33.47%)	1757 (66.53%)		
Unemployment	99 (61.11%)	63 (38.89%)			99 (29.29%)	239 (70.71%)		
Household register			0.763	0.382			0.439	0.508
Agricultural	446 (63.26%)	259 (36.74%)			446 (27.21%)	1193 (72.79%)		
Non-agricultural	757 (65.26%)	403 (34.74%)			757 (28.14%)	1933 (71.86%)		
Living region			0.668	0.716			1.015	0.602
Eastern region	442 (63.78%)	251 (36.22%)			442 (28.12%)	1130 (71.88%)		
Central region	300 (63.83%)	170 (36.17%)			300 (28.63%)	748 (71.37%)		
Western region	461 (65.67%)	241 (34.33%)			461 (26.97%)	1248 (73.03%)		
Place of residence			4.037	0.045			9.320	0.002
Rural	335 (68.23%)	156 (31.77%)			335 (31.43%)	731 (68.57%)		
Urban	868 (63.17%)	506 (36.83%)			868 (26.60%)	2395 (73.40%)		
Marital status			111.441	0.000			87.441	0.000
Unmarried	1128 (68.61%)	516 (31.39%)			1128 (30.18%)	2610 (69.82%)		
Married	64 (31.22%)	141 (68.78%)			64 (11.39%)	498 (88.61%)		
Divorced or widowed	11 (68.75%)	5 (31.25%)			11 (37.93%)	18 (62.07%)		
Per capita monthly income of the household			5.443	0.020			20.986	0.000
≤4000	571 (67.33%)	277 (32.67%)			571 (31.46%)	1244 (68.54%)		
>4000	632 (62.14%)	385 (37.86%)			632 (25.14%)	1882 (74.86%)		
Whether you have pets at home			0.870	0.351			3.335	0.068
Yes	292 (66.36%)	148 (33.64%)			292 (30.10%)	678 (69.90%)		
No	911 (63.93%)	514 (36.07%)			911 (27.12%)	2448 (72.88%)		
Number of siblings			10.028	0.018			7.326	0.062
0	563 (65.24%)	300 (34.76%)			563 (28.54%)	1410 (71.46%)		

Table 7 (continued)

Catergorical variables	Without fertility intentions group (%)	High fertility intentions group (%)	χ^2	p	Without fertility intentions group (%)	Above medium fertility intentions group (%)	χ^2	p
1	415 (67.15%)	203 (32.85%)			415 (27.83%)	1076 (72.17%)		
2	124 (55.61%)	99 (44.39%)			124 (23.22%)	410 (76.78%)		
≥3	101 (62.73%)	60 (37.27%)			101 (30.51%)	230 (69.49%)		
Number of properties owned			1858	0.602			20.294	0.000
0	213 (66.98%)	105 (33.02%)			213 (33.54%)	422 (66.46%)		
1	567 (63.35%)	328 (36.65%)			567 (25.14%)	1688 (74.86%)		
2	288 (65.75%)	150 (34.25%)			288 (29.66%)	683 (70.34%)		
≥3	135 (63.08%)	79 (36.92%)			135 (28.85%)	333 (71.15%)		
Self-efficacy			38.630	0.000			48.085	0.000
Low self-efficacy	686 (71.16%)	278 (28.84%)			686 (32.65%)	1415 (67.35%)		
High self-efficacy	517 (57.38%)	384 (42.62%)			517 (23.20%)	1711 (76.80%)		
Family health			12.669	0.002			31.428	0.000
Poor family health	454 (68.27%)	211 (31.73%)			454 (33.41%)	905 (66.59%)		
Moderate family health	614 (64.16%)	343 (35.84%)			614 (25.02%)	1840 (74.98%)		
Excellent family health	135 (55.56%)	108 (44.44%)			135 (26.16%)	381 (73.84%)		

Appendix 4

See Table 8.

Table 8 Results of univariate analysis of factors (*F*-test, t-test and correlation analysis) for variables affecting fertility intentions at different age groups

Age group	Excluded variables
15–19	Occupational status, Education level, Whether you have pets at home, Living region, Marital status
20–24	Occupational status, Whether you have pets at home, Place of residence, Household register, Number of siblings, Education level (VIF > 5)
25–29	Media exposure, Intimate partner violence, Household register, Per capita monthly income of the household
30–34	Education level, Place of residence, Per capita monthly income of the household
35–39	Media exposure, Place of residence, Household register, Number of siblings, Education level
40–49	Media exposure, Perceived social support, Intimate partner violence, Education level, Living region, Place of residence, Household register, Number of siblings, Number of properties owned, Per capita monthly income of the household, Marital status, Whether you have pets at home

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
This study was approved by the Ethics Research Committee of the Health Culture Research Center of Shaanxi (number JKWH-2022-02). Informed consent was obtained from all participants. All data were collected anonymously and kept confidential. This study was registered in the China Clinical Trial Registry (registration no ChiCTR2200061046).

Consent for publication
Not Applicable.

Competing interests
The authors declare no competing interests.

References
1. United Nations. World Population Prospects 2019. 2019a. https://population.un.org/wpp/2021. Accessed 15 June 2021.
2. National Bureau of Statistics. https://www.stats.gov.cn/english/.
3. Chen W. Changing fertility patterns in China. Chin J Sociol. 2023;9:497–521.
4. Bongaarts J. Household size and composition in the developing world in the 1990s. Popul Stud. 2001;55(3):263–79. https://doi.org/10.1080/00324720127697.
5. Melnikas AJ. Whether, When, and How: Fertility Intentions and Age in the U.S. 2017. https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1015&context=sph_etds. Accessed 10 June 2021.
6. Hayford SR. The evolution of fertility expectations over the life-course. Demography. 2009;46(4):765–83.
7. Sobotka T. Sub-replacement fertility intentions in Austria. Eur J Popul. 2009;25(4):387–412.
8. Kuhnt AK, Trappe H. Channels of social influence on the realization of short-term fertility intensions in Germany. Adv Life Course Res. 2016;27:16–29.
9. Trent RB. Evidence bearing on the construct validity of ideal 'family size.' Popul Environ. 1980;3:309–27.
10. McCleland GH. Family size desires as measures of demand. In: Bulatao RA, Lee R, editors. Determinants of fertility in developing countries. New York: Academic Press; 1983.
11. Ryder NB, Westoff CF. Trends in fertility: reproduction in the United States. Science. 1972;175:291–2. https://doi.org/10.1126/science.175.4019.291.b.
12. China population and development research center. 2024. https://data.cpdrc.org.cn/apps/apply/previewDataInfo.html?tId=6c84fb90-12c4-11e1-840d-7b25c5ee775a
13. Jing W, Liu J, Ma Q, Zhang S, Li Y, Liu M. Fertility intentions to have a second or third child under China's three-child policy: a national cross-sectional study. Hum Reprod. 2022;37(8):1907–18. https://doi.org/10.1093/humrep/deac101.
14. Xiang Z, Zhang X, Li Y, Li J, Wang Y, Wang Y, Ming WK, Sun X, Jiang B, Zhai G, Wu Y, Wu J. Fertility intention and its affecting factors in China: a national cross-sectional survey. Heliyon. 2023;9(2): e13445. https://doi.org/10.1016/j.heliyon.2023.e13445.
15. Skirbekk V. The new have-nots: childlessness in the twenty-first century. In: Decline and Prosper!. Cham: Palgrave Macmillan; 2022. https://doi.org/10.1007/978-3-030-91611-4_7
16. Leridon H, Slama R. The impact of a decline in fecundity and of pregnancy postponement on final number of children and demand for assisted reproduction technology. Hum Reprod. 2008;23:1312–9.
17. Compilation of Key Data for Demographic Monitoring Statistics of Shanghai, 2023. https://wsjkw.sh.gov.cn/tjsj2/20240520/2dafb45f564a4aabb1a9c22e67ae753e.html
18. Main Data of the Seventh National Population Census. https://www.stats.gov.cn/zt_18555/zdtjgz/zgrkpc/dqcrkpc/ggl/202302/t20230215_1904008.html
19. He D, Zhang X, Zhuang Y, et al. China fertility report, 2006–2016. China Popul Dev Stud. 2019;2:430–9. https://doi.org/10.1007/s42379-019-00022-9.
20. Office of the Leading Group of the State Council for the Seventh National Population Census. Major figures on 2020 population census of China. China: China Statistics Press Beijing; 2021.
21. Wang YJ, Kaierdebieke A, Fan SY, Zhang RF, Huang MJ, Li H, et al. Study protocol: a cross-sectional study on psychology and behavior investigation of Chinese residents, PBICR. Psychosom Med Res. 2022;4(3):19.
22. Zheng Z. Measurement and Application of Fertility Intention. Chin J Popul Sci. 2014;6:15–25126.
23. Wang X, Liu C, Wu Y, et al. Study on the influence of individual, family, and social factors on fertility intentions among the reproductive- age population in China. Popul Develop. 2024;30(6):27–40.
24. Baizan P, Nie W. The impact of education on fertility during the Chinese Reform Era (1980–2018): changes across birth cohorts and interaction with fertility policies. Eur J Popul. 2024;40:7. https://doi.org/10.1007/s10680-023-09691-2.
25. Wei H, Wang Q, Wu Y, et al. More children, more "efficacy": the relationship between fertility and self-efficacy among the post-80 s and post-90 s generations. Reprod Health. 2024;21:157. https://doi.org/10.1186/s12978-024-01894-y.
26. Schwarzer R. Generalized self-efficacy scale. Measures in health psychology: A user's portfolio. Causal and control beliefs/Nfer-Nelson. 1995.
27. Chen G, Gully SM, Eden D. Validation of a new general self-efficacy scale. Organ Res Methods. 2001;4(1):62–83.
28. Wang F, Chen K, Du Z, Wu Y, Tang J, Sun X. Reliability and validity analysis and Mokken model of New General Self-Efficacy Scale-Short Form (NGSES-SF). 2022.
29. Shi X, Wu Y, Wang X, Xu J, Miao J, Zang S. Factors associated with nursing students' mental health-related stigma: a multisite cross-sectional study. Nurse Educ Today. 2024;142:106346.
30. Crandall A, Weiss-Laxer NS, Broadbent E, Holmes EK, Magnusson BM, Okano L, Berg JM, Barnes MD, Hanson CL, Jones BL, Novilla LB. The family health scale: reliability and validity of a short-and long-form. Front Public Health. 2020;8: 587125.
31. Wang F, Wu Y, Sun X, Wang D, Ming WK, Sun X, Wu Y. Reliability and validity of the Chinese version of a short form of the family health scale. BMC Primary Care. 2022;23(1):108.
32. Wang X, Wu Y, Meng Z, Li J, Xu L, Sun X, Zang S. Willingness to Use Mobile Health devices in the Post–COVID-19 era: Nationwide cross-sectional study in China. J Med Internet Res. 2023;25: e44225.

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33. Zimet GD, Powell SS, Farley GK, Werkman S, Berkoff KA. Psychometric characteristics of the multidimensional scale of perceived social support. J Pers Assess. 1990;55(3–4):610–7.

34. Wu Y, Tang J, Du Z, Zhang X, Wang F, Sun X. Development of a Short Version of the Perceived Social Support Scale: based on classical test theory and item response theory. 2022.

35. Yang H, Han R, Wang Z. Third-child fertility intention and its socioeconomic factors among women aged 20–34 years in China. BMC Public Health. 2023;23:821. https://doi.org/10.1186/s12889-023-15719-3.

36. Kreyenfeld M, Konietzka D. Childlessness in Europe: contexts, causes, and consequences. Cham: Springer Nature; 2017.

37. Rackin HM, Bachrach CA. Assessing the predictive value of fertility expectations through a cognitive-social model. Popul Res Policy Rev. 2016;35:527–51.

38. Li T, Zheng Y, Yan Y. Have marriage and fertility been de-institutionalized in China? Findings from a survey on marriage and fertility intentions among college students. J Chin Women Stud. 2022;3:85–102.

39. Jiang Q, Zhang C, Zhuang Y, Jiang Y, Zhang X. Rising trend of childlessness in China: analysis of social and regional disparities with 2010 and 2020 census data. BMJ Open. 2023;13(5):e070553. https://doi.org/10.1136/bmjopen-2022-070553.

40. Qiao J, Wang Y, Li X, et al. A Lancet Commission on 70 years of women's reproductive, maternal, newborn, child, and adolescent health in China. Lancet. 2021;397(10293):2497–536. https://doi.org/10.1016/S0140-6736(20)32708-2.

41. Hartnett CS, Gemmill A. Recent trends in US childbearing intentions. Demography. 2020;57(6):2035–45. https://doi.org/10.1007/s13524-020-00929-w.

42. Zhang C, Pu Y, Yang J. Adjustment of one-child birth experience and fertility intentions. Labor Econ Res. 2024.

43. Qiao Y, Di J, Chen S, Hu H. Fertility intentions among reproductive-age women - three provinces, China, 2023. China CDC Wkly. 2024;6(31):778–85. https://doi.org/10.46234/ccdcw2024.171.

44. Guo W, Tan Y, Yin X, Sun Z. Impact of PM2.5 on second birth intentions of China's floating population in a low fertility context. Int J Environ Res Public Health. 2019;16(21):4293.

45. Odusina EK, Ayotunde T, Kunnuji M, Ononokpono DN, Bishwajit G, Yaya S. Fertility preferences among couples in Nigeria: a cross sectional study. Reprod Health. 2020;17(1):92.

46. Yan Z, Hui L, Wenbin J, et al. Third birth intention of the childbearing-age population in mainland China and sociodemographic differences: a cross-sectional survey. BMC Public Health. 2021;21(1):2280. https://doi.org/10.1186/s12889-021-12338-8.

47. Bernhardt E, Goldscheider F, Turunen J. Attitudes to the gender division of labor and the transition to fatherhood: Are egalitarian men in Sweden more likely to remain childless? Acta Sociologica. 2016;59(3):269–84. https://doi.org/10.1177/0001699316645930.

48. Hwang WY, Choi SY, An HJ. Concept analysis of transition to motherhood: a methodological study. Korean J Women Health Nurs. 2022;28:8–17.

49. Liu J, Zhou Z. Mothers' subjective well-being after having a second child in current China: a case study of Xi'an city. Int J Environ Res Public Health. 2019;16:3823. https://doi.org/10.3390/ijerph16203823.

50. Zeng Y, Hesketh T. The effects of China's universal two-child policy. Lancet. 2016;388:1930–8. https://doi.org/10.1016/S0140-6736(16)31405-2.

51. Zhang C. Family support or social support? The role of clan culture. J Popul Econ. 2019;32(2):529–49.

52. Ning N, Tang J, Huang Y, Tan X, Lin Q, Sun M. Fertility intention to have a third child in China following the three-child policy: a cross-sectional study. Int J Environ Res Public Health. 2022;19(22):15412. https://doi.org/10.3390/ijerph192215412.

53. Korea Statistics. Marriage and Divorce Statistics in 2022. 2023. https://kostat.go.kr/board.es?mid=a20108110000&bid=11774&act=view&list_no=424779. Accessed 15 Aug 2024.

54. Adejugbe BO, Ahmed MNQ. Fertility intentions in the USA: unraveling gender and age dynamics through a cross-sectional lens. J Pop Res. 2025;42:14. https://doi.org/10.1007/s12546-025-09365-2.

55. Zhu C, Yan L, Wang Y, Ji S, Zhang Y, Zhang J. Fertility intention and related factors for having a second or third child among childbearing couples in Shanghai. China Front Public Health. 2022;10: 879672. https://doi.org/10.3389/fpubh.2022.879672.

56. Yue C, Zheng X, Shang W, et al. Assessing intentions for a third child among Chinese adults: a nationwide online survey regarding China's 3-child policy. Medicine (Baltimore). 2023;102(12): e33255. https://doi.org/10.1097/MD.0000000000033255.

57. Ito T, Umemoto T, Nakaya M. Providing and receiving of autonomy support promotes self-efficacy and value for group activities in university and the workplace. Int J Educ Res Open. 2024;7:100339.

58. Guo B, Jiang F. Self-efficacy theory and its applications. In: Self-efficacy theory and its applications. Shanghai: Shanghai Education Press; 2008.

59. Hanappi D, Ryser VA, Bernardi L, Le Goff JM. Changes in employment uncertainty and the fertility intention-realization link: an analysis based on the Swiss Household panel. Eur J Popul. 2017;33(3):381–407. https://doi.org/10.1007/s10680-016-9408-y.

60. Spéder Z, Kapitány B. How are time-dependent childbearing intentions realized? Realization, postponement, abandonment, bringing forward. Eur J Population. 2009;25:503–23. https://doi.org/10.1007/s10680-009-9189-7.

61. Vignoli D, Rinesi F, Mussino E. Home to plan the first Child? Fertility intentions and housing conditions in Italy. Popul Space Place. 2013;19(1):60–71. https://doi.org/10.1002/psp.1716.

62. Mönkediek B, Bras H. Family systems and fertility intentions: exploring the pathways of influence. Eur J Popul. 2017;34(1):33–57. https://doi.org/10.1007/s10680-017-9418-4.

63. Wang T, Wang C, Zhou Y, Zhou W, Luo Y. Fertility intentions for a second child among urban working women with one child in Hunan Province, China: a cross-sectional study. Public Health. 2019;173:21–8. https://doi.org/10.1016/j.puhe.2019.05.006.

64. Liu X. Fertility intentions of China's one-child generation: a comparative analysis with the US. J Fam Stud. 2024;31(1):1–34. https://doi.org/10.1080/13229400.2024.2399263.

65. Murphy M, Knudsen LB. The intergenerational transmission of fertility in contemporary Denmark: the effects of number of siblings (full and half), birth order, and whether male or female. Popul Stud. 2002;56(3):235–48.

66. Beaujouan E, Solaz A. Is the family size of parents and children still related? Revisiting the cross-generational relationship over the last century. Demography. 2019;56:595–619. https://doi.org/10.1007/s13524-019-00767-5.

67. Kulu H, Vikat A. Fertility differences by housing type: the effect of housing conditions or of selective moves? Demogr Res. 2007;17:775–802.

68. Lee E, Jin J. Does the housing cost burden affect fertility intention of public housing residents? : focusing on the effect of rent to income ratio. J Korea Plann Assoc. 2024;59:159–77.

69. Xiong Y, Jiao G, Zheng J, et al. Fertility intention and influencing factors for having a second child among floating women of childbearing age. Int J Environ Res Public Health. 2022;19(24):16531. https://doi.org/10.3390/ijerph192416531.

70. Guzzo KB, Hayford SR, Lang VW. Adolescent fertility attitudes and childbearing in early adulthood. Popul Res Policy Rev. 2019;38:125–52. https://doi.org/10.1007/s11113-018-9499-8.

71. He Q, Deng X, Li C, Yan Z, Qi Y. The impact of rural population mobility on fertility intention under the comprehensive two-child policy: evidence from rural China. Int J Environ Res Public Health. 2022;19(12):7365. https://doi.org/10.3390/ijerph19127365.

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