



Intention to have a second child, family support and actual fertility behavior in current China: An evolutionary perspective

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Abstract

Objectives: This study provides an evolutionary perspective to a classic topic in demography, that is, the discrepancy between reproductive intention and subsequent behavior, in the context of China's two-child policy.

Methods: We conduct an event history analysis of longitudinal data from the 2015 and 2018 waves of the Xi'an Fertility Survey (sample size = 321 followed one-child mothers) to test the hypotheses of how within-family support/conflict affects women's fertility behavior.

Results: Only 50% of positive intentions (i.e., intending to have a second child) led to another (live) birth within the 3-year interval; meanwhile, 15% of uncertain intentions and 5% of negative intentions resulted in a birth. Husband's and the firstborn's emotional support raised the hazard of second childbirth along maternal life course, which cannot be fully mediated by mother's fertility intention and thus, contributed to an intention-behavior gap. Husband's sibship size had dual effects on female childbearing behavior: A positive indirect effect mediated by fertility intention, but a negative direct effect presumably due to sibling competition for intergenerational support. Finally, after controlling for fertility intention, having a firstborn son was still associated significantly with a lower second-childbirth hazard, presumably due to son preference as well as concern over parental investment.

Conclusions: Our study identifies a discrepancy between maternal fertility intention and realized childbearing, which was partly explained by (lack of) support from other (multiple) stakeholders in family reproduction.

1 | INTRODUCTION

After about three decades of the so-called "one-child policy" (e.g., urban couples were largely allowed to have one child only; Gu et al., 2007), a universal two-child policy was implemented in China in 2016, to avoid the low-fertility trap and a series of problems concomitant with low fertility such as quick population aging and shortage of labor force (Lutz et al., 2006; The Xinhua News

Agency, 2015). Given that fertility intention—a plan to have a child—is the motivational step most proximate to actual childbearing outcome (Ajzen, 1991; Liu & Lummaa, 2019; Miller, 2011; Schoen et al., 1999), the success of the policy is expected to depend firstly on how women's intentions to have a second child can be realized. Previous studies have indicated that neither positive intentions (i.e., intending to have a[nother] child) nor negative ones can be fully realized; in other words, there

is some intention-behavior gap, a classic topic in demography and social psychology (Ajzen, 1985; Bongaarts, 2001; Liu & Lummaa, 2019; Morgan & Taylor, 2006; Schoen et al., 1999; Zheng, 2011). Thus, to evaluate the potential challenges in implementing the two-child policy, an analysis of the gap in current China, as well as factors contributing to it, is required.

Generally, a negative fertility intention predicts realized reproductive behavior better than a positive one (Kuhnt & Trappe, 2016; Machiyama et al., 2019; Schoen et al., 1999; Speizer & Lance, 2015). For example, in Italy, 60% of mothers intending to have a second child did so within 6 years and thus, the intention-behavior inconsistency rate was 40%; by contrast, the inconsistency rate for negative intentions was just 20%, that is, 20% of those who originally did not intend to have a second child nonetheless reproduced again during the same period (Rinesi et al., 2011). A longitudinal fertility survey (2007–2010) conducted in Jiangsu Province, China, showed that across the between-survey interval, the inconsistency rate was 56% for definitely positive intentions—that is, among those one-child mothers definitely intending to have a second child, more than half of them failed to realize their intention—but just 2% for definitely negative intentions (Zheng, 2011).

One theoretical explanation for the intention-behavior gap could be that the various socioecological constraints—that is, the behavioral control in Ajzen's terms (Ajzen, 1991)—that facilitate or limit one's reproductive success are not fully perceived and under own control when formulating one's fertility intention (e.g., declining fecundity with age, which could change a positive intention into a negative one later [Liefbroer, 2009]). As a result, the effects of such constraints on fertility behavior cannot be fully mediated by fertility intention, but are additional to that of fertility intention, which then causes an intention-behavior gap (see Ajzen, 1985). This view covers the six factors that are used to explain the intention-behavior discrepancy in Bongaarts's framework, for example, preferred family size is smaller than the actual one in the context of an unintended pregnancy, but the reverse cases happen when fecundity declines with age or even complete infertility happens (Bongaarts, 2001).

The support from family members—who are stakeholders in family decision-making—will be a major one among such constraints (Liu & Lummaa, 2019; Miller, 2011). Firstly, husbands play an especially important role in the formation and realization of their wives' fertility intention, not only through their own fecundity, but also through the emotional and instrumental support (Liu & Lummaa, 2019; Thomson & Hoem, 1998). Owing to their higher investment in children and the costs incurred by bearing and rearing children, wives are expected to prefer a smaller family size than husbands (e.g., Borgerhoff Mulder, 2009; Parker, 2006).

When a sexual conflict over family size arises, there could be a conflict over contraceptive use and the realized fertility outcome is a compromise between preferences of the two sides (Bankole, 1995; Bolund et al., 2013; Borgerhoff Mulder, 2009; Mace & Colleran, 2009; Testa, 2012; Testa et al., 2014). Another factor that could influence the likelihood of having a(nother) child is husband's sharing of housework and childcare, that is, a kind of paternal investment (Cooke, 2009; Kim, 2017; Park et al., 2010). However, the effect may follow a threshold pattern (Yoon, 2017); as a result, the relationship between men's participation in housework and actual fertility behavior might not be significant in some contexts, as observed in Finland and Japan (Kato et al., 2018; Miettinen et al., 2015).

Parents/parents-in-law may also have an important influence on women's fertility intention and behavior. First, humans follow a pattern of cooperative breeding and intergenerational support in the form of informal childcare from post-reproductive grandparents is expected to have a positive effect on reproductive-aged women's fertility, especially in the societies lacking of formal childcare facilities (Chen et al., 2000; Kaptijn et al., 2010; Kramer, 2010; Lahdenperä et al., 2014; Schaffnit & Sear, 2017). For example, in contemporary South Korea, the likelihood of second childbirth among one-child mothers coresident with parents or in-laws was almost three times that among those mothers without such a co-residence (Yoon, 2017). However, as also noted in evolutionary anthropological and demographic literature, the positive effect of intergenerational support could be diluted between the couple and their siblings owing to sib competition/conflict (especially with husband's siblings; for the exception in matrilineal societies, see Ji et al., 2013), which extends from fetus to reproductive age (Aassve et al., 2012; Faurie et al., 2009; Fox et al., 2017; Gibson & Gurmu, 2011; Gillespie et al., 2008; Lawson & Mace, 2009; Mace, 1996; Rickard et al., 2007). For instance, in China, the husband's parents are less likely to take care of grandchildren if the husband has siblings, which then lessens the positive effect of parental childcare support on the likelihood of a mother with one child planning to have a second child (Zhao & Zhang, 2019). Second, parents or in-laws may influence women's fertility decision or behavior through emotional support or social pressure (Bernardi, 2003). For instance, the likelihood of planning to have a second child would be higher among Chinese mothers with one child, when the preferences of grandparents for the number or sex of grandchildren have not been satisfied (Jin et al., 2018).

So far, there have been few panel data based analyses of the relationship between fertility intention and actual behavior since the implementation of the two-child policy in China. Additionally, the studies conducted after the policy tend to emphasize the function of social

support—for example, formal child care, maternity benefits, and childcare leave—in facilitating women's fertility behavior (e.g., Lv & Zou, 2018; Wu, 2016). By contrast, the emotional and instrumental support within family has not received sufficient attention. From an evolutionary perspective, such support comes from husband and parents or parents-in-law, as well as the firstborn child (Liu et al., 2017; Liu & Lummaa, 2019). The last factor has been neglected in previous studies; this is a pity, given the central place of the firstborn child in Chinese families after more than 30 years of “one-child policy” and the theoretical significance of parent-offspring conflict over family size from an evolutionary perspective (Goh & Kuczynski, 2009; Liu et al., 2017).

To address such gaps, we study the relationship between mother's intention to have a second child and actual fertility behavior and whether and how the above evolutionary forces influence the relationship in current China. Our analysis is based on panel data from the 2015 and 2018 waves of the Xi'an Fertility Survey.

2 | THE HYPOTHESES

Our hypothesis construction was mainly based on two frameworks: the theory of planned behavior and multiple-decision-maker framework of family reproduction (Ajzen, 1991; Liu & Lummaa, 2019). The former one proposes mechanisms for intention and behavior and implies inconsistency between intention and behavior as the failure of intention to mediate all the effects of predictors for behavior (Ajzen, 1985). The latter one proposes that maternal reproductive decision-making and behavior will be influenced by other family members like husband, already-born children, and grandparents, as mentioned in previous section.

First, the previous theoretical and empirical studies have indicated that a positive intention is a relatively valid predictor of reproductive behavior, but the predictive validity of negative intention would be higher (Kuhnt & Trappe, 2016; Machiyama et al., 2019; Regnier-Loilier & Vignoli, 2011; Schoen et al., 1999; Speizer & Lance, 2015). We had the following group of hypotheses:

Hypothesis H1a. *Women who intended to have a second child were more likely to give a live birth during the survey interval than those without such an intention.*

Hypothesis H1b. *The rate of consistency between fertility intention and reproductive behavior in the case of a negative intention was higher than that of a positive one.*

The theory of planned behavior predicts that background variables (e.g., age, education, family income, occupation, firstborn's sex, etc.) would be taken into account in formulating one's intention (Ajzen, 1991). We had the following hypothesis:

Hypothesis H2. *The effects of individual and family background variables on reproductive behavior would be mediated by fertility intention; in other words, such effects would not be significant, once fertility intention was also included in modeling of actual reproductive behavior.*

The third group of hypotheses was about the effects of husband's emotional support (e.g., Bankole, 1995; Liu & Lummaa, 2019; Testa et al., 2014; Thomson & Hoem, 1998) and instrumental support (e.g., Cooke, 2009; Kim, 2017; Park et al., 2010; Yoon, 2017) on women's fertility behavior:

Hypothesis H3a. *Husband's emotional support for the second childbirth increased the likelihood of having a second child.*

Hypothesis H3b. *Husbands' participation in housework and childcare increased the likelihood of having a second child.*

Recently, it has been shown that the firstborn child could play an important role in family reproductive decision-making via his/her emotional support (Liu & Lummaa, 2019). Thus, we expected the factor would also be relevant to actual fertility behavior:

Hypothesis H4. *The likelihood of second childbirth was higher among the mothers whose firstborn child supported them to do so.*

In developing countries like China, many young couples live with their parents (mainly the parents of the husband), who generally have more traditional pronatalist fertility attitudes. Then, informal grandparental childcare tends to improve women's fertility (Yang & Short, 2007). However, the siblings of husband or wife can dilute the intergenerational support (e.g., Aassve et al., 2012; Zhao & Zhang, 2019). The fifth group of hypotheses was:

Hypothesis H5a. *Mothers influenced by their parents or parents-in-law in reproductive decision-making were more likely to have a second child.*

Hypothesis H5b. *The husband's and wife's number of siblings had a negative effect on childbirth likelihood.*

It has been proposed recently that the emotional support from nuclear family members play a dual role in family reproduction: On the one hand, it is a kind of subjective norm and thus, according to the theory of planned behavior, its effect on final behavior can be mediated by fertility intention; on the other hand, it represents a kind of constraint or behavioral control, which means that its effect cannot be fully mediated by fertility intention (Ajzen, 1991; Liu & Lummaa, 2019). We had the following hypothesis,

Hypothesis H6. *The effects of emotional support from nuclear family members (e.g., husband and the firstborn child) on actual behavior of having a second child would be partly but not fully mediated by mother's fertility intention, that is, both the direct effects and the indirect effects via fertility intention would be significant.*

3 | MATERIALS AND METHODS

3.1 | The data

Our study was based on the longitudinal data from the 2015 and 2018 waves of the Xi'an Fertility Survey. The baseline survey was conducted in the Xi'an metropolitan area, Shaanxi Province, from October 2015 to January 2016, when the respondents already knew that the implementation of the universal two-child policy would start shortly. The respondents in the 2015 baseline survey were mothers of one child, not pregnant with the second child yet, and 20–44 years old. Before questionnaire survey, a multistage and probability-proportional-to-size (PPS) sampling was implemented so that at a given sampling stage (i.e., district/county, street/town, community/village), the probability of a cluster being selected was proportional to the number of final-stage sampling units—that is, one-child mothers—contained in it. The vast majority of the sampled mothers were then interviewed through telephone, but a few mothers filled the questionnaire via a self-administered manner in situ. In total, 570 effective questionnaires were collected. The follow-up survey (wave 2018) was conducted from August to September 2018; in other words, it was about 3 years after the baseline survey. All 570 mothers interviewed in the baseline survey were re-contacted through telephone, and 321 effective questionnaires were collected (i.e., effective follow-up rate \approx 56%).

The two waves of the Xi'an Fertility Survey had been approved by the Biomedical Ethics Committee of Xi'an Jiaotong University (NO2015-636; NO2018-02). Their conduction was in line with the Declaration of Helsinki and before starting a questionnaire survey, each interviewee was informed of the research purpose and expressed her consent to take part in it.

3.2 | Measures

In the statistical modeling, the dependent variable was the actual fertility behavior, that is, whether a one-child mother had a second child during the 3-year interval. In the 2018 follow-up survey, respondents were asked, “Do you have a second child now?” (Options: “yes” or “no”). If a mother answered “yes,” we further inquired the date of second childbirth. The mothers' answers were validated by the household registers provided by local governments.

The predictors (at the time of baseline survey) for fertility behavior were as follows. (1) Fertility intention. The respondents were asked in 2015, “Do you have a plan to have a second child?” (Options: “planning to have,” “not decided” and “not planning to have”). (2) Husband's emotional support (“Does your husband support you to have another child?”), and instrumental support (“How does your husband share the daily housework and childcare?”). (3) The factors related to parents or in-laws, including social pressure (“Are you influenced by your parents or parents-in-law in having a second child?”) and own and husband's number of siblings. The following background factors were included as controlled predictors: Age, family settlement (rural vs. urban), education, occupation, family annual income, and gender of the firstborn child.

The firstborn child's emotional support was measured as “Does your firstborn child support you to have another child?” Generally, a child can express simply what he/she desires by age two, is preliminarily able to grasp simple causal relations between desires and their outcomes (of realization) by age three and is mature enough to differentiate beliefs (a precursor of attitude) from desires from age four (Flavell, 1999). In this sample, 70% of firstborns were over age two and thus, they can express their desire for a sibling (e.g., “I want to have a sister”, which could then be translated by mothers as an emotional support for further reproduction) or even more complex attitude toward having a second child (e.g., “I am (dead) against having another child in the family, because doing so makes our family poorer”).

The descriptive statistics of the above variables are shown in Table 1.

3.3 | Statistical modeling

We conducted an event-history analysis to test the above hypotheses. We first used the bivariate Kaplan–Meier curve to describe the behavior of second childbirth by maternal fertility intentions. Then, multivariate Cox

(proportional hazards) regression models were used to estimate the effects of hypothesis-related factors on actual fertility behavior (Cox, 1972). A Cox model was,

$$h(t) = -\frac{dP}{Pdt}$$

$$h(t,x) = h_0(t) \exp\left(\sum_i \beta_i x_i\right) \text{ or } \ln\left(\frac{h(t,x)}{h_0(t)}\right) = \sum_i \beta_i x_i.$$

TABLE 1 Descriptive statistics of independent variables (one-child mothers; Xi'an fertility survey 2015)

Variables	Statistics ^a
Fertility intention	
Intending to have a second child	15.58% (3.97%)
Not decided	30.84% (5.05%)
Not intending to have a second child	53.58% (5.46%)
Age(years)	32.82 (0.67)
Family settlement	
Rural	34.58% (5.20%)
Urban	65.42% (5.20%)
Education	
Precollege level	48.74% (5.49%)
College level or Graduate level	51.26% (5.49%)
Occupation ^b	
Time-inflexible	30.22% (5.02%)
Time-flexible	46.42% (5.46%)
Housewife	17.13% (4.12%)
Others	6.23% (2.64%)
Family annual income ^c	
Low income	47.63% (5.50%)
Middle income	29.97% (5.04%)
High income	22.40% (4.59%)
Gender of firstborn child	
Son	52.34% (5.46%)
Daughter	47.66% (5.46%)
Husband's attitude to having a second child	
Supportive	28.66% (4.95%)
Neutral	51.71% (5.47%)
Not supportive	19.63% (4.35%)
Husband's share of housework and childcare	
More than half	10.34% (3.34%)
Half	21.32% (4.49%)
Less than half	68.34% (5.10%)
Firstborn's attitude to having a second child	
Supportive	26.79% (4.84%)
Not explicitly supportive ^d	29.60% (4.99%)
Un-asked	43.61% (5.42%)

(Continues)

Here, P referred to population size of mothers still having not given birth to a second child. $h(t,x)$ represented the (instantaneous) hazard rate of having a second child at time t under the influence of the series of hypothesis-related predictors (i.e., x_i). $h_0(t)$ represented baseline hazard function, that is, the (instantaneous) hazard rate of having a second child at time t when all predictors were zero. $\frac{h(t,x)}{h_0(t)}$ was thus hazard ratio or simply HR.

We used Iacobucci's formula to evaluate the mediation role of fertility intention (Iacobucci, 2012; Wen & Ye, 2014). The formula was as follows,

$$Z_{mediation} = \frac{z_a \times z_b}{\sqrt{z_a^2 + z_b^2 + 1}} = \frac{\frac{a}{s_a} \times \frac{b}{s_b}}{\sqrt{\left(\frac{a}{s_a}\right)^2 + \left(\frac{b}{s_b}\right)^2 + 1}}$$

Here, a was the regression coefficient for the variable under question (e.g., husband's emotional support) when modeling—multinomial logistic regression—fertility intention by including other hypothesis-related predictors as independent variables, and b was the regression

TABLE 1 (Continued)

Variables	Statistics ^a
Being influenced by parents or in-laws in having a second child	
Yes	15.26% (3.93%)
No	84.74% (3.93%)
Number of wife's siblings	1.50 (0.14)
Number of husband's siblings	1.57 (0.14)

^aFor each categorical variable (e.g., education), "Statistics" refers to proportions of categories of the variable (with 95% sampling error included in bracket); for each continuous variable (e.g., age, number of wife's siblings and number of husband's siblings), "Statistics" refers to mean (with 95% sampling error included in bracket).

^bOccupation was classified according to national occupation classification and working sectors.

^cFamily annual income: Low income, <40 000 Chinese ¥; middle income, 40 000 ~ 80 000 Chinese ¥; high income, >80 000 Chinese ¥.

^d"Not explicitly supportive": either an uncertain attitude or an explicitly non-supportive attitude.

coefficient for fertility intention when modeling—Cox regression—actual fertility behavior by including both fertility intention and other hypothesis-related predictors as independent variables. s_a and s_b represented the standard errors of a and b . The mediating effect would be identified as significant (at the $\alpha = 0.05$ level) if $|z_{mediation}| > 1.96$.

4 | RESULTS

4.1 | Descriptive statistics

We first report the descriptive statistics of variables used in the event-history analysis of actual fertility behavior along maternal life course (Table 1). Here, the dependent variable, that is, fertility behavior, corresponded to the time interval between the 2015 and 2018 surveys, but all predictors corresponded to the baseline survey. Among the 321 successfully followed one-child mothers, 50 (or 15.58%) had a second child during the between-survey interval.

At the time of the baseline survey, these 321 mothers averaged 32.82 years, 65.42% of them lived in urban areas, and more than half of them had a college or higher education level. Additionally, one third of the women worked in sectors inflexible with working time, 46.42% worked in time-flexible sectors, and 17.13% were housewives. About 52% of mothers had a son as their firstborn.

At the time of the baseline survey, 15.58% of one-child mothers intended to have a second child, 30.84% were undecided and the rest did not intend to have another child. 28.66% of all mothers said their husbands supported them to have a second child, 51.71% of husbands had a neutral attitude, and 19.63% were not supportive. About 26.79% of mothers reflected that their firstborn children supported them to have another child (average age ≈ 7.84 years, $SD \approx 5.40$ years), 29.60% of firstborns were not explicitly supportive (average age ≈ 9.97 years, $SD \approx 5.25$ years), and 43.61% of firstborns were not asked about their attitudes presumably due to their young age (average age ≈ 3.39 years, $SD \approx 4.63$ years). Note: among the children above age two, more than 75% were asked of their attitudes (the corresponding percentage was 82.3% for children above age three); by contrast, the percentage was just 14% among children under age two. That only 15.58% of the women intended to have a second child but 28.66% of the husbands supported their partner to reproduce again suggested some husband-wife conflict. Additionally, among those women intending to have a second child, 18% and 36% of the firstborn children did not give emotional support or were not inquired at all, respectively,

suggesting some conflict between parents and the first-born children. According to the answers of these mothers, about 10% of husbands shared more than half of daily housework and childcare, 21% of husbands shared half, and most of the husbands shared less than half or even did not do housework at all. About one in seven mothers said they were influenced by their parents or parents-in-law in having a second child. On average, the mothers and their husbands had about 1.5 and 1.6 siblings, respectively.

4.2 | Fertility intention and subsequent behavior

In support of the hypothesis H1a on the intention-behavior link, we found that different fertility intentions had evidently different consequences for actual behavior (Figure 1; Table 2). According to Model 1, the hazard of having a second child within the 3-year interval among those mothers intending to do so in the baseline interview was about 12 times that of mothers not intending to reproduce again (HR = 11.77, 95% confidence interval or simply CI = 5.65–24.54; undecided intention vs. negative intention, HR = 2.73, 95% CI = 1.23–6.08). Even after including background factors and family support factors into modeling (i.e., Model 3), the above HRs were still significant or marginally significant, suggesting that

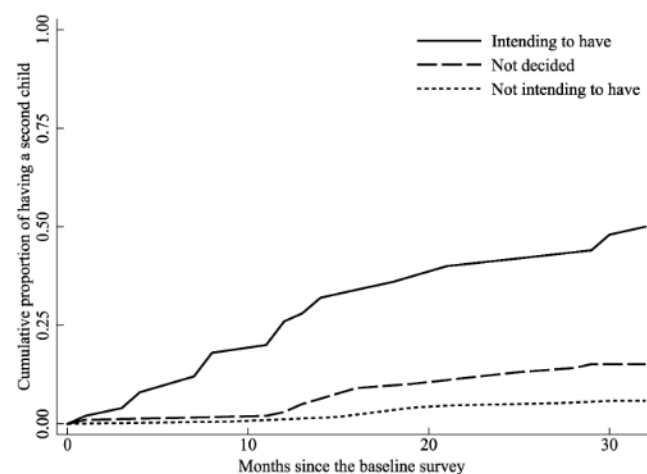


FIGURE 1 Cumulative probability of giving birth to a second child since the baseline survey by fertility intentions (log rank test: p -value < .001). x -axis refers to the number of months since the baseline survey. y -axis refers to the cumulative proportion of having a second child. The three curves correspond to “intending to have a second child” (solid curve), “undecided intention” (long-dashed curve), and “not intending to have a second child” (short-dashed curve)

TABLE 2 The Cox regression estimation of the effects of the related factors on actual fertility behavior during the follow-up interval

Variable	Model 1			Model 2			Model 3		
	HR	95% CI	<i>p</i>	HR	95% CI	<i>p</i>	HR	95% CI	<i>p</i>
Fertility intention (ref. = not intending to have)									
Intending to have	11.77	5.65–24.54	<.001				7.41	2.91–18.88	<.001
Not decided	2.73	1.23–6.08	.014				2.12	0.87–5.13	.097
Age				0.91	0.84–0.99	.020	0.95	0.87–1.04	.239
Family settlement (ref. = urban)									
Rural				2.33	0.91–5.94	.077	1.42	0.51–3.97	.501
Education (ref. = college level or above)									
Precollege level				2.75	1.15–6.56	.023	2.07	0.81–5.28	.129
Occupation (ref. = time-inflexible) ^a									
Time-flexible				0.44	0.18–1.10	.080	0.56	0.21–1.47	.238
Housewife				0.67	0.23–1.92	.459	0.70	0.23–2.15	.536
Others				0.51	0.06–4.14	.529	0.59	0.07–4.82	.622
Family annual income (ref. = low income) ^b									
Middle income				1.97	0.84–4.60	.118	1.85	0.79–4.35	.157
High income				2.63	1.02–6.76	.045	1.64	0.64–4.24	.303
Gender of firstborn child (ref. = son)									
Daughter				2.47	1.27–4.82	.008	2.59	1.32–5.09	.006
Husband's attitude to having a second child (ref. = not supportive)									
Supportive				12.02	1.55–93.09	.017	7.47	0.94–59.51	.058
Neutral attitude				8.14	1.07–61.77	.043	7.27	0.95–55.85	.056
Husband's share of housework and childcare (ref. = less than half)									
More than half				0.81	0.24–2.69	.732	0.65	0.18–2.39	.520
Half				1.37	0.66–2.84	.396	1.58	0.76–3.29	.219
Firstborn's attitude to having a second child (ref. = not asked)									
Supportive				3.66	1.69–7.93	.001	3.22	1.42–7.29	.005
Not explicitly supportive ^c				1.66	0.62–4.49	.316	1.69	0.60–4.81	.322
Being influenced by parents or in-laws in having a second child (ref. = no)									
Yes				1.31	0.57–3.02	.519	0.92	0.39–2.16	.852
Wife's sibling number				1.16	0.83–1.64	.388	1.27	0.90–1.79	.173
Husband's sibling number				0.78	0.55–1.10	.151	0.68	0.48–0.98	.037
–2LL	520.47		<.001	453.51		<.001	434.62		<.001

Note: *p*—statistical significance (i.e., *p*-value). The bolded numbers refer to significant effects. The –2LL (log-likelihood) of null model was 569.40.

Abbreviations: CI, confidence interval; HR, hazard ratio; ref., the reference/control level in modeling.

^aOccupation was classified according to national classification and working sectors.

^bFamily annual income: Low income, <40 000 Chinese ¥; middle income, 40 000 ~ 80 000 Chinese ¥; high income, >80 000 Chinese ¥.

^c“Not explicitly supportive”: either an uncertain attitude or an explicitly nonsupportive attitude. To avoid multicollinearity, firstborn's age was not included in modeling.

fertility intention had a direct effect on actual fertility behavior.

The Kaplan–Meier curve indicated that distance between the three intention-behavior curves increased over time. One year after the baseline survey, 20% of mothers with a positive fertility intention had a second child, while the cumulative proportions in mothers with undecided or negative intentions still remained zero. Two years after the baseline survey, the corresponding cumulative proportions in the three categories of mothers changed into 40%, 12.12%, and 4.65%. Finally, in support of the hypothesis H1b on the predictive validity of a fertility intention, we found that about 3 years after the baseline survey, negative fertility intention had a higher validity in predicting actual fertility behavior: The consistency between negative intentions and actual behavior was 94.19%, while that with respect to positive intentions was just 50%.

4.3 | The effects of background factors and family support on fertility behavior

Most background factors displayed a significant effect on actual fertility behavior. Maternal age had a negative effect on fertility behavior: At a given time, the estimated hazard of having a second child decreased by about 9% if a mother was a year older, after adjustment for other predictors (HR = 0.91, 95% CI: 0.84–0.99; Model 2 of Table 2). On average, the hazard of reproducing again among rural mothers was 2.3 times that of urban mothers (HR = 2.33, 95% CI: 0.91–5.94). If a mother did not have a college-level degree, she had a hazard of reproducing again 2.75 times that of a mother who had finished a college or above level education (HR = 2.75, 95% CI: 1.15–6.56). Family annual income significantly raised the hazard of having a second child (middle vs. low income: HR = 1.97, 95% CI: 0.84–4.60; high vs. low income: HR = 2.63, 95% CI: 1.02–6.76). If the firstborn child was a girl, the hazard of reproducing again was more than two times higher than when the firstborn child was a boy (HR = 2.47, 95% CI: 1.27–4.82).

In support of the hypothesis H2, we found that the effects of such background factors on actual reproductive behavior were substantially mediated by fertility intention: Once fertility intention was included in modeling, the effects of almost all the background variables except for sex of the firstborn child became non-significant (Model 2 vs. Model 3). Regarding the exception, a supplementary analysis indicated that during the between-survey interval, there were 13 artificial abortions as reported by these mothers: six corresponded to a negative fertility intention at the time of baseline survey, five corresponded to an

uncertain intention and only one case corresponded to a positive intention; in other words, almost all induced abortions concerned mothers who did not intend to have a second child. Additionally, of the 50 second childbirths, 33 followed a firstborn daughter and 17 followed a son; among the 13 induced abortions, three followed a firstborn daughter and 10 followed a son (aborting the second pregnancy was associated significantly with the sex of the firstborn child: $\chi^2_1=6.11$, $p < .05$).

In support of the hypothesis H3a, we found that husband's emotional support in the baseline survey significantly raised the hazard of having a second child in the follow-up interval (supportive vs. nonsupportive: HR = 12.02, 95% CI = 1.55–93.09; neutral attitude vs. nonsupportive: HR = 8.14, 95% CI = 1.07–61.77; Table 2). When fertility intention was included into modeling (i.e., Model 3), the effect declined substantially, but was still (marginally) significant (supportive vs. not supportive: HR = 7.47, 95% CI = 0.94–59.51; neutral attitude vs. nonsupportive: HR = 7.27, 95% CI = 0.95–55.85). Thus, fertility intention partly mediated the effect of husband's emotional support; further analysis indicated that the mediation effect mainly occurred in the case of husband's supportive attitude under a positive intention of mother ($z_{\text{mediation (intending to have, supportive)}} = 2.53$). Husband's instrumental support in terms of sharing daily housework and childcare did not influence the hazard of having a second child, regardless of whether fertility intention was included in modeling or not. In summary, the hypotheses H3a and H6 with respect to husband's emotional support were supported, but the survey data did not support the hypothesis H3b on husband's instrumental support.

In support of the hypothesis H4 on the emotional support from the firstborn child, we found that if the firstborn child held a supportive attitude in the baseline survey, the hazard of having a second child was about 3.7 times that when the firstborn child was not asked of his/her attitude toward having a sibling (HR = 3.66, 95% CI = 1.69–7.93; Table 2); there was no difference between a non-explicitly supportive attitude and an un-asked one (HR = 1.66, 95% CI = 0.62–4.49). When the mother's fertility intention was included into modeling, the above effects did not change much and mediation analysis indicated that the mediation effect of fertility intention only occurred in the case of the firstborn's supportive attitude under a positive intention ($z_{\text{mediation (intending to have, supportive)}} = 2.35$). In summary, the hypotheses H4 and the hypothesis H6 with respect to the firstborn child's emotional support were supported.

Our survey data did not support the hypothesis H5a on parental influence, that is, whether a mother reported being influenced by her parents or parents-in-law did not affect significantly her actual fertility behavior during the

follow-up interval, regardless of whether the mother's fertility intention was included in modeling or not (Model 2 vs. Model 3). When fertility intention was not included in the modeling, the overall effect from sibling number was also not significant, either for husband or for mother. However, when fertility intention was included, the number of husband's siblings became significant; according to Model 3, the hazard of having a second child declined by 32% if husband had one more sibling (HR = 0.68, 95% CI = 0.48–0.98; Table 2). Mediation analysis indicated husband's sibship size was associated positively with fertility intention (in the [multinomial] logistic regression analysis of intending to have vs. not intending to have a second child: odds ratio = 1.60, 95% CI = 1.08–2.37). In other words, the indirect effect was positive ($Z_{\text{mediation (intending to have, husband's siblings)}} = 1.98$), but direct effect was negative, which led to nonsignificant overall effect in Model 2. Thus, the hypothesis H5b with respect to husband's sibship size was supported, but that regarding maternal sibling number was not supported.

5 | DISCUSSION

Based on longitudinal data from two waves of the Xi'an Fertility Survey, this study conducts an analysis of the relationship between one-child mother's intention to have a second child and her actual childbearing behavior in a context of various support from husband, the firstborn child and parents/parents-in-law in current China. Consistent with previous studies, mother's fertility intention was a relatively reliable—especially in the case of a negative intention—but not a perfect predictor of her short-term reproductive behavior. Additionally, it mediated the effects from background factors (e.g., age, education, and family income), except for the gender of the firstborn child on actual fertility behavior. We also find support for our hypotheses on within-family support: The support from other family members significantly affected the likelihood of second childbirth, which was only partly mediated by mother's fertility intention and thus, contributed to an intention-behavior gap. Evidently, such support was not equally important; for example, husband's emotional support was more important than his instrumental support in promoting a second childbirth (Schaffnit & Sear, 2017 even found a significant negative effect of the latter support on second childbirth in a British survey sample).

Some of our important findings cannot be easily explained by relevant social psychology and demography frameworks (e.g., Ajzen, 1991; Bongaarts, 2001; Miller, 2011), but can instead be understood from an evolutionary perspective. First, consistent with the parent-

offspring conflict theory and multiple-decision-maker framework of family reproduction (Liu & Lummaa, 2019), this study shows the important role that the firstborn child played in family reproduction, which has not received sufficient attention from either researchers or mothers under study here. To our knowledge, the current study is the first to show that owing to its dual nature, the effect of the firstborn child's emotional support on maternal fertility behavior can be only partly but not fully mediated by maternal intention. A comparison of the mediation effect for husband's vs. the firstborn child's emotional support also suggests that the latter one was less well considered by the mothers in formulating their intention. Furthermore, about 44% of the firstborn children were not inquired about their attitude toward having a second child at the time of the baseline survey (Table 1); however, one in four of such children were aged above 3 years then and thus, old enough to express one's desire or attitude. A child can get involved in influencing parental reproductive affairs sooner or later and there are various methods that he/she might employ to influence parental reproductive behavior, even after pregnancy: fussing, blackmail, and so forth (Trivers, 1985). Indeed, there were some reported cases of blackmail induced abortion after the implementation of the two-child policy (e.g., Liu, 2015).

Another important finding concerns the sibship size. The previous studies have identified either one or the other—but not both—of the following two effects: On the one hand, having more siblings could be positively associated with one's own fertility; on the other hand, it might dilute intergenerational support as a result of sibling competition and thus, suppress the actual fertility behavior. The current study is one of the few to show simultaneously such conflicting effects with empirical data (the phenomenon is also called suppressing or antagonistic effect in statistics, see Wen & Ye, 2014). Previously, a similar phenomenon was noticed in historical Krummhörn (Germany) and Quebec (Canada) populations, which was then explained from a view of the conflict between genetic inheritance of fecundity (i.e., having more siblings means higher inherited fecundity; see also Pettay et al., 2005) and sibling competition for parental resources (Fox et al., 2017). To the authors' knowledge, there are two alternative explanations for a possible positive effect of sibship size on one's own fertility: intergenerational fertility norm transmission (see also Bao et al., 2017; Cavalli-Sforza & Feldman, 1981; Li & Jiang, 2017; Liu & Lummaa, 2019; Mathews & Sear, 2013; Murphy & Wang, 2001; Yi & Chen, 2014); inheritance of fertility preference (e.g., Miller, 2011). Currently, the norm-transmission perspective is dominant among demographers, but the other two have gradually

gained support too. Although scholars have not reached a consensus over the positive effect, the dual effects of sibship size on one's fertility can be more or less established now.

Third, this study shows that having already a daughter directly raised the hazard of reproducing again (Models 2 and 3). This result was not fully expected beforehand, as a previous study on the same population showed that the gender of the firstborn child did not influence maternal baseline fertility intention (Liu & Lummaa, 2019). One explanation could be that although son preference is falling in China (Hou et al., 2018; Shi & Yang, 2021; Zhuang et al., 2021), it has not fully withered away. As a result, those with a daughter and an unmet preference for a son more likely continued to reproduce, as shown in India and among some rural-to-urban migrants in China (Chaudhuri, 2012; Gellatly & Petrie, 2017; Hesketh & Xing, 2006; Jha et al., 2011; Wang et al., 2020). However, son preference might not be the sole mechanism accounting for the observation. Given that induced abortions rather than fertility intentions were associated with firstborn's sex (see Section 4.3), we preliminarily infer that another effect of firstborn's sex on actual childbearing could also arise, when an unintended pregnancy happened. In current China, many couples worry about investing in children especially sons, for example, marrying a son costs a lot owing to male surplus (see Helle et al., 2002; Jin et al., 2013; Shi & Yang, 2021). In our baseline survey, as it happened, two mothers with a firstborn son foresaw (potential) great pressure in parenting two children if they had another son or there was sibling competition between two children. Presumably for the concern, couples already having a son more likely aborted an unintended pregnancy; by contrast, having a firstborn daughter could bring couples more affordability and courage to have a second child. It is warranted to test the above preliminary inference with other larger samples detailed and accurate in counting pregnancies and their outcomes.

There are some limitations with the current research. First, the sample size was not large, which limited the power of some inferences and made a finer analysis of mothers who explicitly inquired their firstborn children not very feasible. Second, the emotional support from husband and the firstborn child was reflected by mother rather than directly by them. Although mother's perceived support could be basically consistent with their actual support (for the case of husband, see Miller, 1994) and best relevant for her decision-making, a direct inquiry might provide some additional evolutionary insight into family reproductive decision-making and behavior.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests to declare.

AUTHOR CONTRIBUTIONS

Lianchao Zhang: Data curation (supporting); formal analysis (lead); investigation (equal); methodology (equal); software (lead); validation (lead); visualization (lead); writing – original draft (equal). **Jianghua Liu:** Conceptualization (lead); data curation (lead); funding acquisition (lead); investigation (equal); methodology (equal); project administration (lead); resources (lead); supervision (lead); validation (supporting); visualization (supporting); writing – original draft (equal); writing – review and editing (equal). **Virpi Lummaa:** Supervision (supporting); visualization (supporting); writing – review and editing (equal).

DATA AVAILABILITY STATEMENT

The data used in the study are available upon request from the corresponding author.

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