Fertility Intention and Related Factors for Having a Second or Third Child Among Childbearing Couples in Shanghai, China

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Background and Purpose: As the global fertility rate declines, China has issued two and three-child policies in the past 10 years. Therefore, this study serves to evaluate fertility intention rates and related factors in couples intending to have a second child and third child.

Methods: A cross-sectional survey was conducted in mainland China from July to August 2021. Couples with one or two children were invited to participate in our study in order to collect information about more than one child fertility intention and the possibly related factors. Odds ratios (ORs) and their corresponding 95% confidence intervals (CIs) were calculated and adjusted for potential confounding factors.

Results: Data was collected from a total of 1,026 couples. Among couples with one child, 130 (16.2%) couples had the intention to have a second child. Additionally, only 9.4% of couples with two children desired to have third child. The study revealed large differences in socioeconomic and personal factors between the two groups. For couples with intentions for a second-child, a female age > 35 years (adjusted odds ratio, aOR 1.92), a first child’s age range from 3 to 6 (aOR 3.12), annual child spending as a percentage of household income > 30% (aOR 2.62), and children’s educational barriers (aOR 1.55) were associated with lack of intent to have a second child. Similarly, among couples with two children, parents with family financial constraints (aOR 6.18) and children’s educational barriers (aOR 4.93) are more likely to have lack of intent to have a third child. Here, we report that government policies encouraging fertility (aOR 0.04) can effectively promote couples to pursue a second or third child.

Conclusion: Overall, couples with one or two children in Shanghai had a low intention to give birth to a second or third child. In order to increase the birth rates, it is necessary to implement policies to reduce the burden of raising children and provide relief to parent’s pressure of rearing a child with increased free time.

Keywords: fertility intention, second child, third child, childbearing age, influencing factors
INTRODUCTION

Fertility has always been a key issue of national concern. The decline in fertility is becoming an inevitable trend in most countries around the world, especially in developed countries (1, 2). Low fertility rates are influenced by a range factor including medical infertility and lack of fertility intention (3). Couples with physical infertility may seek medical support (4). While often perceived as simply a behavioral choice, fertility intention needs to be clearly investigated regarding influencing factors such as sociodemographic and economic characteristics (5).

In the late 1970s, the one-child policy, which was also called “family planning,” was implemented to relieve the population pressure and support China in leaving severe poverty (6). During this policy, each couple was allowed to bear only one child. Now, several decades later, China has become one of the “low-fertility-rate countries” (7) and has had to meet new challenges which are aftereffects of the policy such accelerated population aging, skewed sex ratio, and decline in the working-age population, all of which are may hinder economic development (8).

Since 21st century, China has gradually changed its fertility policy, from a selective two-child policy to a comprehensive two-child policy. Nevertheless, according to the China Health Statistics Yearbook, the total annual births number in China has not shown an obvious growth trend (9) (Figure 1). On August 20, 2021, the Chinese government amended the Family Planning Law to allow a couple in China to have three children.

Recently, research on fertility intention has becomes the focus of fertility level because of the essential role of couples' behavior in the mediation of fertility outcomes (10). Although there are discrepancies between fertility intention and behavior at the individual level, on a population-level, fertility intention is correlated with having a child (11). Fertility intention is regarded to predict fertility behavior and it is affected by government policy as well as individual, social, economic, and cultural factors (12, 13). In China, previous studies have shown that the prevalence of the fertility intention was 39.4% for a second child in 2017, and 12.2% for a third child in 2021 among the general population (14, 15). According to this year’s National Bureau of Statistics, 43% of the births in 2021 were second births. Therefore, it is imperative to evaluate the fertility intention for a second or third child and related factors. To date, few studies have been conducted to evaluate fertility intention in parous couples (16). Most studies of fertility intentions involve all couples of childbearing age. Here, we investigate the intention to have a second/third child among couples who already have one/two children to remove confounding factors and clearly understand mechanisms.

Considering remediating the current situation of low birth rates, efforts should be made to address associated factors in target families with one or two children. This study is designed to evaluate the factors influencing parous women’s choice of having one more child. Thus, this research serves to provide information on the uptake of the universal multiple birth policy on individual, social, and economic levels so that a higher fertility rate may be achieved.

METHODS

Study Design and Participants

We conducted a cross-sectional survey in Shanghai from July to August 2021. The study population was based on the female fertility prospective cohort established established between 2013 and 2017 at one of the pre-pregnancy centers in Shanghai, which contains information on basic sociodemographics and reproductive intentions (17). Couples with one or two children were invited to participate in our study to share information about their “second/third births intentions” and likely related factors.

The inclusion criteria of our study were as follows: females aged between 20 and 45 years old, married with one or two living children, no history of severe physical or mental diseases, and voluntary participation in the study. The private information of patients has been strictly protected and data has been anonymized. Patients had the right to refuse or quit the study at any point effective immediately.

Definition of Fertility Intention

Fertility intention refers to people’s desire to have children and pursuit of childbirth (18), which is impacted by the expectation of the number, timing, gender, and quality of the children. Fertility intention, which was the dependent variable and primary outcome, was measured by one question: “Do you intend to have another child?” with the response options being: “do not intend, intend, and uncertain” accordingly.

Procedures

An in-person questionnaire and conversation were carried out to collect information from each participant. The questionnaire included the following components: sociodemographic characteristics of the women and their husbands (age, BMI, birthplace, education level, household annual income, family type, number of children, history of disorders, and pregnancy history, etc.), information of the first and second children in the family (age, gender, and economic investment, etc.), whether or not to have one more child and the reason related to it (whether to have second child for family with one child; whether to have third child for family with two child), ideal number of children (How many children do you think is appropriate in the family), and the factors which may influence the decision of having another child (economic status, working conditions, government policy, childcare, and challenges with access to children’s education). The contents of the questionnaire were appropriately revised after review and pretest by professors in Gynecology (ZZ). Finally, the validity and reliability of questionnaire is established.

To ensure a high quality of data collection, the questionnaire was filled out by the investigator during the interview according to standard protocol. If participants did not answer any questions because they were unwilling to respond, it was treated that as missing information.

Couples with one child were divided into three groups: with second-child intention (those with fertility intent), without second-child intention (those who wanted no more children), and undecided (those who have not decided whether or not to
have a second child). Accordingly, couples with two children were divided into three groups in the same way.

Statistical Analysis
All of the data were analyzed using SPSS (Version 26.0, IBM, Corp, Armonk, NY, USA). Between the groups with and without second/third child intention, a chi-squared test was used to compare the differences in basic characteristics. A binary logistic regression with “intention for a second child” and “intention for a third child” as the dependent variable and demographic factors as explanatory variable was conducted to test the associations between the intention for a second or third child and demographic factors of the couples or their children. Univariable conditional logistic regression analysis was also used to calculate crude odds ratios (ORs) and their 95% confidence intervals (CIs). According to the univariate analysis results, the covariables with $P < 0.1$ were included in the multivariate logistic regression model. Multivariate logistic regression analysis was performed to explore the potential factors and corresponding ORs. Statistical significance was indicated by $p$-value < 0.05.

RESULTS
Basic Characteristics
Shown in Figure 2, a total of 1,107 women were recruited for the study and agreed to participate to the questionnaire in person.
| TABLE 1 | Sociodemographic characteristics of study participants. |
|---------------|-----------------------------------------------------|
|               | ALL couples with one child | Have no second-child intention | Have second-child intention | Undecide |
|               | N = 802   | N = 540 | N = 130 | N = 132 | P<sub>c</sub> |
|               | n          | %        | n          | %        | n          | %        | n          | %        | n          | %        |
| Age, years, women |               |                         |                         |                      |             |             |             |             |             |
| <35            | 432        | 53.87      | 267        | 49.44    | 85         | 65.38    | 80         | 60.61    | 0.001      |
| ≥35            | 370        | 46.13      | 273        | 50.56    | 45         | 34.62    | 52         | 39.39    | 147        |
| Age, years, men |               |                         |                         |                      |             |             |             |             |             |
| <35            | 304        | 41.30      | 186        | 37.27    | 53         | 47.75    | 65         | 51.59    | <0.001     |
| ≥35            | 432        | 58.70      | 313        | 62.73    | 58         | 52.25    | 61         | 48.41    | 149        |
| BMI<sub>b</sub>, women |             |             |             |                      |             |             |             |             |             |
| <18.5          | 117        | 16.57      | 70         | 14.77    | 23         | 19.01    | 24         | 21.62    | 0.264      |
| 18.5-23.9      | 528        | 74.79      | 363        | 76.58    | 90         | 74.38    | 75         | 67.57    | 155        |
| ≥24            | 61         | 8.64       | 41         | 8.66     | 8          | 6.61     | 12         | 10.81    | 28         |
| BMI<sub>b</sub>, men |             |             |             |                      |             |             |             |             |             |
| <18.5          | 16         | 2.36       | 11         | 2.42     | 3          | 2.56     | 2          | 1.87     | 0.619      |
| 18.5-23.9      | 417        | 61.41      | 272        | 59.78    | 79         | 67.52    | 66         | 61.68    | 128        |
| ≥24            | 246        | 36.23      | 172        | 37.80    | 35         | 29.91    | 39         | 36.45    | 74         |
| Education attainment, women |             |             |             |                      |             |             |             |             |             |
| High school or low | 42         | 5.61       | 23         | 4.61     | 11         | 9.02     | 8          | 6.30     | 0.395      |
| Junior college or university | 609 | 81.42      | 413        | 82.77    | 94         | 77.05    | 102        | 80.31    | 169        |
| Graduate or above | 97         | 12.97      | 63         | 12.63    | 17         | 13.93    | 17         | 13.39    | 22         |
| Education attainment, men |             |             |             |                      |             |             |             |             |             |
| High school or low | 40         | 5.37       | 21         | 4.22     | 13         | 10.74    | 6          | 4.76     | 0.028      |
| Junior college or university | 609 | 81.74      | 415        | 83.33    | 88         | 72.73    | 106        | 84.13    | 158        |
| Graduate or above | 96         | 12.89      | 62         | 12.45    | 20         | 16.53    | 14         | 11.11    | 34         |
| Birthplace, women |             |             |             |                      |             |             |             |             |             |
| Shanghai       | 288        | 39.78      | 213        | 43.92    | 34         | 28.57    | 41         | 34.17    | 0.004      |
| Other place    | 436        | 60.22      | 272        | 56.08    | 85         | 71.43    | 79         | 65.83    | 144        |
| Birthplace, men |             |             |             |                      |             |             |             |             |             |
| Shanghai       | 334        | 46.84      | 246        | 51.36    | 45         | 38.79    | 43         | 36.44    | 0.002      |
| Other place    | 379        | 53.16      | 233        | 48.64    | 71         | 61.21    | 75         | 63.56    | 141        |
| Annual household incomes (RMB) |             |             |             |                      |             |             |             |             |             |
| <200,000       | 46         | 5.84       | 34         | 6.44     | 7          | 5.47     | 5          | 3.79     | 0.288      |
| (Continued)
TABLE 1  Continued

| Parent's family situation | ALL couples with one child | Have no second-child intention | Have second-child intention | Undecide | ALL couples with second child | Have no third-child intention | Have third-child intention | Undecide | \( P^c \) |
|---------------------------|----------------------------|--------------------------------|-----------------------------|----------|-------------------------------|--------------------------------|-----------------------------|----------|----------|
| Both only child          | 389                        | 48.50                          | 271                         | 50.19    | 54                            | 41.54                          | 64                           | 48.48    | 0.237    |
| Both non-only child      | 204                        | 25.44                          | 139                         | 25.74    | 32                            | 24.62                          | 33                           | 25.00    | 0.013    |
| One of only child        | 209                        | 26.06                          | 130                         | 24.07    | 44                            | 33.85                          | 35                           | 26.52    | 0.013    |

First child's age, years

| ≤2 | 157 | 19.58 | 90 | 16.67 | 32 | 24.62 | 35 | 26.52 | 0.013 |
| 3–6 | 621 | 77.43 | 436 | 80.74 | 91 | 70.00 | 94 | 71.21 |
| >7 | 24 | 2.99 | 14 | 2.59 | 7 | 5.38 | 3 | 2.27 |

Second child's age, years

| ≤2 | / | / | / | / | / | / | 94 | 38.37 | 77 | 41.85 | 12 | 28.57 | 5 | 26.32 | 0.006 |
| 3–6 | 150 | 61.22 | 107 | 58.15 | 30 | 71.43 |
| >7 | 1 | 0.41 | 0 | 0.00 | 0 | 0.00 | 1 | 5.26 |

Previous history of gynecological diseases

| No | 672 | 83.79 | 469 | 86.85 | 107 | 82.31 | 96 | 72.73 | <0.001 |
| Yes | 130 | 16.21 | 71 | 13.15 | 23 | 17.69 | 36 | 27.27 |

Previous history of gynecological surgery

| No | 735 | 92.57 | 490 | 92.11 | 116 | 89.23 | 129 | 97.73 | 0.025 |
| Yes | 59 | 7.43 | 42 | 7.89 | 14 | 10.77 | 3 | 2.27 |

The item parents pay most for first child

| Education | 538 | 67.08 | 373 | 69.07 | 85 | 65.38 | 80 | 60.61 | 0.161 |
| Others | 264 | 32.92 | 167 | 30.93 | 45 | 34.62 | 52 | 39.39 |

The item parents pay most for second child

| Education | / | / | / | / | / | / | 79 | 35.27 | 61 | 33.15 | 9 | 42.86 | 9 | 47.37 | 0.348 |
| Others | 145 | 64.73 | 123 | 66.85 | 12 | 57.14 | 10 | 52.83 |

Annual first child expense

| <70,000 | 579 | 72.56 | 370 | 68.90 | 105 | 81.40 | 104 | 78.79 | 0.001 |
| 70,000-100,000 | 148 | 18.55 | 118 | 21.97 | 15 | 11.63 | 15 | 11.36 |
| 100,000-140,000 | 38 | 4.76 | 32 | 5.96 | 3 | 2.33 | 3 | 2.27 |
| >140,000 | 33 | 4.76 | 17 | 3.17 | 6 | 4.66 | 10 | 7.58 |

(Continued)
## TABLE 1 | Continued

| All couples with one child | Have no second-child intention | Have second-child intention | Undecide | $P^c$ | All couples with second child | Have no third-child intention | Have third-child intention | Undecide | $P^c$ |
|----------------------------|--------------------------------|----------------------------|----------|-------|--------------------------------|-----------------------------|-----------------------------|----------|-------|
| $N = 802^a$                | $N = 540$                      | $N = 130$                  | $N = 132$|       | $N = 224^c$                   | $N = 184$                  | $N = 21$                    | $N = 19$ |       |
| n                          | %                              | n                          | %        |       | n                              | %                          | n                          | %        |       |
| Annual second child expense |                                |                            |          |       |                                |                            |                            |          |       |
| <70,000                    | /                              | /                          | /        | /     | 197                            | 88.74                      | 165                         | 90.66    | 16    |
| 70,000–100,000             |                                |                            |          |       | 17                             | 7.66                       | 13                          | 7.14     | 2     |
| 100,000–140,000            |                                |                            |          |       | 3                              | 1.35                       | 2                           | 1.10     | 1     |
| >140,000                   |                                |                            |          |       | 5                              | 2.25                       | 2                           | 1.10     | 2     |
| Factors affecting the fertility intention |                                |                            |          |       |                                |                            |                            |          |       |
| Family financial constraints$^a$ |                                |                            |          |       |                                |                            |                            |          |       |
| No                        | 381                            | 47.74                      | 286      | 53.36 | 63                             | 48.46                      | 32                          | 24.24    | <0.001|
| Yes                       | 417                            | 52.26                      | 250      | 46.64 | 67                             | 51.54                      | 100                         | 75.76    | 148   |
| Working conditions$^f$    |                                |                            |          |       |                                |                            |                            |          |       |
| No                        | 719                            | 90.10                      | 487      | 90.86 | 110                            | 84.62                      | 122                         | 92.42    | 0.063 |
| Yes                       | 79                             | 9.90                       | 49       | 9.14  | 20                             | 15.38                      | 10                          | 7.58     | 27    |
| Fertility-encouraged government policy$^g$ |                                |                            |          |       |                                |                            |                            |          |       |
| No                        | 655                            | 82.08                      | 448      | 83.58 | 97                             | 74.62                      | 110                         | 83.33    | 0.053 |
| Yes                       | 143                            | 17.92                      | 88       | 16.42 | 33                             | 25.38                      | 22                          | 16.67    | 75    |
| Childcare barriers$^h$    |                                |                            |          |       |                                |                            |                            |          |       |
| No                        | 89                             | 11.15                      | 65       | 12.13 | 18                             | 13.85                      | 6                           | 4.55     | 0.026 |
| Yes                       | 709                            | 88.85                      | 471      | 87.87 | 112                            | 86.15                      | 126                         | 95.45    | 194   |
| Children's educational barriers$^i$ |                                |                            |          |       |                                |                            |                            |          |       |
| No                        | 279                            | 34.96                      | 172      | 32.09 | 60                             | 46.15                      | 47                          | 35.61    | 0.010 |
| Yes                       | 519                            | 65.04                      | 364      | 67.91 | 70                             | 53.85                      | 85                          | 64.39    | 124   |

$^a$The sum does not necessarily equal the sample size for all variables because of missing data.

$^b$BMI is defined as Body mass index. Body mass index is defined as weight in kilograms divided by the square of height in meters.

$^c$Pearson's $\chi^2$ test.

$^d$Annual first child expense: the total annual investment in children's life, education, etc.

$^e$Family financial constraints: the shortage of money in raising more children.

$^f$Working conditions: no extra time to raise more children due to work.

$^g$Fertility-encouraged government policy: A policy to encourage childbirth by providing maternity subsidies and maternity leave.

$^h$Childcare barriers: the shortage of time or labour in raising more children.

$^i$Children's educational barriers: the stress of meet the educational needs of children.
Then, 65 (5.8%) couples subsequently declined to participate in the survey and 16 (1.4%) couples were pregnant. As a result, 1,026 couples were enrolled in the study, including 802 (78.2%) couples with one child and 224 (21.8%) couples with two children.

Table 1 shows the sociodemographic characteristics of all participants. In the second-child intention group, the mean age (± standard deviation (SD)) was 34.91 (±3.40) for the women and 36.68 (±3.86) for the men. Furthermore, for couples in the third-child intention group, the female and male mean age (±SD) was 36.87 (±4.15) and 38.66 (±5.02). For most couples, their family's annual income was between 300,000 to 500,000 yuan. Couples with one child mostly came from only-child families, while families where only one parent was from an only-child family accounted for most of the couples with two children.

**Intention to Have a Second or Third Child**

As shown in Table 2, among couples with one child, 130 (16.2%) couples had the intention to have a second child, while 540 (67.3%) couples had no intention of having another child, and another 132 (16.4%) couples had not yet decided. The majority of couples with two children (82.4%) showed no desire to have a third child and only 9.4% of couples expressed the intention to have a third child. Overall, participants indicated that the ideal number of children was 1.72 ± 0.52. Furthermore, the ideal number of children for couples with one child was 1.61 ± 0.52. In contrast, the ideal number of children for couples with two kids was 2.06 ± 0.34.

**Factors Influencing Fertility Intention**

The crude odds ratios (cORs) and adjusted odds ratios (aORs) of factors associated with second-child intention are shown in Table 3. A female age >35 years [aOR 1.92 (1.27–2.91)] and annual child-related spending as a percentage of household income >30% [aOR 2.62 (1.05–6.53)] were associated with a lack of intent to have a second child. For couples with one child, education accounted for 67.1% of the total annual investment in that child. Families with two children spent 87% of child-related expenses on the first child's education. In the second child, the proportion of investment in education dropped to 35.3%. Educational barriers prevent parents from having a second child, regardless of being a one- or two-child families [one-child family: aOR 1.55(1.03–2.33); two-child family: aOR 4.93(1.34–18.14)]. Couples with a child aged 3 to 6 [aOR 3.12(1.19–8.17)] were less likely to have a second child. Moreover, the fertility-encouraged government policy [aOR 0.61(0.38–0.98)] makes it easier for couples to have a second child.

However, for families with two children, the age of the both of the two children and the financial investment in the second child have no effect on the intent to have the third child (Table 4). Among couples with two children, parents with family financial constraints [aOR 6.18(1.80–21.22)] are more likely lack intent to have a third child. Therefore, the government policy encouraging fertility may make people more willing to have a third child [aOR 0.03(0.01–0.17)].

**DISCUSSION**

In the context of an overall low fertility rate, the intention rates investigated here for second and third births were 16.2% and 9.4% in Shanghai, respectively. This finding is lower than that of Jue Liu who found the second-child intent rate was 39.4% in central and eastern China after the universal two-child policy (15). Likewise, the third-child intention rate in our survey was also lower than the data obtained nationwide by another scholar in 2021 which was 12.2% (14). Unlike previous studies (10), here, we conducted a cross-sectional survey among couples with one child for second-child intention and couples with two children for third-child intention, controls for confounding factors and provides more detail and therefore accuracy (19, 20). In addition, we found that the baseline age of the participants in this study was older than that of the previous two studies. We believe that this is related to the social culture of late marriage and late childbearing of Women in Shanghai, which is based on the rapid economic development of Shanghai (9). It can be observed that differences in race, region, and social culture lead to differences in fertility intention. A study from Bangladesh suggested that the willingness of local women to have a second child was 71.2%, and the willingness to have a third child was 55% (21). In Iran,
### TABLE 3 | Factors associated with second-child intention.

|                      | Have no second-child intention | Have second-child intention | Unadjusted OR (95% CI) | P     | Adjusted OR (95% CI) | P     |
|----------------------|--------------------------------|-----------------------------|------------------------|-------|----------------------|-------|
|                      | N = 540                         | N = 130                     |                        |       |                      |       |
|                      | No second-child intention vs. have second-child intention |                      |                        |       |                      |       |
| Age, years, women    |                                |                             |                        |       |                      |       |
| <35                  | 267                            | 85                          | Ref                    | 0.002 | Ref                  | 0.002 |
| ≥35                  | 273                            | 45                          | 1.86 (1.27–2.77)       | 0.002 | 1.92 (1.27–2.91)      | 0.002 |
| First child's age, years |                              |                             |                        |       |                      |       |
| ≤2                   | 84                             | 30                          | 1.41 (0.52–3.80)       | 0.023 | 1.97 (0.70–5.52)      | 0.017 |
| 3–6                  | 371                            | 90                          | 2.40 (0.94–6.10)       | 0.023 | 3.12 (1.19–8.17)      | 0.017 |
| ≥7                   | 56                             | 7                           | Ref                    | Ref   | Ref                  | Ref   |
| The percentage of child-related expense (%)a |                                |                             |                        |       |                      |       |
| <10                  | 370                            | 105                         | Ref                    | 0.054 | Ref                  | 0.117 |
| 10–30                | 118                            | 15                          | 1.47 (0.91–2.37)       | 0.054 | 1.26 (0.77–2.07)      | 0.054 |
| ≥30                  | 32                             | 3                           | 2.86 (1.17–6.95)       | 0.054 | 2.62 (1.05–6.53)      | 0.054 |
| Fertility-encouraged government policy |                                |                             |                        |       |                      |       |
| No                   | 448                            | 97                          | Ref                    | 0.053 | Ref                  | 0.039 |
| Yes                  | 86                             | 33                          | 0.58 (0.37–0.91)       | 0.053 | 0.61 (0.38–0.96)      | 0.053 |
| Children's educational barriers |                              |                             |                        |       |                      |       |
| No                   | 172                            | 60                          | Ref                    | 0.003 | Ref                  | 0.038 |
| Yes                  | 364                            | 70                          | 1.81 (1.23–2.68)       | 0.003 | 1.55 (1.03–2.33)      | 0.003 |

aThe percentage of child expense (%) = 100% × Annual child-related expense/Annual household income.

The sum does not necessarily equal the sample size for all variables because of missing data.

Pearson’s χ² test.

A country also with a low fertility rate, 43% of families in the city of Tehran who already had a one child have a second child (22). In most developed countries, according to the National Survey of Family Growth (NSFG), about 12.8% of families were unwilling to have any children in 2017, and this trend increases each year (1).

Couples’ age was one of the most important associated factors with the second-child intention. We found that women who were 35 and older were less likely to want to have a second child. Perhaps people realize that being an older woman can lead to infertility and more pregnancy complications (18). A large number of studies have confirmed that before the age of 35 is the optimal reproductive age for women, which is consistent with our results (23). However, this pattern was not reflected in the third-child intention population: women with two children were not influenced by their age in their intent to have a third child. A possible explanation is that the baseline age of women who wish to have a third child is older (mean age: 36.87), and women older than 35 account for 65.8% of the total “third child intent” population. In addition, older women are less likely to have children (12, 13). Most women are facing infertility troubles caused by advanced age, rather than other factors affecting their desire to have a third child.

Most studies have shown that the high cost of education can be a deterrent to fertility (15). Although most of the children attend tuition-free schools in Shanghai, many parents take additional tutoring or extracurricular education, which increases the cost. This study also confirms that the family financial burden of education in Shanghai is significantly negatively correlated with fertility willingness.

Children dependency ratio is the population of children aged 0–14 divided by the working population aged 15–64. According to the China Statistical Yearbook-2021, Shanghai has the highest per capita disposable income in China (72,232 RMB), while its children dependency ratios were the lowest in the country. The children dependency ratio of 13.25 in Shanghai is almost half of the national average of 26.24. The decline in the number of children a family needs to support leads families to pursue meritocratic individual education, where the cost of educating a single child is relatively high. Existing data confirms this; the per capita expenditure on education and culture of Shanghai residents ranks first in China (as shown in Supplementary Table 2). When the number of children in a family increase, the financial investment in education of the whole family will increase greatly without culturally changing the previous education model. This increased burden of education discourages couples from having a second or third child.

In another survey (13, 24), a family’s socioeconomic status was found to be associated with raising a third child. Our findings confirm these results. In our study, family financial constraints have a negative effect on the third-child intention. Greater economic resources mean that families can afford the high costs...
TABLE 4 | Factors associated with third-child intention.

| Have no third-child intention | Have third-child intention | Unadjusted OR (95% CI) | P | Adjusted OR (95% CI) | P |
|-------------------------------|-----------------------------|------------------------|---|----------------------|---|
| N = 184                       | N = 21                      |                        |   |                      |   |
| Age, years, women             |                             |                        |   |                      |   |
| <35                          | 62                          | 8                      | Ref |                      |   |
| ≥35                          | 121                         | 13                     | 1.20 (0.47–3.05) | 0.700 | 1.24 (0.39–3.98) | 0.713 |
| First child's age, years      |                             |                        |   |                      |   |
| ≤2                           | 7                           | 1                      | 0.99 (0.41–2.40) | 0.992 | 0.86 (0.21–3.46) | 0.837 |
| 3–6                          | 88                          | 11                     | 0.87 (0.10–7.71) | 0.62 | 0.86 (0.05–8.63) | 0.837 |
| ≥7                           | 89                          | 12                     | Ref |                      |   |
| The percentage of children expense (%)<sup>a</sup> |                             |                        |   |                      |   |
| <10                          | 24                          | 5                      | Ref |                      |   |
| 10–30                        | 63                          | 11                     | 1.19 (0.38–3.89) | 0.067 | 0.54 (0.12–2.53) | 0.080 |
| ≥30                          | 93                          | 5                      | 3.88 (1.04–14.48) | 4.34 | 6.18 (1.80–21.22) | 0.004 |
| Family financial constraints  |                             |                        |   |                      |   |
| No                           | 57                          | 15                     | Ref | <0.001               | Ref |
| Yes                          | 127                         | 6                      | 5.57 (2.06–15.10) | 6.18 | 6.18 (1.80–21.22) | 0.004 |
| Fertility-encouraged government policy |             |                        |   |                      |   |
| No                           | 135                         | 2                      | Ref | <0.001               | Ref |
| Yes                          | 49                          | 19                     | 0.04 (0.01–0.17) | 0.04 | 0.04 (0.01–0.19) | <0.001 |
| Children's educational barriers |                       |                        |   |                      |   |
| No                           | 162                         | 19                     | Ref | 0.014                | Ref |
| Yes                          | 22                          | 2                      | 3.47 (1.29–9.36) | 4.93 | 1.34–18.14)       | 0.016 |

<sup>a</sup>The percentage of children expense (%) = 100% × Annual two children expense / Annual household income.
The sum does not necessarily equal the sample size for all variables because of missing data.
Pearson’s χ2 test.

The fertility intention metric includes the ideal number of children, gender, and time to have children. In the absence of coercive birth restrictions, the number of children people have depended largely on how many they want. Some scholars have found that although China’s population policy is gradually opening up, the ideal number of children has been declining in recent years, and economic development and the improvement of education level may likely contribute to a continuous decline in the ideal number of children (28). A couple’s ideal number of children is affected by factors such as population policy, economic factors, and children’s education, leading to a large gap between the ideal and reality. The gap is more pronounced among families with one child, rather than two. Most families with one child have an ideal number of two children, but economic, educational and other factors prevent them from pursuing a second child. The ideal number of children for families with a second child is close to 2, which is exactly what they expect. Therefore, in order to increase the levels of fertility intention, and thus increase the fertility level and birth rate, We must urge the government to introduce policies, such as providing maternity subsidies, or reducing the burden of children’s education.

There are some limitations to our study. First, as this is a single-center study in Shanghai, the sample size is relatively small. Although our sample size still meets the basic statistical
requirements and can detect a moderate effect size as significant, these results may not be applicable to other regions. In addition, the target population of this survey is people of childbearing age who have lived in Shanghai for a long time. In Shanghai, there are more people with higher education levels, higher incomes, and advanced ages, which has certain deviations from the national average. People in Shanghai cannot represent women in all regions of China. Future research may focus on people from different regions of China and different economic and cultural backgrounds. In addition, this cross-sectional study can accommodate the multiple child-bearing intentions of couples of childbearing age in Shanghai, providing valuable data for policy departments, but cannot determine causal relationships from these associations.

CONCLUSION

In conclusion, couples with one or two children in Shanghai have low intentions to give birth to a second or third child. Their decision is probably influenced by female age, age of the first child, family economic conditions, children's education expenses, and national fertility policies. It is necessary to take measures to reduce the financial burden of raising children and increase free time for couples to provide relief from parents' pressure of rearing a child. Governments and societies need increase efforts to support the intention to have a second or third child and thus increase the national fertility rate.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

REFERENCES

1. Hartnett CS, Gemmill A. Recent trends in US childbearing intentions. *Demography*. (2020) 57:2035–45. doi: 10.1007/s13524-020-00929-w
2. Blomberg Jensen M, Priskorn L, Jensen T K, Juul A, Skakkebaek N E. Temporal trends in fertility rates: a nationwide registry based study from 1901 to 2014. *PLoS ONE*. (2015) 10:e0143722. doi: 10.1371/journal.pone.0143722
3. Shreffler K M, Tiemeyer S, Dories C, Sierling T, Grell A, McQuillan J. Infertility and fertility intentions, desires, and births among US women. *Demogr Res.* (2016) 35:1149–68. doi: 10.4054/DemRes.2016.35.39
4. Datta J, Palmer M J, Tanton C, Gibson I, Jones K G, Macdowall W, et al. Prevalence of infertility and help seeking among 15 000 women and men. *Hum Reprod.* (2016) 31:2108–18. doi: 10.1093/humrep/dew123
5. Morgan S P, Rackin H. The correspondence between fertility intentions and behavior in the United States. *Popul Dev Rev*. (2010) 36:91–118. doi: 10.1111/j.1728-4457.2010.00319.x
6. Hesketh T, Lu L, Xing Z. The effect of China’s one-child family policy after 25 years. *N Engl J Med.* (2005) 353:1171–6. doi: 10.1056/NEJMhp051833
7. Feng W, Cai YBG. Population, policy, and politics: how will history judge China’s one-child policy. *Popul Dev Rev.* (2013) 38:115e129. doi: 10.1111/j.1728-4457.2013.00555.x
8. Zeng Y, Hesketh T. The effects of China’s universal two-child policy. *Lancet*. (2016) 388:1930–8. doi: 10.1016/S0140-6736(16)31405-2
9. National health commission of the People’s Republic of China. *China Health Statistics Yearbook 2020*. Beijing: Peking Union Medical College Press (2020).
10. Mencarini L, Vignoli D, Gottard A. Fertility intentions and outcomes: implementing the theory of planned behavior with graphical models. *Adv Life Course Res.* (2015) 23:14–28. doi: 10.1016/j.alcr.2014.12.004
11. Quesnel-Vallee A M S. Missing the target? Correspondence of fertility intentions behavior in the US. *Popul Res Pol Rev.* (2003) 22:497–525. doi: 10.1023/B:POPU.0000021074.33415.c1
12. Jiang Q, Li Y, Sanchez-Barricarte J. Fertility intention, son preference, and second childbirth: survey findings from Shannxi Province of China. *Soc Indic Res.* (2016) 125:935–53. doi: 10.1007/s11356-015-0875-z
13. Zheng Y, Yuan J, Xu T, Chen M, Liang H, Connor D, et al. Socioeconomic status and fertility intentions among Chinese women with one child. *Hum Fertil.* (2016) 19:43–7. doi: 10.1111/humf.12014
14. Yan Z, Hui L, Wenbin J, Liuxue L, Yuemei L, Bohan L, et al. Third birth intention of the childbearing-age population in mainland China and sociodemographic differences: a cross-sectional survey. *BMC Public Health*. (2021) 21:2280. doi: 10.1186/s12889-021-12338-8
15. Liu J, Liu M, Zhang S, Ma Q, Wang Q. Intent to have a second child among Chinese women of childbearing age following China’s new universal two-child policy: a cross-sectional study. *BMJ Sex Reprod Health*. (2019) 45:59–66. doi: 10.1136/bmjsh-2018-200197
16. Naghibi S A, Khazaee-Pool M, Moosazadeh M. Psychometric properties of fertility desire scale (FDS) developed for Iranian parents. *BMC Public Health*. (2019) 19:1113. doi: 10.1186/s12889-019-7413-x
17. Zhu C, Wu J, Liang Y, Yan L, He C, Chen L, et al. Fertility intentions among couples in Shanghai under COVID-19: a cross-sectional

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Institutional Review Board of the International Peace Maternity and Children’s Health Hospital. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JZ was conceived of the study and participated in its design, as well as supervised the study, and critically revised the manuscript. CZ performed the investigation and wrote the manuscript. LY and YW contributed to collection. YZ and SJ participated in statistical analysis. All authors read and approved the final version of the manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.879672/full#supplementary-material

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We sincerely thank the couples who participated in the study.
18. May-Panloup P, Boucret L, Chao de la Barca J M, Desquiret-Dumas V, Ferre-L’Hotellier V, Moriniere C, et al. Ovarian ageing: the role of mitochondria in oocytes and follicles. *Hum Reprod Update*. (2016) 22:725–43. doi: 10.1093/humupd/dmw028

19. Rucinski K B, Schwartz S R, Powers K A, Pence B W, Chi B H, Black V, et al. Fertility intentions and clinical care attendance among women living with HIV in South Africa. *AIDS Behav*. (2020) 24:1585–91. doi: 10.1007/s10461-019-02564-y

20. Jones RK, Foster DG, Biggs MA. Fertility intentions and recent births among US abortion patients. *Contraception*. (2021) 103:73–9. doi: 10.1016/j.contraception.2020.11.007

21. Akram R, Sarker AR, Sheikh N, Ali N, Mozumder M, Sultana M. Factors associated with unmet fertility desire and perceptions of ideal family size among women in Bangladesh: insights from a nationwide demographic and health survey. *PLoS ONE*. (2020) 15:e0233634. doi: 10.1371/journal.pone.0233634

22. Erfani A. Low fertility intention in Tehran, Iran: the role of attitudes, norms and perceived behavioural control. *J Biosoc Sci*. (2017) 49:292–308. doi: 10.1017/S0021932016000109

23. Cheng P J, Duan T. China’s new two-child policy: maternity care in the new multiparous era. *B/OG*. (2016) 123(Suppl. 3):7–9. doi: 10.1111/1471-0528.14290

24. Dribe M, Hacker J D, Scalone F. The impact of socio-economic status on net fertility during the historical fertility decline: a comparative analysis of Canada, Iceland, Sweden, Norway, and the USA. *Popul Stud*. (2014) 68:135–49. doi: 10.1080/00324728.2014.889741

25. Wu P, Wu Q, Dou Y. Simulating population development under new fertility policy in China based on system dynamics model. *Qual Quant*. (2016) 51:2171–89. doi: 10.1007/s11135-016-0380-8

26. Zhang X, Huang J, Luo Y. The effect of the universal two-child policy on medical insurance funds with a rapidly ageing population: evidence from China’s urban and rural residents’ medical insurance. *BMC Public Health*. (2021) 21:1444. doi: 10.1186/s12889-021-11367-7

27. National Health Commission of the People’s Republic of China, the Central Political Bureau (2021). Available online at: http://www.nhc.gov.cn/wjw/mftbd/202105/95871240947b416eb97eeac5d302061.shtml (accessed February 15, 2022).

28. Wu F. Review on fertility intentions: theories and empirical studies. *Sociol Stud*. (2020) 4:218-240. doi: 10.19934/j.cnki.shxyj.2020.04.011

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