RESEARCH ARTICLE

# A Study on the Relationship Between Overall Education Attainment and Fertility Intentions in China — An Empirical Analysis Based on CGSS 2012–2021 Data

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## Abstract

**In recent years, the educational attainment of the Chinese population has significantly improved, while fertility intention has shown a gradual decline. To explore whether there is a significant relationship between these two factors, this paper utilizes the publicly available data from the Chinese General Social Survey (CGSS) spanning ten years from 2012 to 2021. An ordered logistic model is employed for empirical analysis. The study reveals that, under the condition of other factors remaining constant, groups with different educational attainments exhibit varying fertility intentions. Furthermore, the research finds a negative correlation between the educational attainment and fertility intention among the Chinese population. Given the ongoing improvement in the educational attainment of the population, measures such as strengthening school education and implementing relevant fertility policies are effective ways to enhance fertility intention.**

**Keywords**: educational attainment, fertility intention, CGSS, logistic model.

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## 1 Introduction

By the end of 2023, China had achieved a consolidation rate of 95.7% for its nine-year compulsory education and a gross enrollment rate of 60.2% in higher education, successfully meeting the "14th Five-Year Plan" targets ahead of schedule [1]. Individuals in China not only have access to foundational education but are also increasingly able to enroll in higher education institutions, thus enabling them to acquire more advanced theoretical knowledge and substantially enhancing their overall educational attainment. However, in contrast to the robust growth observed in China's education sector, the country's fertility rates have demonstrated a steady downward trajectory in recent years.

Within this context, scholars have conducted extensive research investigating the relationship between educational attainment and fertility intentions among the Chinese population. Nevertheless, the existing academic literature has not yet reached a consensus regarding the nature of this relationship.

Firstly, some scholars argue that educational

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attainment is negatively correlated with fertility intentions, meaning that individuals with higher levels of education tend to have lower intentions to have children. For example, Cai et al. [2] through an analytical study of 1,287 women of reproductive age in Wuhan and Changsha, found that higher educational attainment among these women was associated with a lower intention to have a third child. Nie [3] also analyzed the relationship between educational attainment and fertility intentions based on data from the 2017 China General Social Survey (CGSS). The empirical results similarly indicate a negative correlation between the two variables. Liu et al. [4] using data from the 2013 China General Social Survey (CGSS), employed an empirical approach combining Poisson regression and other regression models. Their findings suggest that education has a negative effect on fertility intentions regarding a second child. Cygan-Rehm et al. [5] also examined the impact of education on fertility under conditions of a rigid labor market and found that in Germany, there is likewise a negative correlation between educational attainment and fertility intentions. Fort et al. [6] evaluated the causal relationship between education and childlessness using data from England spanning 1936 to 1975. Their findings revealed a negative correlation between educational attainment and fertility rates in England. On the other hand, some scholars have arrived at contrasting conclusions through empirical analysis, suggesting a positive correlation between educational attainment and fertility intentions. For example, Mi et al. [7] using panel data from 31 provinces in China spanning the years 1998 to 2017. conducted an empirical analysis employing a Panel Vector Autoregression (PVAR) model. Their findings indicate that the improvement in educational attainment among the Chinese population may, in fact, promote an increase in fertility. Zhong et al. [8] in a study examining the impact of the "universal two-child" policy on the fertility intentions of urban couples where both spouses are non-native residents ("double non"), found that couples with higher educational attainment were more inclined to have a second child. The study concluded that fertility intentions in this context are positively correlated with educational attainment. Fort et al. [6] further extended their analysis using data from continental Europe spanning 1936 to 1975 to evaluate the causal relationship between education and the incidence of childlessness. Contrary to their findings in England, the results indicated that in continental Europe, higher levels of educational attainment were associated with lower rates of childlessness—suggesting that higher educational attainment was linked to stronger fertility intentions. Testa [9] using data from the Eurobarometer survey covering individuals across 27 EU countries, analyzed the relationship between women's educational attainment and their lifetime fertility intentions. The results indicated that the higher the level of educational attainment among women, the stronger their lifetime fertility intentions. Finally, some scholars argue that the relationship between educational attainment and fertility intentions is inherently complex. For example, Li et al. [10] using an instrumental variable approach, found that the increase in educational attainment is negatively correlated with fertility intentions among middle- and low-income groups, while for high-income groups, the relationship is not statistically significant. Hu [11] drawing on data from the 2015 China General Social Survey (CGSS) and employing relevant econometric models, found that higher levels of educational attainment are associated with lower fertility intentions among residents. However, this effect was not statistically significant for males. Moreover, the career advancement resulting from higher educational attainment was found to have a positive effect on fertility intentions, indicating a nuanced interplay between educational attainment, employment outcomes, and reproductive preferences. Zhang et al. [12] using provincial panel data from mainland China spanning 15 years (2003–2017), conducted an empirical analysis employing spatial econometric models. Their findings revealed that the effect of educational attainment on birth rates exhibits a "U-shaped" relationship—indicating that at lower levels of educational attainment, increases in education suppress fertility intentions, while at higher levels, further education promotes it. Additionally, the study identified significant spatial spillover effects, suggesting that educational attainment in one region can influence fertility intentions in neighboring regions. Zhao [13] based on data from the 2010, 2012, and 2013 China General Social Survey (CGSS), found that when policy restrictions are not taken into account, women with either relatively high or relatively low levels of educational attainment exhibit stronger intentions to have a second child. This finding suggests that the relationship between educational attainment and fertility intentions follows a "U-shaped" structure.

In conclusion, the current academic research on the relationship between educational attainment and

fertility intentions has not reached a unified conclusion, and the establishment of a comprehensive theoretical framework requires further investigation. Additionally, research on fertility intentions extends beyond the intention for first childbirth, with some scholars actively exploring the intentions to have a second or third child. Finally, based on both domestic and international scholarly work, it is evident that differences in educational attainment do have an impact on fertility intentions, though the nature of this impact may vary depending on the empirical methods used, resulting in differing conclusions.

Building on this, the marginal contributions of this study are as follows:

- First, it further confirms the negative effect of educational attainment on fertility intentions in China.
- Second, it restricts the study of fertility intentions to theoretical birth quantities, with the aim of comprehensively understanding fertility intentions in China, specifically by combining the intentions for having a second and third child with the intention for first childbirth.

Based on these considerations, the study proposes the following research hypothesis: The educational attainment of the population has a negative impact on fertility intentions.

## 2 Empirical analysis

### 2.1 Data Sources

This study uses publicly available data from the China General Social Survey (CGSS) conducted between 2012 and 2021. The database is managed and released annually by the China Survey and Data Center (NSRC) at Renmin University of China. It is a representative longitudinal social survey in China, providing comprehensive and systematic descriptions and analyses of Chinese society through annual data, thus revealing the actual state of social changes in China.

### 2.2 Data Cleaning

According to the specific needs of this study, several data cleaning steps were applied to the CGSS data from 2012 to 2021:

- First, only the data related to educational attainment and fertility intentions were retained for empirical analysis.
- Second, missing values, duplicates, and data with unclear cultural level were removed.
- Third, based on national regulations regarding the fertility age range and practices from relevant literature, only sample data from individuals aged 20 to 49 were retained.

Finally, the samples with educational attainment categorized as secondary vocational schools and technical schools were merged into the "High School" category, while samples from private schools, literacy classes, and elementary schools were merged into the "Elementary School" category. The final effective samples after cleaning were as follows: 6,008 samples in 2012, 5,651 samples in 2013, 4,909 samples in 2015, 5,525 samples in 2017, 5,393 samples in 2018, and 3,138 samples in 2021[1].

### 2.3 Variable Specification

#### *2.3.1 Dependent Variable*

The focus of this study is the fertility intentions of the Chinese population. The measurement of fertility intentions encompasses aspects such as the desired number of children and preferences regarding the gender of offspring [14]. Asking respondents about the number of children they would like to have under ideal circumstances is considered a relatively reliable method of measuring fertility intentions [15, 16]. Accordingly, this study adopts the ideal number of children as the measure of fertility intentions, specifically using responses to the CGSS survey question: "If there were no policy restrictions, how many children would you ideally like to have?" The responses were recoded as follows: values ranging from 0 to 5 were assigned corresponding values from 0 to 5, while responses indicating 6 or more children were uniformly coded as 6.

#### *2.3.2 Independent Variable*

The independent variable in this study is educational attainment. Following standard practice, the highest level of education completed by each respondent is adopted as the quantitative measure of educational attainment. This information is drawn from the CGSS survey question: "What is your highest level of education completed?" Based on the methodology employed by Ye et al. [17], the educational attainment are coded as follows: individuals with no formal

[1]The selection of data years is based on the years of data released by the CGSS database, and since the majority of existing literature does not exclude the 2013 and 2017 data, this paper follows the same approach.

**Table 1.** Names and coding of control variables.

| Variable Name | Coding Description | Variable Name | Coding Description |
|---|---|---|---|
| Education Attainment | No formal education = 0<br>Primary school / Private school / Literacy class = 1<br>Junior high school = 2<br>Senior high school / Technical secondary / Vocational = 3<br>Associate degree = 4<br>Bachelor's degree = 5<br>Postgraduate and above = 6 | Self-rated Health | Very unhealthy = 0<br>Relatively unhealthy = 1<br>Fair = 2<br>Relatively healthy = 3<br>Very healthy = 4 |
| Fertility Intentions | Number of children from 0–5 assigned values 0–5<br>6 children or more assigned value = 6 | Religious Belief | No religious belief = 0<br>Has religious belief = 1 |
| Gender | Male = 1<br>Female = 0 | Hukou Type | Agricultural hukou = 0<br>Non-agricultural hukou = 1 |
| Ethnicity | Han = 1<br>Non-Han (ethnic minorities) = 0 | Marital Status | Unmarried (including cohabiting) = 0<br>Married (including first marriage, separated but not divorced, divorced, widowed, remarried with spouse) = 1 |
| | | Political Affiliation | Communist Party member = 1<br>Non-party member (general public or Communist Youth League member) = 0 |

education are assigned a value of 0; those who completed primary school are assigned a value of 1; junior high school, a value of 2; senior high school, a value of 3; associate degree, a value of 4; bachelor's degree, a value of 5; and postgraduate or higher degrees, a value of 6.

#### *2.3.3 Control Variables*

To ensure the robustness of the empirical results, this study incorporates a set of control variables based on relevant literature—particularly the research of Lü et al. [18] as well as the specific focus of the present study [19–23]. The selected control variables include: gender, household registration status (hukou), religious belief, ethnicity, political affiliation, self-rated health status, and marital status. The detailed treatment and coding of these variables are presented in Table 1.

### 2.4 Model Specification

In research on the relationship between educational attainment and fertility intentions, most models commonly adopt methods such as the Ordinary Least Squares (OLS) regression model and sample selection models [24]. However, considering the ordered and discrete nature of fertility intentions data, this study employs an Ordered Logistic Regression Model for quantitative analysis. The specific model is formulated as follows:

$$Log(fer_i) = \alpha + \beta \text{edu}_i + \gamma \text{control}_i + \varepsilon_i \quad (1)$$

In this model, $\text{fer}_i$ represents the individual's fertility intention, $\text{edu}_i$ denotes the overall educational attainment of the population, and $\text{control}_i$ includes the set of control variables, namely gender, ethnicity, political affiliation, self-rated health, religious belief, hukou type, and marital status. The parameters $\alpha$, $\beta$, and $\gamma$ are to be estimated, and $\varepsilon_i$ denotes the random error term.

## 3 Empirical Results

### 3.1 Descriptive Statistics

#### *3.1.1 Dependent Variable*

Table 2 presents the specific statistical results for fertility intentions across various years. It can be observed that, in the ideal state, the proportion of individuals with zero fertility intentions has gradually increased over the past decade, while the proportion of those with more than four children has generally shown a downward trend. Additionally, in order to better explore the changes in fertility intentions

**Table 2.** Fertility intention statistical results.

| Number of Children | 2012 | 2013 | 2015 | 2017 | 2018 | 2021 | 2012-2021 |
|---|---|---|---|---|---|---|---|
| 0 | 1.30% | 1.54% | 1.79% | 2.41% | 3.69% | 6.09% | 2.53% |
| 1 | 24.77% | 24.99% | 20.57% | 22.26% | 21.73% | 23.52% | 23.02% |
| 2 | 66.01% | 65.65% | 69.46% | 64.13% | 62.64% | 62.01% | 65.15% |
| 3 | 5.49% | 5.70% | 5.91% | 6.05% | 6.79% | 6.69% | 6.05% |
| 4 | 1.80% | 1.57% | 1.63% | 1.74% | 1.74% | 1.27% | 1.66% |
| 5 | 0.30% | 0.28% | 0.22% | 0.36% | 0.32% | 0.25% | 0.29% |
| 6 or more | 0.33% | 0.27% | 0.41% | 3.06% | 3.10% | 0.16% | 1.29% |

**Table 3.** Education attainment statistical results.

| Education attainment | 2012 | 2013 | 2015 | 2017 | 2018 | 2021 | 2012-2021 |
|---|---|---|---|---|---|---|---|
| No formal education | 4.46% | 3.70% | 4.01% | 4.09% | 5.08% | 2.87% | 4.13% |
| Primary school | 17.93% | 17.73% | 17.82% | 14.97% | 14.39% | 10.33% | 15.94% |
| Junior high school | 33.17% | 33.07% | 33.00% | 28.47% | 28.50% | 27.21% | 30.85% |
| Senior high school / Technical secondary / Vocational school | 20.29% | 19.85% | 18.64% | 18.62% | 18.88% | 19.38% | 19.30% |
| Associate degree | 11.55% | 12.30% | 10.90% | 12.92% | 12.78% | 13.93% | 12.29% |
| Bachelor's degree | 11.73% | 11.98% | 13.79% | 18.01% | 17.62% | 23.07% | 15.44% |
| Postgraduate and above | 0.87% | 1.36% | 1.83% | 2.91% | 2.76% | 3.22% | 2.06% |

between 2012 and 2021, the CGSS data from these six years were organized into cross-sectional data for analysis. The findings reveal that over 65% of respondents expressed a desire to have two children, while 2.53% of respondents were unwilling to have any children.

### *3.1.2 Independent Variable*

Table 3 presents the specific statistical results regarding educational attainment across different years. It can be observed that over the past decade, approximately 66% of respondents have completed the nine-year compulsory education, and nearly half of the population has had the opportunity to pursue senior high school or higher education. Based on the annual data from 2012 to 2021, it is evident that the overall level of educational attainment among the Chinese population has shown an upward trend— the proportion of individuals with no formal education has declined, while the number of those receiving higher education has increased significantly.

### *3.1.3 Key Variables*

Table 4 illustrates the differences in fertility intentions across various levels of educational attainment within the sample for each year—namely, the variation in fertility intentions among individuals with different educational attainment. It can be observed that in recent years, respondents with no formal education exhibited the highest fertility intentions, whereas those with undergraduate or associate degrees reported the lowest. Respondents with postgraduate degrees or above showed fertility intentions similar to those with undergraduate and associate degrees. Overall, individuals at all educational attainments include those who are unwilling to have children as well as those who wish to have multiple children. Moreover, based on recent years' data, fertility intentions have declined across all levels of educational attainment.

### *3.1.4 Control Variables*

Table 5 presents the descriptive statistics for the independent variables, dependent variable, and control variables used in this study. It can be seen that the average fertility intention among the 30,624 respondents is 1.87 children. The overall level of educational attainment falls between junior high school and senior high school. The average self-rated health score is 2.93, indicating that, on average, respondents consider their health to be between "fair" and "relatively good." Over half of the respondents are either members of the general public or members of the Communist Youth League. Most respondents are married, of Han ethnicity, have no religious affiliation, and are registered as agricultural household residents.

**Table 4.** Differences in overall educational attainment and fertility intentions.

| | Education attainment | No formal education | Primary school | Junior high school | Senior high school / Technical secondary / Vocational school | Associate degree | Bachelor's degree | Postgraduate and above |
|---|---|---|---|---|---|---|---|---|
| 2012 | Sample Size | 268 | 1077 | 1993 | 1219 | 694 | 705 | 52 |
| | Mean | 2.09 | 1.96 | 1.84 | 1.77 | 1.77 | 1.73 | 1.85 |
| | Standard Deviation | 0.72 | 0.73 | 0.66 | 0.72 | 0.68 | 0.64 | 0.78 |
| | Maximum | 4 | 6 | 6 | 6 | 6 | 6 | 5 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2013 | Sample Size | 209 | 1002 | 1869 | 1122 | 695 | 677 | 77 |
| | Mean | 2.15 | 1.99 | 1.83 | 1.74 | 1.67 | 1.76 | 1.83 |
| | Standard Deviation | 0.76 | 0.69 | 0.64 | 0.72 | 0.64 | 0.70 | 0.55 |
| | Maximum | 6 | 6 | 6 | 6 | 5 | 6 | 3 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2015 | Sample Size | 197 | 875 | 1620 | 915 | 535 | 677 | 90 |
| | Mean | 2.21 | 1.96 | 1.90 | 1.81 | 1.76 | 1.77 | 1.82 |
| | Standard Deviation | 0.80 | 0.73 | 0.66 | 0.66 | 0.69 | 0.61 | 0.68 |
| | Maximum | 6 | 6 | 6 | 6 | 6 | 5 | 6 |
| | Minimum | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2017 | Sample Size | 226 | 827 | 1573 | 1029 | 714 | 995 | 161 |
| | Mean | 2.25 | 2.08 | 1.97 | 1.87 | 1.91 | 1.91 | 1.88 |
| | Standard Deviation | 1.09 | 1.00 | 0.86 | 0.94 | 1.08 | 1.09 | 0.94 |
| | Maximum | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2018 | Sample Size | 274 | 776 | 1537 | 1018 | 689 | 950 | 149 |
| | Mean | 2.14 | 2.07 | 1.98 | 1.90 | 1.89 | 1.84 | 1.83 |
| | Standard Deviation | 1.07 | 0.91 | 0.94 | 0.99 | 1.05 | 1.12 | 1.19 |
| | Maximum | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2021 | Sample Size | 90 | 324 | 854 | 608 | 437 | 724 | 101 |
| | Mean | 1.98 | 2.02 | 1.89 | 1.70 | 1.62 | 1.58 | 1.54 |
| | Standard Deviation | 0.92 | 0.72 | 0.65 | 0.71 | 0.79 | 0.82 | 0.85 |
| | Maximum | 4 | 5 | 6 | 6 | 6 | 6 | 6 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2012-2021 | Sample Size | 1264 | 4881 | 9446 | 5911 | 3764 | 4728 | 630 |
| | Mean | 2.15 | 2.01 | 1.90 | 1.80 | 1.78 | 1.78 | 1.80 |
| | Standard Deviation | 0.91 | 0.81 | 0.75 | 0.81 | 0.86 | 0.90 | 0.92 |
| | Maximum | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

### 3.2 Regression Results

This study employs an ordered logistics regression model to examine the impact of educational attainment on fertility intentions. In Model (1), control variables are not included, while Model (2) incorporates a set of control variables. The regression results are presented in Table 6.

From Table 6, it is evident that there is a negative correlation between educational attainment and fertility intentions over the past decade. Although the regression coefficients decrease after the inclusion of relevant control variables, they remain statistically significant at the 1% level. Examining the regression results year by year, it becomes clear that while the coefficients reflecting the relationship between overall educational attainment and fertility intentions among the Chinese population have shown a complex pattern—first decreasing, then increasing, and subsequently decreasing again—the coefficients are consistently negative. This supports the hypothesis of the study that educational attainment is negatively associated with fertility intentions. As for the control variables, religious belief, political affiliation, and gender exhibit a statistically significant positive influence on fertility intentions at the 1% level, while hukou type and ethnicity show a statistically significant negative influence on fertility intentions at the 1% level.

### 3.3 Robustness Check

To ensure the robustness and reliability of the model results, this study also employs an Ordered Probit Regression Model to re-estimate the data. A comparison of the regression results is presented in Table 7.

From Table 7, it can be observed that the statistical

**Table 5.** Descriptive statistics of key control variables.

| | Variable Name (Symbol) | Education Attainment (edu) | Fertility Intention (fer) | Gender (gen) | Ethnicity (nat) | Political Affiliation (pol) | Self-Rated Health (srh) | Religious Belief(rel) | Hukou Type (dom) | Marital Status (mar) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2012 | Sample Size | 6008 | 6008 | 6008 | 6008 | 6008 | 6008 | 6008 | 6008 | 6008 |
| | Mean | 2.55 | 1.84 | 0.49 | 0.91 | 0.09 | 2.89 | 0.14 | 0.46 | 0.86 |
| | Standard Deviation | 1.38 | 0.69 | 0.50 | 0.29 | 0.29 | 0.96 | 0.35 | 0.50 | 0.35 |
| | Maximum | 6 | 11 | 1 | 1 | 1 | 4 | 1 | 1 | 1 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2013 | Sample Size | 5651 | 5651 | 5651 | 5651 | 5651 | 5651 | 5651 | 5651 | 5651 |
| | Mean | 2.61 | 1.83 | 0.49 | 0.91 | 0.09 | 3.05 | 0.10 | 0.43 | 0.84 |
| | Standard Deviation | 1.39 | 0.69 | 0.50 | 0.29 | 0.28 | 0.95 | 0.30 | 0.49 | 0.36 |
| | Maximum | 6 | 20 | 1 | 1 | 1 | 4 | 1 | 1 | 1 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2015 | Sample Size | 4909 | 4909 | 4909 | 4909 | 4909 | 4909 | 4909 | 4909 | 4909 |
| | Mean | 2.63 | 1.87 | 0.46 | 0.92 | 0.08 | 2.96 | 0.11 | 0.41 | 0.83 |
| | Standard Deviation | 1.45 | 0.69 | 0.50 | 0.28 | 0.27 | 0.95 | 0.31 | 0.49 | 0.38 |
| | Maximum | 6 | 21 | 1 | 1 | 1 | 4 | 1 | 1 | 1 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2017 | Sample Size | 5525 | 5525 | 5525 | 5525 | 5525 | 5525 | 5525 | 5525 | 5525 |
| | Mean | 2.87 | 1.96 | 0.46 | 0.92 | 0.09 | 2.88 | 0.09 | 0.46 | 0.79 |
| | Standard Deviation | 1.53 | 0.98 | 0.50 | 0.27 | 0.29 | 0.95 | 0.29 | 0.50 | 0.40 |
| | Maximum | 6 | 21 | 1 | 1 | 1 | 4 | 1 | 1 | 1 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2018 | Sample Size | 5393 | 5393 | 5393 | 5393 | 5393 | 5393 | 5393 | 5393 | 5393 |
| | Mean | 2.84 | 1.94 | 0.47 | 0.92 | 0.09 | 2.93 | 0.09 | 0.45 | 0.79 |
| | Standard Deviation | 1.54 | 1.01 | 0.50 | 0.27 | 0.29 | 0.94 | 0.29 | 0.50 | 0.41 |
| | Maximum | 6 | 10 | 1 | 1 | 1 | 4 | 1 | 1 | 1 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2021 | Sample Size | 3138 | 3138 | 3138 | 3138 | 3138 | 3138 | 3138 | 3138 | 3138 |
| | Mean | 3.13 | 1.75 | 0.43 | 0.92 | 0.1 | 2.89 | 0.06 | 0.43 | 0.72 |
| | Standard Deviation | 1.51 | 0.76 | 0.49 | 0.27 | 0.3 | 0.91 | 0.24 | 0.50 | 0.45 |
| | Maximum | 6 | 11 | 1 | 1 | 1 | 4 | 1 | 1 | 1 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2012 -2021 | Sample Size | 30624 | 30624 | 30624 | 30624 | 30624 | 30624 | 30624 | 30624 | 30624 |
| | Mean | 2.74 | 1.87 | 0.47 | 0.91 | 0.09 | 2.93 | 0.10 | 0.44 | 0.81 |
| | Standard Deviation | 1.48 | 0.82 | 0.50 | 0.28 | 0.29 | 0.95 | 0.30 | 0.50 | 0.39 |
| | Maximum | 6 | 21 | 1 | 1 | 1 | 4 | 1 | 1 | 1 |
| | Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

results obtained from the ordered probit regression model show some differences in coefficients compared to the ordered logistics regression model. However, both models are statistically significant and indicate a negative correlation between the overall educational attainment of the population and fertility intentions. Therefore, it can be concluded that the results derived from the model selected in this study are robust.

## 4 Discussion and Recommendation

### 4.1 Discussion

First, based on the regression analysis and robustness tests, it is clear that, regardless of whether the relevant variables are controlled for, the overall effect of educational attainment on fertility intentions is significantly negative at the 1% level. This result aligns with the findings of Nie [3] and other scholars, indicating that in China, the higher the educational attainment, the lower the fertility intentions.

Second, analyzing the above results through the lens of the Theory of Planned Behavior reveals several reasons behind these findings. First, in terms of behavioral attitudes, as the educational attainment of Chinese people increases, they are likely to have higher demands and perspectives on personal freedom and value. Therefore, in pursuit of a freer lifestyle, they may reduce their fertility intentions. Second, regarding subjective norms, due to differences in educational attainment, individuals may be influenced by different groups. People with higher educational attainment are more likely to prioritize personal achievements and career development, which may reduce their willingness to have children in order to avoid disruptions to their personal growth. Lastly, in terms of perceived behavioral control, individuals with higher educational attainment may perceive childbearing as a significant drain on time and energy. Given that measures to reduce the burden of childbearing are still insufficient, this perception may lead to decreased fertility intentions.

Third, based on the regression results and cause analysis, it is evident that the negative impact of educational attainment on fertility intentions has gradually increased in recent years. This suggests that, under unchanged real-world conditions, fertility intentions may decline further in the coming years. This is an unfavorable trend for the country's

**Table 6.** Logistics regression results.

| Years | Models | Educational Attainment | | Gender | | Ethnicity | | Political Affiliation | | Self-Rated Health | | Religious Belief | | Hukou Type | | Marital Status | | $R^2$ | Sample Size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2012 | Model (1) | -0.179*** | (0.019) | | | | | | | | | | | | | | | 0.0075 | 6008 |
| | Model (2) | -0.054** | (0.026) | 0.181*** | (0.055) | -0.550*** | (0.100) | 0.128 | (0.099) | -0.044 | (0.029) | 0.607*** | (0.085) | -0.388*** | (0.066) | 0.472*** | (0.082) | 0.0228 | 6008 |
| 2013 | Model (1) | -0.211*** | (0.020) | | | | | | | | | | | | | | | 0.0106 | 5651 |
| | Model (2) | -0.094*** | (0.027) | 0.112** | (0.056) | -0.172* | (0.102) | 0.532*** | (0.104) | -0.101*** | (0.031) | 0.309*** | (0.100) | -0.576*** | (0.069) | 0.237*** | (0.081) | 0.0229 | 5651 |
| 2015 | Model (1) | -0.181*** | (0.021) | | | | | | | | | | | | | | | 0.0081 | 4909 |
| | Model (2) | -0.055** | (0.028) | 0.070 | (0.063) | -0.283** | (0.118) | 0.088 | (0.119) | 0.033 | (0.034) | 0.643*** | (0.107) | -0.575*** | (0.073) | 0.313*** | (0.087) | 0.0216 | 4909 |
| 2017 | Model (1) | -0.133*** | -0.018 | | | | | | | | | | | | | | | 0.0046 | 5525 |
| | Model (2) | -0.063*** | -0.024 | 0.054 | -0.056 | -0.178* | -0.105 | 0.351*** | -0.102 | 0.004 | -0.03 | 0.815*** | -0.101 | -0.399*** | -0.066 | 0.138* | -0.075 | 0.0151 | 5525 |
| 2018 | Model (1) | -0.176*** | -0.018 | | | | | | | | | | | | | | | 0.0079 | 5393 |
| | Model (2) | -0.118*** | -0.022 | 0.227*** | -0.056 | -0.175* | -0.106 | 0.088 | -0.101 | -0.014 | -0.03 | 0.499*** | -0.1 | -0.258*** | -0.064 | 0.245*** | -0.073 | 0.014 | 5393 |
| 2021 | Model (1) | -0.280*** | -0.025 | | | | | | | | | | | | | | | 0.0197 | 3138 |
| | Model (2) | -0.150*** | -0.031 | 0.163** | -0.075 | -0.462*** | -0.146 | 0.389*** | -0.129 | 0.096** | -0.042 | 0.594*** | -0.163 | -0.389*** | -0.081 | 0.891*** | -0.09 | 0.0449 | 3138 |
| 2012-2021 | Model (1) | -0.186*** | -0.008 | | | | | | | | | | | | | | | 0.0086 | 30624 |
| | Model (2) | -0.088*** | -0.01 | 0.132*** | -0.024 | -0.285*** | -0.045 | 0.259*** | -0.044 | -0.014 | -0.013 | 0.562*** | -0.042 | -0.417*** | -0.028 | 0.362*** | -0.033 | 0.0189 | 30624 |

**Note:** Values in parentheses represent standard errors. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

**Table 7.** Comparison of regression results.

| Years | Models | Educational Attainment | | Gender | | Ethnicity | | Political Affiliation | | Self-Rated Health | | Religious Belief | | Hukou Type | | Marital Status | | $R^2$ | Sample size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2012 | logistics Model (1) | -0.179*** | (0.019) | | | | | | | | | | | | | | | 0.0075 | 6008 |
| | logistics Model (2) | -0.054** | (0.026) | 0.181*** | (0.055) | -0.550*** | (0.100) | 0.128 | (0.099) | -0.044 | (0.029) | 0.607*** | (0.085) | -0.388*** | (0.066) | 0.472*** | (0.082) | 0.0228 | 6008 |
| | probit Model (1) | -0.103*** | (0.011) | | | | | | | | | | | | | | | 0.0081 | 6008 |
| | probit Model (2) | -0.037** | (0.014) | 0.109*** | (0.030) | -0.297*** | (0.053) | 0.076 | (0.056) | -0.021 | (0.016) | 0.325*** | (0.044) | -0.210*** | (0.036) | 0.257*** | (0.045) | 0.0241 | 6008 |
| 2013 | logistics Model (1) | -0.211*** | (0.020) | | | | | | | | | | | | | | | 0.0106 | 5651 |
| | logistics Model (2) | -0.094*** | (0.027) | 0.112** | (0.056) | -0.172* | (0.102) | 0.532*** | (0.104) | -0.101*** | (0.031) | 0.309*** | (0.100) | -0.576*** | (0.069) | 0.237*** | (0.081) | 0.0229 | 5651 |
| | probit Model (1) | -0.120*** | (0.011) | | | | | | | | | | | | | | | 0.0111 | 5651 |
| | probit Model (2) | -0.056*** | (0.015) | 0.069** | (0.031) | -0.075 | (0.055) | 0.297*** | (0.058) | -0.052*** | (0.017) | 0.164*** | (0.053) | -0.303*** | (0.038) | 0.171*** | (0.045) | 0.0232 | 5651 |
| 2015 | logistics Model (1) | -0.181*** | -0.021 | | | | | | | | | | | | | | | 0.0081 | 4909 |
| | logistics Model (2) | -0.055** | -0.028 | 0.07 | -0.063 | -0.283** | -0.118 | 0.088 | -0.119 | 0.033 | -0.034 | 0.643*** | -0.107 | -0.575*** | -0.073 | 0.313*** | -0.087 | 0.0216 | 4909 |
| | probit Model (1) | -0.104*** | -0.012 | | | | | | | | | | | | | | | 0.0089 | 4909 |
| | probit Model (2) | -0.034** | -0.015 | 0.043 | -0.034 | -0.135** | -0.062 | 0.05 | -0.066 | 0.022 | -0.018 | 0.341*** | -0.055 | -0.312*** | -0.04 | 0.195*** | -0.048 | 0.0227 | 4909 |
| 2017 | logistics Model (1) | -0.133*** | -0.018 | | | | | | | | | | | | | | | 0.0046 | 5525 |
| | logistics Model (2) | -0.063*** | -0.024 | 0.054 | -0.056 | -0.178* | -0.105 | 0.351*** | -0.102 | 0.004 | -0.03 | 0.815*** | -0.101 | -0.399*** | -0.066 | 0.138* | -0.075 | 0.0151 | 5525 |
| | probit Model (1) | -0.072*** | -0.01 | | | | | | | | | | | | | | | 0.0045 | 5525 |
| | probit Model (2) | -0.038*** | -0.013 | 0.038 | -0.031 | -0.088 | -0.057 | 0.198*** | -0.056 | 0.003 | -0.016 | 0.389*** | -0.054 | -0.204*** | -0.036 | 0.061 | -0.04 | 0.0133 | 5525 |
| 2018 | logistics Model (1) | -0.176*** | -0.018 | | | | | | | | | | | | | | | 0.0079 | 5393 |
| | logistics Model (2) | -0.118*** | -0.022 | 0.227*** | -0.056 | -0.175* | -0.106 | 0.088 | -0.101 | -0.014 | -0.03 | 0.499*** | -0.1 | -0.258*** | -0.064 | 0.245*** | -0.073 | 0.014 | 5393 |
| | probit Model (1) | -0.091*** | -0.01 | | | | | | | | | | | | | | | 0.0069 | 5393 |
| | probit Model (2) | -0.060*** | -0.012 | 0.136*** | -0.031 | -0.101* | -0.058 | 0.046 | -0.056 | -0.003 | -0.016 | 0.248*** | -0.054 | -0.129*** | -0.035 | 0.148*** | -0.039 | 0.013 | 5393 |
| 2021 | logistics Model (1) | -0.280*** | -0.025 | | | | | | | | | | | | | | | 0.0197 | 3138 |
| | logistics Model (2) | -0.150*** | -0.031 | 0.163** | -0.075 | -0.462*** | -0.146 | 0.389*** | -0.129 | 0.096** | -0.042 | 0.594*** | -0.163 | -0.389*** | -0.081 | 0.891*** | -0.09 | 0.0449 | 3138 |
| | probit Model (1) | -0.156*** | -0.013 | | | | | | | | | | | | | | | 0.0202 | 3138 |
| | probit Model (2) | -0.081*** | -0.017 | 0.084** | -0.041 | -0.254*** | -0.077 | 0.230*** | -0.071 | 0.059*** | -0.023 | 0.297*** | -0.086 | -0.209*** | -0.045 | 0.541*** | -0.05 | 0.0481 | 3138 |
| 2012-2021 | logisticsModel (1) | -0.186*** | -0.008 | | | | | | | | | | | | | | | 0.0086 | 30624 |
| | logisticsModel (2) | -0.088*** | -0.01 | 0.132*** | -0.024 | -0.285*** | -0.045 | 0.259*** | -0.044 | -0.014 | -0.013 | 0.562*** | -0.042 | -0.417*** | -0.028 | 0.362*** | -0.033 | 0.0189 | 30624 |
| | probitModel (1) | -0.102*** | -0.004 | | | | | | | | | | | | | | | 0.0085 | 30624 |
| | probitModel (2) | -0.050*** | -0.006 | 0.081*** | -0.013 | -0.145*** | -0.024 | 0.143*** | -0.024 | -0.004* | -0.007 | 0.285*** | -0.022 | -0.217*** | -0.015 | 0.210*** | -0.018 | 0.0186 | 30624 |

**Note:** The values in parentheses represent standard errors, with *** indicating significance at the 1% level, ** indicating significance at the 5% level, and * indicating significance at the 10% level.

development and requires national attention.

### 4.2 Recommendation

Based on the above discussions, this paper proposes the following recommendations:

First, optimize school education. Strengthening population education and integrating it into the compulsory education system can help establish correct views on population from an early age. It is also crucial to enhance education on national conditions related to population, helping young people understand the country's population needs, fostering a sense of responsibility, and thus increasing their fertility intentions. Improving the quality of education, whether through increased government investment, better teacher compensation, or enhanced ability to attract quality educators, essentially leads to better teaching quality in schools, making population education more accessible to students and ultimately achieving the goal of enhancing their fertility intentions. Attention should also be given to the physical and mental health of students. Schools could collaborate with government-linked health centers to provide regular physical and psychological check-ups to ensure that young people maintain good physical and mental well-being. Overall, schools should place greater emphasis on educating students about population issues, fostering a respect for life, and instilling a sense of responsibility for bringing new life into the world, thereby enhancing their fertility intentions.

Second, improve social education. Strengthen public opinion guidance. The government can use third-party media or its official websites for public education, actively promoting the concept of age-appropriate childbirth and advocating the importance of a warm family and healthy child development. This would help the relevant population increase their sense of fertility responsibility and transmit positive family responsibilities, thereby encouraging the appropriate timing of marriage and childbirth. Establish and improve marriage and fertility support institutions. As the government actively develops high-quality marriage and fertility counseling services, various organizations should also improve comprehensive, scientifically-based support systems and provide consultation services to help the relevant population access timely and accurate information, alleviate psychological pressure, and adopt scientific, culturally appropriate views on marriage and fertility, thus enhancing their fertility intentions. Enrich the cultural life of the community. Local communities can regularly organize diverse cultural activities to stimulate the public's spirit and enhance their quality of life, helping individuals feel the joy of life and indirectly boosting the fertility intentions of young people of childbearing age. In short, improving social education requires communities, organizations, and institutions to work together, continuously organizing cultural activities that meet the needs of the public, enriching their inner world, meeting their daily relaxation needs, increasing their sense of happiness, and enhancing their likelihood of willing to have children.

Third, strengthen government support. The government should continue to expand the reach of pro-fertility policies, reduce the substantial financial burdens associated with childbearing, and eliminate fertility concerns among people of childbearing age, thereby stimulating their fertility intentions. Safeguard the legal employment rights of women. The government should strengthen protections for the legal employment of pregnant women, enact relevant laws and regulations to prevent workplace discrimination against women, and create more equal employment opportunities for women in the new era. Stricter punishments should be enforced against companies that illegally dismiss pregnant women, and businesses should be encouraged to adopt family-friendly policies that allow female employees to receive reasonable fertility-related benefits. Improve child welfare protections by increasing investments in children's well-being and enhancing their quality of life, which will alleviate the burden of raising children and further promote fertility intentions. In summary, the government should take active measures to ensure that pro-fertility policies are deeply embedded in society, achieving the ultimate goal of increasing the fertility intentions of the population.

## 5 Conclusion

In the context of increasing educational attainment among Chinese people, the trend of declining fertility intentions has emerged. This paper utilizes publicly available data from the 2012–2021 China General Social Survey (CGSS), selecting 30,624 valid samples. Using an ordered logistics regression model, the study focuses on analyzing the impact of educational attainment on fertility intentions in China. The analysis and tests confirm the relationship between educational attainment and fertility intentions, and the conclusions are as follows:

Based on the analysis from the ordered logistics

regression model and the robustness test of the ordered probit model, the study finds that the higher the educational attainment of Chinese people, the lower their fertility intentions. This indicates a negative correlation between educational attainment and fertility intention, supporting the hypothesis proposed at the beginning of the paper.

According to the Theory of Planned Behavior, the paper finds that the decline in fertility intentions among Chinese people may be due to the increasing demand for personal development, personal freedom, and fertility support measures, among other factors, as educational attainment rise.

In terms of cause analysis, this paper suggests that the government, schools, and other institutions need to collaborate to build a fertility-friendly society in order to promote an increase in fertility intentions in China.

## Data Availability Statement

Data will be made available on request.

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## Conflicts of Interest

The authors declare no conflicts of interest.

## Ethical Approval and Consent to Participate

Not applicable.

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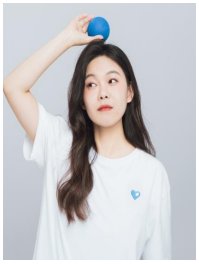

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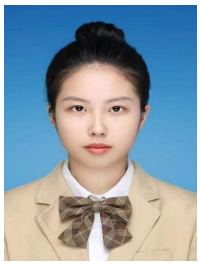

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