How Does Children's Sex Affect Parental Sex Preferences: Preference Adaptation and Information Learning*

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This study examines whether and how the sex of children shapes women's reported sex preferences. Using nationally representative data from the Peruvian Demographic and Health Survey, we exploit the quasi-random assignment of child sex at birth. We find that having a first-born daughter lowers the ideal proportion of sons by 6.1 percentage points (mean = 37.1%) and raises the ideal proportion of daughters by 5.2 percentage points (mean = 38.5%). When the first two children are both daughters rather than both sons, the ideal proportion of sons decreases by 8.8 percentage points, and the ideal proportion of daughters increases by 6.2 percentage points. Further analysis reveals that the effects of the first child's sex are more pronounced for women with only one child than for women with multiple children and that the effects of having a daughter vary with her birth order. These findings support the roles of preference adaptation and information learning in shaping women's reported sex preferences.

Keywords: Sex of children, Son preference, Preference adaptation, Information learning, Peru.

JEL codes: D19, J13, J16.

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1 Introduction

In many developing countries, sons are preferred over daughters, with parents often desiring more sons than daughters or desiring at least one son. This has led to skewed sex ratios in parts of Asia (e.g., China and India), shortages of women in marriage markets, excess male violence, and long-term social instability (Sen, 1990; Dyson, 2012; Guilmoto, 2012; Edlund et al., 2013; Jiang et al., 2014).

Most studies attribute parental sex preferences to structural factors that influence the gendered benefits and costs of children, such as the roles of sons versus daughters in supporting parents in old age (e.g., Das Gupta et al., 2003; Ebenstein and Leung, 2010) and different marriage costs (e.g., Bhalotra et al., 2020). Other studies suggest that individual factors, such as education and exposure to mass media, are also important determinants (Pande and Astone, 2007; Lin, 2009; Chen et al., 2020). However, little is known about whether and how people's sex preferences can change throughout parenthood, which can be crucial for designing policies to reduce son preference and its demographic consequences.

This study proposes two mechanisms—preference adaptation and information learning—through which the sex of children may shape parental sex preferences. First, behavioral economics suggests that preferences are not fixed; people tend to value what they have over what they do not (Elster, 1982; Sen, 1999; Sugden, 2004). Applied to fertility, parents may adjust their sex preferences to align with the actual sex composition of their children when the two differ (*preference adaptation*). Second, parents form their sex preferences based on the expected benefits and costs of raising sons versus daughters (Das Gupta et al., 2003; Ebenstein and Leung, 2010; Bhalotra et al., 2020). Yet, before having children, these expectations are based on limited or imperfect information. After transitioning to parenthood, they acquire first-hand information and update their preferences accordingly (*information learning*). Overall, both mechanisms predict that child sex can influence parental sex preferences.

These two mechanisms motivate complementary empirical hypotheses. *Under preference adaptation, the effects of a child's sex are more pronounced for parents with fewer children (Hypothesis 1, or H1).* This mechanism emphasizes that parents care about the overall sex composition of their children, so the first child has a larger effect on sex composition in smaller families. *Information learning further suggests that, holding the number of sons and daughters constant, the effects of a child's sex on parental preferences depend*

on the child's birth order (Hypothesis 2, or H2). Parents may pay different levels of attention to children in different birth orders, leading to varying levels of information learned from each child, thus affecting their sex preferences differently. Together, these hypotheses allow us to examine the roles of preference adaptation and information learning in shaping parental sex preferences.

To empirically examine the effects of child sex on parental sex preferences, we leverage the Peruvian setting, where observed birth-sex patterns support treating child sex as randomly assigned. Using data from the Peruvian Demographic and Health Survey (DHS), we measure a woman's sex preference by her reported ideal proportions of sons and daughters. Our analysis shows that having a first-born daughter decreases the ideal proportion of sons by 6.1 percentage points (pp) and increases the ideal proportion of daughters by 5.2 pp. When the first two children are both daughters instead of both sons, the ideal proportion of sons decreases by 8.8 pp, and the ideal proportion of daughters increases by 6.2 pp. These effects are substantial, given that the average desired proportions of sons and daughters are 37.1% and 38.5%, respectively.

We next examine the two mechanisms. Consistent with preference adaptation (H1), the first-child effects are stronger among women with one child than among those with multiple children. This difference remains after allowing the effects to vary with the duration of parenthood. Consistent with information learning (H2), reported sex preferences differ between daughter–son and son–daughter sequences after controlling for birth spacing. The sequence difference also persists among women with exactly two children. Together, these findings support the role of parenting experiences in shaping reported sex preferences.

This study contributes to the literature on the formation of sex preferences. Most studies attribute sex preferences to structural factors that determine the gendered benefits and costs of children, including old-age support and marriage costs (e.g., Das Gupta et al., 2003; Ebenstein and Leung, 2010; Bhalotra et al., 2020), while some others suggest that individual factors also play a role (e.g., Pande and Astone, 2007; Lin, 2009; Robitaille, 2013; Chen et al., 2020). Our study extends this literature by examining how children's sex shapes parents' reported preferences and by providing evidence consistent with preference adaptation and information learning. Although some studies have mentioned that child sex *may* influence parental sex preferences (e.g., Aly and Shields, 1991; Bhat and Zavier, 2003; Robitaille, 2013), our contribution is to estimate how quasi-random variation in

children's sex affects mothers' reported ideal sex composition and to examine the family-size and birth-sequence patterns associated with this response.[1] Our study provides causal evidence that children's sex affects parents' reported ideal sex composition. This finding highlights that stated sex preferences can themselves respond to childbearing experiences, which matters when these measures are used to explain fertility behavior.

These findings are relevant to policies addressing son preference and unbalanced sex ratios, including bans on prenatal sex selection and financial incentives for families with daughters (Anukriti, 2018; Kumar and Sinha, 2020). Our results suggest that evaluations using stated sex preferences should account for the possibility that these responses are influenced by families' realized sex composition. If the estimated effects reflect changes in parental valuations, improving perceptions of raising daughters may offer a complementary approach to reducing son preference. Whether such changes translate into subsequent fertility decisions, sex selection, or investments in children requires separate evidence.

Finally, our study contributes to the broader literature on how children reshape parents' preferences and attitudes. For example, Shafer and Malhotra (2011), Sun and Lai (2017), and Borrell-Porta et al. (2019) find that parents with daughters are less likely to hold traditional gender role attitudes. Our findings complement this literature by showing that parenting daughters shifts mothers' stated ideals toward daughters and away from sons.

The remainder of the paper is organized as follows. Section 2 discusses the root causes of sex preferences and how they are affected by child sex. Section 3 presents the cultural, social, and demographic background of Peru. Section 4 introduces the data and variables used in the empirical analysis. Section 5 discusses the identification strategy. Section 6 presents the results. Section 7 concludes the study.

2 Theoretical Framework

In this section, we outline a theoretical framework to guide our empirical analysis. We begin by discussing the causes of sex preferences, followed by an exploration of preference adaptation and information learning theories to explain how children's sex can affect parental sex preferences. Finally, we compare the predictions of these two theories.

[1]For example, Aly and Shields (1991) state that "childbearing is an important event in changing the preference of parents" (Aly and Shields, 1991: 355). However, they do not discuss how the sex preferences of parents can be changed by childbearing. Instead, they treat it as constant over time and examine how it may affect sequential fertility decisions.

2.1 Sex Preferences

Since the seminal works of Becker and Lewis (1973) and Becker (1981), economists have approached children as goods, using microeconomic analysis to study fertility decisions. Raising a child requires parents to expend time, effort, and money. In return, parents may expect support from their children in old age (children as investment goods) or derive utility directly from the quantity and quality of their children (children as consumption goods). Based on these costs and benefits, parents decide on the number of children to have. If parents view sons and daughters differently, they may desire different numbers of each (Davies and Zhang, 1997; Kim, 2005; Li and Pantano, 2023). Parents are said to have a "son preference" if they want more sons than daughters, and a "daughter preference" if they want more daughters.[2] We now discuss the factors causing sons and daughters to be viewed differently.

First, the economic returns to raising sons and daughters can differ due to cultural, economic, and institutional factors. For instance, in some Asian countries like India, parents rely primarily on sons for financial support in old age (Das Gupta et al., 2003; Chung and Das Gupta, 2007; Ebenstein and Leung, 2010; Ebenstein, 2021), while in southern European countries such as Greece, daughters typically provide more support (Dagkouli-Kyriakoglou, 2022). Moreover, the earning potential of male and female children may differ, affecting their ability to support parents financially (Qian, 2008; Mahajan and Ramaswami, 2017). In countries like China and India, parents may face significant economic burdens from paying a bride price or dowry (Bhalotra et al., 2020; Dong et al., 2021). As children can serve as a form of investment, parents may prefer the sex associated with higher economic returns.

Second, non-economic returns may also differ between sons and daughters. Indeed, parents highly value children's inherent traits and behavioral characteristics, which, however, may differ by sex. For example, girls are often associated with qualities such as neatness, cuteness, and helpfulness (Arnold and Kuo, 1984), while boys are often perceived as more fun and easier to raise (Goldberg, 2009; Nugent, 2013). These (perceived) differences in non-economic returns can explain why, even in Nordic countries with high gender equality, parents still desire at least one child of each sex (Andersson et al., 2006).

Finally, sex preferences can reflect the tastes of parents, forming a feature of their

[2]It should be noted that sex preference may arise not only from the personal tastes but also from constraints faced by parents. This differs from the conventional notion of "preference" in economics, which typically reflects only personal tastes.

utility function (Davies and Zhang, 1997). Many studies show that migrants from societies with a strong preference for sons retain this preference even after moving to Western countries (e.g., Dubuc and Coleman, 2007; Almond et al., 2013; Carol and Hank, 2020). This persistence, despite dramatic socio-economic changes, highlights the role of parental tastes, which can persist over time despite the absence of initial economic and non-economic drivers.

In summary, sons and daughters are not perfect substitutes from the perspective of parents. Consequently, parents may desire some of their children to be boys and others to be girls.

2.2 Preference Adaptation and Sex Preferences

Behavioral economics has provided compelling evidence that human preferences are not immutable, as assumed by orthodox rational choice theories. A notable way preferences evolve is by aligning desires with realistically available options. People tend to prefer what they have or are likely to get, rather than what they do not have or are unlikely to get (Sugden, 2004; Dorsey, 2010). An archetypal illustration of this phenomenon can be found in the fable *The Fox and the Grapes* from the book *Aesop's Fables*, where the fox, upon realizing that he cannot reach the grapes, convinces himself that he has never really wanted them because they are sour. This preference, known as "adaptive preference," was introduced by Elster (1982) and applied to welfare economics by Sen (1982, 1999) and Nussbaum (2001), who noted that "the poor and deprived may accept and even find justification of their lot in life" (Sen, 1982: 376).

Adaptation plays an important role in parental sex preferences. Consider parents who strongly desire sons but have only daughters and are unable to have more children. They can either maintain their preference for sons and live unhappily with only daughters, or they can adjust their preferences to align with reality and live happily. If preferences are sufficiently malleable, the latter scenario is more likely. Overall, this example suggests that parents may experience disutility when the sex composition of their children does not match their desires, but they can mitigate the disutility by adjusting their preferences.

2.3 Information Learning and Sex Preferences

Classical theories of information economics highlight the importance of information in shaping decision-making (Stigler, 1961, 1962). Consumers often seek information about

the price and quality of a good to inform their choices (Stigler, 1961). Some goods, such as office stationery, have attributes that can be easily evaluated before purchase, making it feasible for consumers to acquire relevant information through simple searches. In contrast, some others, such as canned tuna, have attributes that are difficult to evaluate accurately before consumption, requiring consumers to rely on experience for evaluation. This distinction has led Nelson (1970) to classify the former as "search goods" and the latter as "experience goods". In practice, many goods possess a mixture of both attributes (Nelson, 1974).

Children, a special good in economic analyses, possess experience attributes that parents cannot predict with certainty, such as inherent traits and behavioral characteristics (Ben-Porath and Welch, 1972). Before having a child, parents may have some preliminary information about the differences between raising a son or a daughter, but this may be biased or incomplete. For example, in China, there is a widespread belief that sons provide more old-age support to their parents than daughters, although recent empirical research suggests no significant difference (Oliveira, 2016). As individuals enter parenthood, they will gain firsthand insights into their sons/daughters' attributes (Luppi, 2016), and their sex preferences may change based on this new information. Indeed, they tend to want more children of the sex that they find more valuable based on their experience.

Parenting experiences can provide favorable or unfavorable information about raising sons and daughters (Luppi, 2016). When these experiences are more rewarding than anticipated, parents may revise upward their assessment of the benefits of raising children of that sex. For example, discovering that raising a daughter is more rewarding than expected may shift preferences toward daughters. Such updating provides a learning-based explanation for parents increasingly favoring the sex of their existing children.

2.4 Preference Adaptation vs. Information Learning

Both preference adaptation and information learning suggest that children's sex can influence parental sex preferences. These mechanisms motivate two complementary empirical hypotheses.

First, *a composition-based account of preference adaptation predicts that the effects of the first child's sex are more pronounced for parents with fewer children and diminish as family size increases (H1).* In essence, this theory implies that parents are concerned with the overall sex composition of their children and will adjust their sex preferences toward

the actual sex composition if there is a discrepancy. For parents with fewer children, a child has a greater impact on the overall sex composition, necessitating a larger adjustment. To illustrate, consider two hypothetical families, A and B, who both initially preferred boys and wanted all their children to be boys. If each family's first child is a daughter, they will adjust their preferences. However, the extent of this adjustment may differ depending on the total number of children they end up having. For example, if Family A has four children while Family B has only two, a simple calculation shows that the first child changes the proportion of sons by 25% for Family A, but by 50% for Family B. Consequently, Family B must make a larger adjustment to align its preferences with its realized sex composition.[3]

Second, under a composition-based account of adaptation, families with the same numbers of sons and daughters adjust their preferences toward the same sex composition, holding other relevant circumstances constant. By contrast, *information learning can generate birth-order differences if parents acquire different information from children at different birth orders, or if they place different weights on the information (H2).* The first child may be particularly influential because it marks the transition to parenthood (Luppi, 2016; Luppi and Mencarini, 2018). Consequently, raising a daughter followed by a son may affect preferences differently from raising a son followed by a daughter.[4]

Together, these hypotheses guide our empirical assessment of adaptation and learning. Although the predicted patterns need not be exclusive to either mechanism, they provide complementary evidence on how parenting experiences shape sex preferences.

3 Background of Peru

While a preference for sons prevails in many societies, a very slight preference for daughters is present in Peru, as well as in other Latin American countries. In Peru, most women either express no sex preference or want an equal number of sons and daughters. Some women may want more daughters than sons, but relatively few women want the opposite (Fuse, 2010).[5]

[3]Parents also care about the sex of other children. Here, we focus on the adjustment caused by the first child.

[4]Studies in various research areas suggest that parental attitudes are more affected by having a first-born daughter than by subsequent daughters (e.g., Cronqvist and Yu, 2017; Sharrow et al., 2018; Greenlee et al., 2020).

[5]According to Fuse (2010), a woman shows no sex preference if she states that her ideal sex composition is up to God, or that her ideal number of both sons and daughters is zero while the number of children

The absence of son preference in Peru is deeply rooted in its family system and social norms. In regions where son preference is particularly strong, such as India, the family system is typically patrilineal and patrilocal (Das Gupta et al., 2003; Chung and Das Gupta, 2007). Married daughters typically move away from their natal parents, limiting their ability to support them, while married sons often reside with or near their parents, facilitating resource flow between them (Kochar, 2000; Ebenstein, 2021). As a result, parents rely primarily on their sons for old-age support. Conversely, in Peru and other Latin American countries, the family system and social norms place few constraints on women's economic and social autonomy, allowing married daughters to maintain close relationships with their parents (Basu and Das Gupta, 2001). Indeed, married daughters are as likely as sons to live with their parents, enabling them to significantly contribute to their parents' well-being (Bongaarts and Zimmer, 2002).

To assess parental sex preferences, researchers often estimate the parity progression ratio (PPR), or the proportion of women who progress from one parity to the next, conditional on the sex composition of existing children (e.g., Clark, 2000; Altindag, 2016; Cukrowska-Torzewska and Grabowska, 2023). The underlying logic is that if parents prefer sons over daughters, they will be more likely to have another child if they do not have a son than if they do not have a daughter, and vice versa. Figure 1 shows the conditional PPR for Peruvian parents with one or two children. The plot on the left shows that about 74% of women had a second child regardless of the sex of the first child at the time of the survey. Similarly, the plot on the right shows that if they have only two sons or only two daughters, they are equally likely to have another child, with a probability of 66%.[6] Overall, the two plots suggest that Peruvian parents do not have a *strong* preference for either sons or daughters.

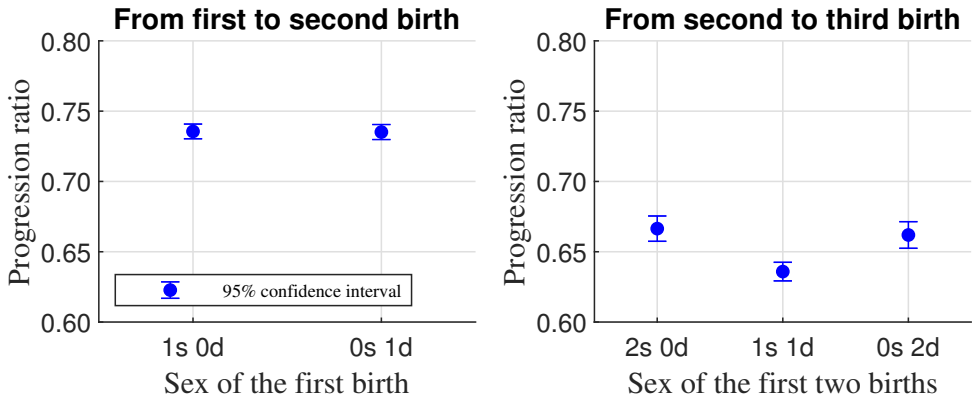
Peru's relatively balanced aggregate sex preferences make it a useful setting for examining the effects of children's sex. Abortion has generally been prohibited since 1924, with an exception on therapeutic grounds. We assess the plausibility of random assignment using the birth-sex patterns in Figures 2 and 3. Figure 2 shows the probability of a male birth at each parity. It is about 0.51 regardless of the birth order, which falls within the

whose sex does not matter is positive.

[6]In addition, the plot on the right shows that parents are less likely to have a third child if they have a son and a daughter, suggesting satisfaction with a mixed-sex composition of children. This PPR pattern, where average progression ratios to a second birth are similar following first-born sons and daughters, while the progression to a third child depends on the first two children's sex composition, is not unique to Peru. Andersson et al. (2006) document the same pattern for Denmark, Finland, Norway, and Sweden.

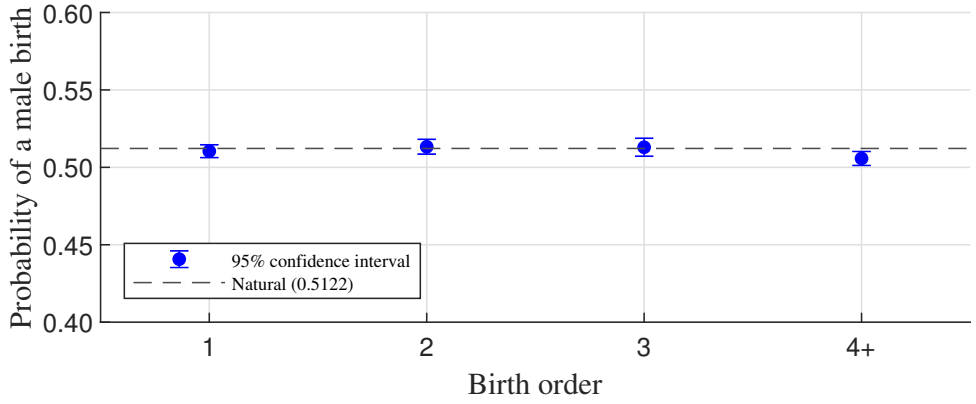
biologically normal range of 0.507 to 0.517.

Figure 1: Parity Progression Ratio Conditional on the Sex of Existing Children



Notes: Data are from the Peruvian Demographic and Health Survey in 1996, 2000, and 2004-2011. "1s 0d" means that parents previously had one son and zero daughters. Other abbreviations can be interpreted similarly.

Figure 2: Probability of a Male Birth at Each Parity

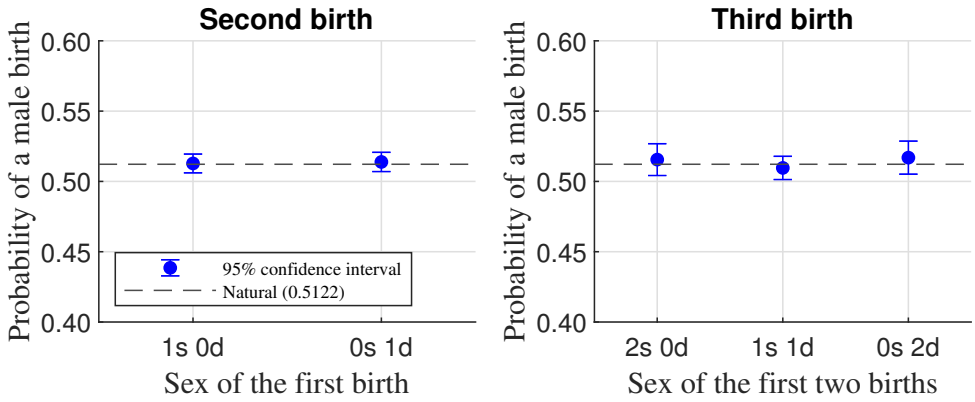


Notes: Data are from the Peruvian Demographic and Health Survey in 1996, 2000, and 2004-2011.

Since Figure 2 may mask the possibility that some parents abort male fetuses while others abort female fetuses, Figure 3 further plots the probability that the next birth is a male, conditional on the sex composition of previous children. If parents were using abortion to control the sex of their children, the next birth would be more likely to be a boy if the parents prefer sons but do not have one, and more likely to be a girl if they prefer daughters but do not have one. Figure 3 shows that the probability that the second (or third) birth is a male does not depend on the sex of the first child (or the first two children). The patterns provide little evidence of prenatal sex selection. As will become

clear below, the randomness of child sex in Peru offers great advantages for estimating the effects of child sex on reported preferences and examining the proposed mechanisms.

Figure 3: Probability of a Male Birth Conditional on the Sex of Previous Children



Notes: Data are from the Peruvian Demographic and Health Survey in 1996, 2000, and 2004-2011. "1s 0d" means that parents previously had one son and zero daughters. Other abbreviations can be interpreted similarly.

4 Data and Variables

This study uses data from three rounds of the Peruvian Demographic and Health Survey (DHS) in the years 1996, 2000, and 2004-2011. The data are repeated cross-sectional and are part of the DHS program, which has been collecting high-quality, nationally representative data on population and health in developing countries since 1984. Since 1990, the DHS has systematically included questions to elicit information on fertility ideals and sex preferences. In Peru, the collection of data on fertility ideals and sex preferences began with the 1996 survey, which provides the key data for our study.

We have access to each woman's complete birth record, from which we extract valuable information about the sex of her children. We exclude women with twin births from the study. In our empirical analysis, we focus on either the sex of the first child or the sex of the first two children. When the first birth involves twins of different sexes, it is both difficult and meaningless to determine the sex of the first child. In addition, when examining the role of information learning, we need to consider the birth order of the daughter, and it is not practically meaningful to distinguish the birth orders of twins. We also exclude women reporting a nonnumeric or zero ideal family size and those with missing information on ideal sex composition or control variables. The final sample

comprises 107,560 mothers aged 15–49.[7]

Table 1 presents a summary of the key variables. Peruvian women in our sample have an average of 3.0 children, with a probability of 0.49 that the first-born child is female. The average time since the first birth is about 13 years. These women have an average age of 34 and have received an average of 8.3 years of schooling, with a standard deviation of 4.5 years. Approximately 64.2% of them are employed at the time of the survey, and 68.9% live in urban areas.

Table 1: Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Panel A. Individual characteristics					
Children ever born	107,560	2.997	2.085	1	16
First-born daughter	107,560	0.490	0.500	0	1
Second-born daughter	80,664	0.487	0.500	0	1
Years since first birth	107,560	13.039	8.350	0	38
Age	107,560	34.069	8.404	15	49
Years of schooling	107,560	8.328	4.492	0	17
Employed	107,560	0.642	0.479	0	1
Urban residence	107,560	0.689	0.463	0	1
Panel B. Reported sex preferences					
Ideal proportion of sons	107,560	0.371	0.278	0	1
Ideal proportion of daughters	107,560	0.385	0.284	0	1
Want at least one son	107,560	0.691	0.462	0	1
Want at least one daughter	107,560	0.708	0.455	0	1
Want at least one child of each sex	107,560	0.642	0.479	0	1
Want more sons than daughters	107,560	0.131	0.337	0	1
Want more daughters than sons	107,560	0.141	0.348	0	1

Following the literature (e.g., Clark, 2000; Bhat and Zavier, 2003; Fuse, 2010), our measures of sex preferences are constructed from the answers to the following two questions:

Q1. If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?

Q2. How many of these children would you like to be boys, how many would you like to be girls, and for how many would it not matter if it's a boy or a girl?

These questions elicit respondents' current assessments of their ideal family size and sex composition under a *hypothetical* return to childlessness. This framing is designed to

[7]In the 1996 survey, the questions about sex preference were also administered to a sample of men. In Appendix A, we show that having daughters leads men to prefer a smaller proportion of sons and a larger proportion of daughters, which is in line with the findings for women.

reduce justification bias arising from reluctance to express dissatisfaction with existing children (Goldman et al., 1989; Casterline and Agyei-Mensah, 2017).

Based on the responses, we calculate the reported ideal proportions of sons, daughters, and children whose sex does not matter. These proportions sum to one, so we focus on the first two as our main outcomes. They capture women's stated preferences for their children's sex composition at the time of the survey and complement behavioral indicators based on fertility decisions and sex ratios at birth. As Kalsi (2026) shows, stated and behavioral measures can capture different dimensions of fertility control and gender discrimination. Although the hypothetical framing helps mitigate justification bias, some rationalization may remain. Our estimated effects on reported ideals may therefore reflect both changes in the valuation of sons and daughters and changes in how these preferences are expressed.

Table 1 shows that, on average, Peruvian women want 37.1% of their children to be boys and 38.5% to be girls, indicating a slight preference for daughters (difference = 1.4 pp, p-value < 0.001), which is consistent with the findings of Fuse (2010).[8] In addition, the data show that 69.1% of Peruvian women want to have at least one son, 70.8% want to have at least one daughter, and 64.2% want to have at least one child of each sex. Finally, 13.1% of them want more sons than daughters, while 14.1% want more daughters than sons.

5 Identification Strategies

5.1 Identifying the Effects of Children's Sex

To estimate the effects of children's sex on parental sex preferences, we use the following regression model,

$$Preference_i = \beta_0 + \beta_1 Sex_i + \beta_2 X_i + \epsilon_i. \quad (1)$$

In this equation, $Preference_i$ is the outcome variable, which can be the ideal proportion of sons or daughters reported by Woman i. The variable Sex is a measure of the sex of the children, to be detailed shortly. X is a vector of control variables, including the number of children ever born, the number of years since the first birth, age, years of

[8] To put the degree of daughter preference in Peru into perspective, we compare it with the son preference in India. The 2015-2016 DHS data in India suggest that Indian women want about 47.9% of their children to be boys but only 41.0% to be girls. This implies a difference of 7.0 pp (p-value < 0.001), much larger than the 1.4 pp observed in Peru.

schooling, employment status (whether employed or not), and residential type (urban or rural) of the respondent.[9] In addition, X includes dummy variables for the state and year of the interview. Lastly, ϵ is the disturbance term. Under the identification assumptions discussed below, β_1 captures the causal effect of children's sex on the reported ideal proportion of sons or daughters.

We now discuss the measurement of children's sex. While the sex of each child is essentially a random variable, the measure of children's sex (Sex) can become endogenous in the regression analysis if children born later in the birth order are improperly considered. This is because parental decisions about further childbearing may depend on their sex preferences and the sex of their existing children. For example, parents with a preference for sons/daughters are more likely to have another child if their current children are all girls/boys, and are less likely to do so in the opposite scenario. If we consider children born later in the birth order, we will unintentionally exclude parents who were satisfied with the sex of their earlier children and stopped childbearing. Consequently, the sample mainly includes parents who were not satisfied with the sex of their earlier children and continued to have more children. This will lead to a sample selection bias, whereby a correlation between the sex of earlier children and parental sex preferences can be observed, even if the former does not causally affect the latter.[10]

We first focus on the sex of the first child to avoid sample selection arising from subsequent fertility decisions, following Dahl and Moretti (2008) and Choi and Hwang (2015), who identify the causal effects of the first child's sex on family structure and parental investment in children, respectively. We also extend the analysis to the second birth, drawing on evidence on fertility progression in Peru. Figure 1 shows similar average second-birth progression ratios following first-born sons and daughters. Appendix B further shows that differences in progression by first-child sex vary little with maternal birth cohort, age at first birth, and schooling (Table A.3), and that observable balance in maternal characteristics by first-child sex remains largely unchanged when restricting the sample to women with at least two children (Table A.4). This extension assumes that progression preserves comparability in unobserved preferences between women with first-born sons and daughters.

[9] Age squared is not included, as its effect is minimal, but results are robust to its inclusion.
[10] See Choi and Hwang (2015) for more discussions.

5.2 Examining the Roles of Preference Adaptation and Information Learning

The preference adaptation theory suggests that the effects of the first child's sex are more pronounced for parents with relatively few children. To test this hypothesis, we compare the effects of the first child's sex between parents with only one child and those with at least two children.[11] The comparison is made using the following regression model,

$$Preference_i = \alpha_0 + \alpha_1 Daughter_{1,i} + \alpha_2 Daughter_{1,i} \times Children_{2,i} + \alpha_3 X_i + u_i. \quad (2)$$

In the baseline specification, $Children_{2,i}$ is a dummy variable taking the value 1 if parents have at least two children and 0 otherwise, which is also included in X_i. The effect of a first-born daughter on parental sex preference is α_1 for parents with only one child and $\alpha_1 + \alpha_2$ for parents with more than one child. If preference adaptation plays a role, we expect $\alpha_1 + \alpha_2$ to have the same sign as α_1, but a smaller magnitude. Because the family-size difference may reflect the duration of parenthood, in an extended specification, we additionally control for the interaction between the first-born-daughter indicator and years since first birth.

The information learning theory suggests that the effect of a child's sex on parental sex preferences depends on the child's birth order, as parents may pay different levels of attention to children in different birth orders. In particular, the effect of a first-born daughter may differ from that of a second-born daughter. To test this hypothesis, we use the following regression model,

$$Preference_i = \gamma_0 + \gamma_1 DS_i + \gamma_2 SS_i + \gamma_3 DD_i + \gamma_4 X_i + v_i. \quad (3)$$

In this equation, we use three dummy variables: DS, which takes the value 1 if the first child is a daughter and the second is a son; SS, which takes the value 1 if the first two children are both sons; and DD, which takes the value 1 if the first two children are both daughters. The reference group consists of women who have a first-born son and a second-born daughter. In X, we additionally control for the number of years between the first two births to account for differences in birth spacing. Thus, γ_1 captures the effect of having a first-born daughter and a second-born son relative to having a first-born son and a second-born daughter. A statistically significant difference between the two sequences would support the proposed learning mechanism, under which parenting experiences exert

[11] We use an indicator for having at least two children rather than the number of children directly, because higher-parity fertility depends on both earlier children's sex and parental sex preferences, making total fertility endogenous.

different influences across birth orders.

6 Results

This section presents the findings of our study. First, we show how children's sex affects women's sex preferences. Next, we explore the role of preference adaptation and learning in shaping these effects. Finally, we demonstrate the robustness of our results using alternative measures of sex preferences.

6.1 Effects of Children's Sex on Parental Sex Preferences

Table 2 shows how a woman's sex preference is affected by the sex of her first child. In Columns (1) and (2), the outcome variable is the ideal proportion of sons, while in Columns (3) and (4), it is the ideal proportion of daughters. We first conduct the analysis without control variables, followed by a complete analysis with controls.

The results indicate a significant effect of the first child's sex on the mother's sex preference. Columns (1) and (2) show that having a first-born daughter reduces the ideal proportion of sons by 6.1 pp. Meanwhile, Columns (3) and (4) show that having a first-born daughter increases the ideal proportion of daughters by 5.2 pp. These effects are substantial, given that the average ideal proportions of sons and daughters are 37.1% and 38.5%, respectively.

In Table 3, we extend the analysis to include the sex of the second child and examine how a woman's sex preference is affected by the proportion of daughters among her first two children. Again, having daughters leads women to report a lower ideal proportion of sons and a higher ideal proportion of daughters. Indeed, when the first two children are both daughters rather than sons, the ideal proportion of sons decreases by 8.8 pp, while the ideal proportion of daughters increases by 6.2 pp.

Regarding control variables, Tables 2 and 3 show that the ideal proportion of sons is positively associated with the number of years since the first birth and the mother's level of education, but negatively associated with the mother's age and urban residence. The ideal proportion of daughters, on the other hand, is positively associated with the number of years since the first birth and the mother's level of education, but negatively associated with the total number of children ever born and the mother's age. However, the coefficients on these variables are small in magnitude.

Table 2: Effect of the first child's sex on a woman's sex preference

	Ideal proportion of sons		Ideal proportion of daughters	
	(1)	(2)	(3)	(4)
First-born daughter	-0.061***	-0.061***	0.052***	0.052***
	(0.002)	(0.002)	(0.002)	(0.002)
Children ever born		-0.000		-0.004***
		(0.001)		(0.001)
Years since first birth		0.001***		0.002***
		(0.000)		(0.000)
Age		-0.001***		-0.002***
		(0.000)		(0.000)
Years of schooling		0.001***		0.002***
		(0.000)		(0.000)
Employed		-0.002		0.001
		(0.003)		(0.003)
Urban		-0.008***		0.004
		(0.003)		(0.003)
State fixed effect	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes
N	107,560	107,560	107,560	107,560
R^2	0.012	0.036	0.008	0.020

Notes. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3: Effect of the first two children's sex on a woman's sex preference

	Ideal proportion of sons		Ideal proportion of daughters	
	(1)	(2)	(3)	(4)
Proportion of daughters	-0.088***	-0.088***	0.062***	0.062***
	(0.004)	(0.004)	(0.004)	(0.004)
Children ever born		-0.001		-0.005***
		(0.001)		(0.001)
Years since first birth		0.001		0.002***
		(0.000)		(0.000)
Age		-0.001		-0.001***
		(0.000)		(0.000)
Years of schooling		0.001		0.002***
		(0.000)		(0.000)
Employed		-0.001		0.001
		(0.003)		(0.003)
Urban		-0.013***		0.001
		(0.003)		(0.003)
State fixed effect	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes
N	80,664	80,664	80,664	80,664
R^2	0.013	0.038	0.006	0.018

Notes. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The results in Tables 2 and 3 show that having daughters shifts women's reported ideal sex composition toward daughters and away from sons. These effects are substantial and precisely estimated, indicating that the fertility ideals women report respond to the sex of their existing children.

6.2 Family-Size Heterogeneity

We first examine whether the effect of first-child sex on reported ideals differs by family size. As discussed in Section 2.4, stronger effects among women with fewer children would be consistent with adaptation toward realized sex composition. We estimate Equation (2), comparing women with one child with those who have at least two children.

Table 4 shows larger first-child effects among women with one child. In Columns (1) and (2), having a first-born daughter lowers the reported ideal proportion of sons by 9.1–9.2 pp among women with one child, while the effect is 4.1–4.2 pp smaller among women with at least two children. Columns (4) and (5) show a corresponding increase of 8.5 pp in the reported ideal proportion of daughters among women with one child, with an effect 4.4–4.5 pp smaller among women with multiple children.

One concern is that these differences may partly reflect differences in the duration of parenthood. To examine this possibility, Columns (3) and (6) additionally interact the first-born-daughter indicator with years since first birth. The coefficient on this interaction is positive for the ideal proportion of sons and negative for the ideal proportion of daughters, consistent with attenuation of the first-child effect over time. The interaction with having at least two children decreases in magnitude from 4.1 to 2.2 pp for sons and from 4.5 to 2.5 pp for daughters, but both remain statistically significant at the 0.1 percent level. Thus, allowing the first-child effect to vary with the duration of parenthood narrows, but does not eliminate, the family-size difference. The remaining attenuation is consistent with preference adaptation.

Another concern is that women who have not completed childbearing may also take anticipated future children into account when adapting their preferences. We therefore conduct two supplementary analyses in Appendix C. First, we restrict the sample to women who report wanting no more children, have been sterilized, or have become infertile. The attenuation of the first-child effects among women with multiple children remains in this sample. Second, we examine heterogeneity by reported ideal family size and find that the first-child effect weakens as ideal family size increases.

Table 4: Effects of the first child's sex on sex preference for women with different numbers of children

	Ideal proportion of sons			Ideal proportion of daughters		
	(1)	(2)	(3)	(4)	(5)	(6)
First-born daughter	-0.092***	-0.091***	-0.102***	0.085***	0.085***	0.096***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
First-born daughter	0.042***	0.041***	0.022***	-0.044***	-0.045***	-0.025***
× At least two children	(0.005)	(0.005)	(0.007)	(0.006)	(0.006)	(0.007)
At least two children	-0.015***	-0.017***	-0.008	0.024***	0.031***	0.021***
	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)
First-born daughter			0.002***			-0.002***
× Years since first birth			(0.000)			(0.000)
Other control variables	No	Yes	Yes	No	Yes	Yes
State fixed effect	No	Yes	Yes	No	Yes	Yes
Year of interview fixed effect	No	Yes	Yes	No	Yes	Yes
N	107,560	107,560	107,560	107,560	107,560	107,560
R^2	0.013	0.037	0.037	0.010	0.021	0.022

Notes. Other control variables include children ever born, years since first birth, age, years of schooling, employment status, and urban residence. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

6.3 Birth-Sequence Differences

We next examine whether reported ideals differ between daughter–son and son–daughter sequences among the first two births. Both sequences contain one son and one daughter, allowing us to assess whether the ordering of parenting experiences matters beyond the sex composition of the first two children. We estimate Equation (3), additionally controlling for the number of years between the first two births.

Table 5 shows that, relative to the son–daughter sequence, the daughter–son sequence is associated with a 1.3 pp lower ideal proportion of sons and a 1.9 pp higher ideal proportion of daughters in the specifications with controls. Thus, reported fertility ideals differ even when the first two births contain one child of each sex. These findings are consistent with parenting experiences having different influences across birth orders, potentially through differences in attention or information acquired.

One concern is that women in this sample may have subsequent children, so the two sequences need not imply the same overall family composition. We therefore repeat the analysis among women with exactly two children in Appendix D, and find that a sequence difference remains among women whose families contain exactly one son and one daughter.

Because restricting the sample by realized family size may introduce selection through subsequent fertility decisions, we treat this comparison as a sensitivity analysis.

Table 5: Effects of the first two children's sex and birth order on a woman's sex preference

	Ideal proportion of sons		Ideal proportion of daughters	
	(1)	(2)	(3)	(4)
Daughter-Son	-0.012***	-0.013***	0.019***	0.019***
	(0.004)	(0.004)	(0.004)	(0.004)
Son-Son	0.041***	0.041***	-0.012***	-0.012**
	(0.004)	(0.004)	(0.004)	(0.004)
Daughter-Daughter	-0.046***	-0.046***	0.051***	0.051***
	(0.004)	(0.004)	(0.004)	(0.004)
Other control variables	No	Yes	No	Yes
State fixed effect	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes
N	80,664	80,664	80,664	80,664
R^2	0.013	0.038	0.007	0.019

Notes. The omitted sequence is son–daughter. Other control variables include children ever born, years since first birth, the interval between the first two births, age, years of schooling, employment status, and urban residence. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

6.4 More Robustness Checks

6.4.1 Alternative Measures of Sex Preferences

In the previous analysis, a woman's sex preference is measured by the ideal proportions of sons or daughters, reflecting the assumption that parents who favor a particular sex want a larger proportion of children of that sex. Sex preferences, however, may manifest in different ways. To assess the robustness of our findings to different preference measures, we consider two additional dimensions of sex preferences.

First, sex preference may take the form of a minimum desire to have at least one child of a given sex. To capture this, we construct three indicator variables: (1) the woman desires at least one son, (2) she desires at least one daughter, and (3) she desires at least one child of each sex. Indicators (1) and (2) capture preferences for sons and daughters, respectively, while indicator (3) captures the desire for a mixed-sex family.

Second, sex preference may be expressed as a relative valuation of sons and daughters. We therefore construct two additional indicators: (1) the woman desires more sons than

daughters and (2) she desires more daughters than sons. These indicators capture the relative valuation of sons and daughters, respectively.

Table 6 shows that the main findings are robust when sex preferences are measured using minimum-desire indicators. Having a first-born daughter lowers the probability of wanting at least one son and raises the probability of wanting at least one daughter (Panel A). Having two daughters rather than two sons lowers the probability of wanting at least one son and of wanting children of both sexes (Panel B). For the indicators of wanting a son or a daughter, the first-child effects are larger among women with one child than among women with multiple children (Panel C). The daughter–son sequence is also associated with a higher probability of wanting at least one daughter than the son–daughter sequence, although the corresponding differences for wanting a son or children of both sexes are not statistically significant (Panel D).

Table 7 shows that having daughters also shifts relative-preference measures toward daughters and away from sons (Panels A and B). Family-size differences appear in specifications without control variables but are statistically insignificant in the controlled specifications (Panel C). Birth-sequence differences remain evident in Panel D.

Overall, the alternative measures reinforce the effects of children's sex on reported preferences and provide further evidence of birth-sequence differences, although family-size heterogeneity is less uniform after accounting for the duration of parenthood.

6.4.2 Evidence from a Son-Preferring Country: India

Our main analysis focuses on Peru, where aggregate sex preferences are relatively balanced, the birth-sex patterns provide little evidence of prenatal sex selection, and average second-birth progression ratios are similar following first-born sons and daughters. This institutional setting allows us to exploit variations in the sex of both the first and second child to examine the roles of preference adaptation and information learning. A natural question, however, is whether children's sex also affects parental sex preferences in countries with strong son preference, such as China and India.

Conducting an empirical analysis in such settings poses significant challenges. Parents may use sex-selective abortion to control the sex of their children, creating reverse causality between parental preferences and children's sex. In addition, son-biased fertility stopping rules create selection into higher parities, complicating the extension of the analysis beyond the first birth.

Table 6: Effect of children's sex on a woman's sex preference (minimum desire for sons and daughters)

	Want at least one son		Want at least one daughter		Want at least one child of each sex	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Effect of the first child's sex on a woman's sex preference						
First-born daughter	-0.051***	-0.051***	0.029***	0.030***	-0.012**	-0.012**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Other control variables	No	Yes	No	Yes	No	Yes
State fixed effect	No	Yes	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes	No	Yes
Panel B: Effect of the first two children's sex on a woman's sex preference						
Proportion of daughters	-0.066***	-0.066***	0.010	0.010	-0.030***	-0.030***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Other control variables	No	Yes	No	Yes	No	Yes
State fixed effect	No	Yes	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes	No	Yes
Panel C: Effect of the first child's sex on a woman's sex preference by the number of children						
First-born daughter	-0.092***	-0.100***	0.068***	0.077***	-0.015	-0.016
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
First-born daughter	0.056***	0.037***	-0.052***	-0.039***	0.004	-0.000
× At least two children	(0.009)	(0.011)	(0.009)	(0.011)	(0.010)	(0.011)
At least two children	-0.001	-0.004	0.051***	0.038***	0.043***	0.022**
	(0.006)	(0.007)	(0.006)	(0.008)	(0.007)	(0.008)
Other control variables	No	Yes	No	Yes	No	Yes
State fixed effect	No	Yes	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes	No	Yes
Panel D: Effect of the first two children's sex and birth order on a woman's sex preference						
Daughter-Son	-0.007	-0.007	0.021***	0.021***	0.007	0.007
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Son-Son	0.017**	0.017**	0.002	0.002	-0.010	-0.010
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Daughter-Daughter	-0.049***	-0.049***	0.012*	0.013*	-0.041***	-0.041***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Other control variables	No	Yes	No	Yes	No	Yes
State fixed effect	No	Yes	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes	No	Yes

Notes. Other control variables include children ever born, years since first birth, age, years of schooling, employment status, and urban residence. Panel C additionally includes the interaction between the first-born-daughter indicator and years since first birth. Panel D additionally controls for the interval between the first two births. In Panel D, the omitted sequence is son–daughter. Standard errors are in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 7: Effect of children's sex on a woman's sex preference (relative importance of sons and daughters)

	Want more sons than daughters		Want more daughters than sons	
	(1)	(2)	(3)	(4)
Panel A: Effect of the first child's sex on a woman's sex preference				
First-born daughter	-0.088***	-0.088***	0.086***	0.086***
	(0.003)	(0.003)	(0.003)	(0.003)
Other control variables	No	Yes	No	Yes
State fixed effect	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes
Panel B: Effect of the first two children's sex on a woman's sex preference				
Proportion of daughters	-0.150***	-0.150***	0.136***	0.136***
	(0.005)	(0.005)	(0.005)	(0.005)
Other control variables	No	Yes	No	Yes
State fixed effect	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes
Panel C: Effect of the first child's sex on a woman's sex preference by the number of children				
First-born daughter	-0.101***	-0.100***	0.110***	0.110***
	(0.005)	(0.005)	(0.006)	(0.006)
First-born daughter	0.017**	-0.008	-0.032***	-0.001
× At least two children	(0.006)	(0.008)	(0.007)	(0.008)
At least two children	0.017***	0.024***	0.034***	0.028***
	(0.005)	(0.006)	(0.004)	(0.005)
Other control variables	No	Yes	No	Yes
State fixed effect	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes
Panel D: Effect of the first two children's sex and birth order on a woman's sex preference				
Daughter-Son	-0.017***	-0.017***	0.019***	0.019***
	(0.004)	(0.004)	(0.005)	(0.005)
Son-Son	0.105***	0.105***	-0.022***	-0.022***
	(0.005)	(0.005)	(0.004)	(0.004)
Daughter-Daughter	-0.044***	-0.044***	0.116***	0.116***
	(0.004)	(0.004)	(0.005)	(0.005)
Other control variables	No	Yes	No	Yes
State fixed effect	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes

Notes. Other control variables include children ever born, years since first birth, age, years of schooling, employment status, and urban residence. Panel C additionally includes the interaction between the first-born-daughter indicator and years since first birth. Panel D additionally controls for the interval between the first two births. In Panel D, the omitted sequence is son–daughter. Standard errors are in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

An important exception is the sex of the first child. Existing evidence suggests that prenatal sex selection is limited at first births in India (Kalsi, 2026). Together with the first-birth sex ratio reported in Appendix E, this supports treating first-child sex as approximately randomly assigned in our sample. While we cannot use the sex of the second child to investigate the underlying mechanisms, we can examine whether the sex of the first child affects parental sex preferences in a context with a strong preference for sons.

Using data from the 2015–2016 Indian Demographic and Health Survey, we find that the sex of the first child has a significant effect on parents' reported sex preferences.[12] As shown in Table 8, having a first-born daughter reduces the ideal proportion of sons by 3.8 pp and increases the ideal proportion of daughters by 5.2 pp. Despite substantial institutional differences between Peru and India, these results confirm that the core relationship documented in the main analysis extends to a son-preferring country, thereby reinforcing the external validity of our findings.

Table 8: Effect of the first child's sex on a woman's sex preference (India)

	Ideal proportion of sons		Ideal proportion of daughters	
	(1)	(2)	(3)	(4)
First-born daughter	-0.036***	-0.038***	0.053***	0.052***
	(0.004)	(0.004)	(0.004)	(0.004)
Other control variables	No	Yes	No	Yes
State fixed effect	No	Yes	No	Yes
N	32,415	32,415	32,415	32,415
R^2	0.007	0.075	0.017	0.046

Notes. Other control variables include children ever born, years since first birth, age, years of schooling, employment status, and urban residence. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

7 Conclusions

This study proposes two mechanisms, preference adaptation and information learning, through which the sex of children influences parental sex preferences. First, parents may adjust their preferences based on the actual sex composition of their children, when it differs from their desired composition. Second, parents may acquire new information about the values of sons and daughters through their parenting experiences and revise their sex

[12] See Appendix E for a detailed description of the Indian sample.

preferences accordingly. While both theories suggest an effect of child sex on parental sex preferences, they motivate complementary empirical hypotheses: the preference adaptation theory posits that the effect of the first child's sex is more pronounced for parents with fewer children, whereas the information learning theory suggests that the effect of a child's sex varies with the child's birth order.

Using data from the Peruvian DHS, we find that having daughters leads women to report a lower ideal proportion of sons and a higher ideal proportion of daughters. The first-child effect is stronger among women with one child than among those with multiple children, even after allowing it to vary with duration of parenthood. This pattern supports the adaptation mechanism. Reported fertility ideals also differ between daughter–son and son–daughter sequences after controlling for birth spacing, and the difference persists among women with exactly two children. These findings support the role of information learning and highlight the importance of parenting experiences in shaping reported sex preferences.

Our findings focus on reported ideals elicited after childbearing. They establish that these reports respond to the sex of existing children, but cannot distinguish changes in parents' valuations from changes in how those valuations are expressed in the survey. Establishing whether these responses translate into subsequent fertility decisions, sex selection, or investments in children requires additional evidence.

References

Almond, D., Edlund, L., & Milligan, K. (2013). Son preference and the persistence of culture: Evidence from South and East Asian immigrants to Canada. *Population and Development Review*, *39*(1), 75–95.

Altindag, O. (2016). Son preference, fertility decline, and the nonmissing girls of Turkey. *Demography*, *53*(2), 541–566.

Aly, H. Y., & Shields, M. P. (1991). Son preference and contraception in Egypt. *Economic Development and Cultural Change*, *39*(2), 353–370.

Andersson, G., Hank, K., Rønsen, M., & Vikat, A. (2006). Gendering family composition: Sex preferences for children and childbearing behavior in the Nordic countries. *Demography*, *43*(2), 255–267.

Anukriti, S. (2018). Financial incentives and the fertility-sex ratio trade-off. *American Economic Journal: Applied Economics*, *10*(2), 27–57.

Arnold, F., & Kuo, E. C. (1984). The value of daughters and sons: A comparative study of the gender preferences of parents. *Journal of Comparative Family Studies*, *15*(2), 299–318.

Basu, A., & Das Gupta, M. (2001). Family systems and the preferred sex of children. In N. J. Smelser & P. B. Baltes (Eds.), *International encyclopedia of the social and behavioral sciences,* vol. 8. Amsterdam: Elsevier: 5350–5357.

Becker, G. S. (1981). A treatise on the family. *Cambridge: Harvard University Press.*

Becker, G. S., & Lewis, H. G. (1973). On the interaction between the quantity and quality of children. *Journal of Political Economy*, *81*(2, Part 2), S279–S288.

Ben-Porath, Y., & Welch, F. (1972). *Chance, child traits, and choice of family size.* RAND Corporation.

Bhalotra, S., Chakravarty, A., & Gulesci, S. (2020). The price of gold: Dowry and death in India. *Journal of Development Economics*, *143*, 102413.

Bhat, P. M., & Zavier, A. F. (2003). Fertility decline and gender bias in northern India. *Demography*, *40*(4), 637–657.

Bongaarts, J., & Zimmer, Z. (2002). Living arrangements of older adults in the developing world: An analysis of Demographic and Health Survey household surveys. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *57*(3), S145–S157.

Borrell-Porta, M., Costa-Font, J., & Philipp, J. (2019). The 'mighty girl' effect: Does parenting daughters alter attitudes towards gender norms? *Oxford Economic Papers*, *71*(1), 25–46.

Carol, S., & Hank, K. (2020). Natives' and immigrants' gender preferences for children in Germany. *European Journal of Population*, *36*(2), 235–246.

Casterline, J. B., & Agyei-Mensah, S. (2017). Fertility desires and the course of fertility decline in sub-Saharan Africa. *Population and Development Review*, *43(S1)*, 84–111.

Chen, C., Chou, S.-Y., Gimenez, L., & Liu, J.-T. (2020). The quantity of education and preference for sons: Evidence from Taiwan's compulsory education reform. *China Economic Review*, *59*, 101369.

Choi, E. J., & Hwang, J. (2015). Child gender and parental inputs: No more son preference in Korea? *American Economic Review*, *105*(5), 638–43.

Chung, W., & Das Gupta, M. (2007). The decline of son preference in South Korea: The roles of development and public policy. *Population and Development Review*, *33*(4), 757–783.

Clark, S. (2000). Son preference and sex composition of children: Evidence from India. *Demography*, *37*(1), 95–108.

Cronqvist, H., & Yu, F. (2017). Shaped by their daughters: Executives, female socialization, and corporate social responsibility. *Journal of Financial Economics*, *126*(3), 543–562.

Cukrowska-Torzewska, E., & Grabowska, M. (2023). The sex preference for children in Europe: Children's sex and the probability and timing of births. *Demographic Research*, *48*(8), 203–232.

Dagkouli-Kyriakoglou, M. (2022). 'Keeping the children close and the daughters closer.' Is family housing support in Greece gendered? *European Journal of Women's Studies*, *29*(2), 266–281.

Dahl, G. B., & Moretti, E. (2008). The demand for sons. *Review of Economic Studies*, *75*(4), 1085–1120.

Das Gupta, M., Jiang, Z., Li, B., Xie, Z., Chung, W., & Bae, H.-O. (2003). Why is son preference so persistent in East and South Asia? A cross-country study of China, India and the Republic of Korea. *Journal of Development Studies*, *40*(2), 153–187.

Davies, J. B., & Zhang, J. (1997). The effects of gender control on fertility and children‘s consumption. *Journal of Population Economics*, *10*, 67–85.

Dong, Z., Alhaj-Yaseen, Y., Jiao, Y., & Zhong, Y. (2021). Surplus men and scarce women: The impact of mating competition on the desire for sons in China. *Pacific Economic Review*, *26*(3), 339–371.

Dorsey, D. (2010). Preferences, welfare, and the status-quo bias. *Australasian Journal of Philosophy*, *88*(3), 535–554.

Dubuc, S., & Coleman, D. (2007). An increase in the sex ratio of births to India-born mothers in England and Wales: Evidence for sex-selective abortion. *Population and Development Review*, *33*(2), 383–400.

Dyson, T. (2012). Causes and consequences of skewed sex ratios. *Annual Review of Sociology*, *38*, 443–461.

Ebenstein, A. (2021). Elderly coresidence and son preference: Can pension reforms solve the 'missing women' problem?

Ebenstein, A., & Leung, S. (2010). Son preference and access to social insurance: Evidence from China's rural pension program. *Population and Development Review*, *36*(1), 47–70.

Edlund, L., Li, H., Yi, J., & Zhang, J. (2013). Sex ratios and crime: Evidence from China. *Review of Economics and Statistics*, *95*(5), 1520–1534.

Elster, J. (1982). Sour grapes - Utilitarianism and the genesis of wants. In A. Sen & B. Williams (Eds.), *Utilitarianism and beyond*. Cambridge: Cambridge University Press: 219–238.

Fuse, K. (2010). Variations in attitudinal gender preferences for children across 50 less-developed countries. *Demographic Research*, *23*, 1031–1048.

Goldberg, A. E. (2009). Heterosexual, lesbian, and gay preadoptive parents' preferences about child gender. *Sex Roles*, *61*(1), 55–71.

Goldman, N., Moreno, L., & Westoff, C. F. (1989, October). *Peru experimental study: An evaluation of fertility and child health information* (Report). Institute for Resource Development/Macro Systems, Inc. Columbia, MD.

Greenlee, J. S., Nteta, T. M., Rhodes, J. H., & Sharrow, E. A. (2020). Helping to break the glass ceiling? Fathers, first daughters, and presidential vote choice in 2016. *Political Behavior*, *42*(3), 655–695.

Guilmoto, C. Z. (2012). Skewed sex ratios at birth and future marriage squeeze in China and India, 2005–2100. *Demography*, *49*(1), 77–100.

Jiang, Q., Feldman, M. W., & Li, S. (2014). Marriage squeeze, never-married proportion, and mean age at first marriage in China. *Population Research and Policy Review*, *33*(2), 189–204.

Kalsi, P. (2026). Measures of son preference and the treatment of girls in India. *Journal of Population Economics*, *39*(1), 2.

Kim, J. (2005). Sex selection and fertility in a dynamic model of conception and abortion. *Journal of Population Economics*, *18*, 41–67.

Kochar, A. (2000). Parental benefits from intergenerational coresidence: Empirical evidence from rural Pakistan. *Journal of Political Economy*, *108*(6), 1184–1209.

Kumar, S., & Sinha, N. (2020). Preventing more "missing girls": A review of policies to tackle son preference. *World Bank Research Observer*, *35*(1), 87–121.

Li, Q., & Pantano, J. (2023). The demographic consequences of sex-selection technology. *Quantitative Economics*, *14*(1), 309–347.

Lin, T.-C. (2009). The decline of son preference and rise of gender indifference in Taiwan since 1990. *Demographic Research*, *20*, 377–402.

Luppi, F. (2016). When is the second one coming? The effect of couple's subjective well-being following the onset of parenthood. *European Journal of Population*, *32*(3), 421–444.

Luppi, F., & Mencarini, L. (2018). Parents' subjective well-being after their first child and declining fertility expectations. *Demographic Research*, *39*, 285–314.

Mahajan, K., & Ramaswami, B. (2017). Caste, female labor supply, and the gender wage gap in India: Boserup revisited. *Economic Development and Cultural Change*, *65*(2), 339–378.

Nelson, P. (1970). Information and consumer behavior. *Journal of Political Economy*, *78*(2), 311–329.

Nelson, P. (1974). Advertising as information. *Journal of Political Economy*, *82*(4), 729–754.

Nugent, C. N. (2013). Wanting mixed-sex children: Separate spheres, rational choice, and symbolic capital motivations. *Journal of Marriage and Family*, *75*(4), 886–902.

Nussbaum, M. C. (2001). *Women and human development: The capabilities approach*. Cambridge: Cambridge University Press.

Oliveira, J. (2016). The value of children: Inter-generational support, fertility, and human capital. *Journal of Development Economics*, *120*, 1–16.

Pande, R. P., & Astone, N. M. (2007). Explaining son preference in rural India: The independent role of structural versus individual factors. *Population Research and Policy Review*, *26*(1), 1–29.

Qian, N. (2008). Missing women and the price of tea in China: The effect of sex-specific earnings on sex imbalance. *Quarterly Journal of Economics*, *123*(3), 1251–1285.

Robitaille, M.-C. (2013). Determinants of stated son preference in India: Are men and women different? *Journal of Development Studies*, *49*(5), 657–669.

Sen, A. (1982). *Choice, welfare and measurement*. Oxford: Basil Blackwell.

Sen, A. (1990). More than 100 million women are missing. *New York Review of Books*, *37*(20), 61–66.

Sen, A. (1999). *Development as freedom*. Oxford: Oxford University Press.

Shafer, E. F., & Malhotra, N. (2011). The effect of a child's sex on support for traditional gender roles. *Social Forces*, *90*(1), 209–222.

Sharrow, E. A., Rhodes, J. H., Nteta, T. M., & Greenlee, J. S. (2018). The first-daughter effect: The impact of fathering daughters on men's preferences for gender-equality policies. *Public Opinion Quarterly*, *82*(3), 493–523.

Stigler, G. J. (1961). The economics of information. *Journal of Political Economy*, *69*(3), 213–225.

Stigler, G. J. (1962). Information in the labor market. *Journal of Political Economy*, *70*(5, Part 2), 94–105.

Sugden, R. (2004). The opportunity criterion: Consumer sovereignty without the assumption of coherent preferences. *American Economic Review*, *94*(4), 1014–1033.

Sun, X., & Lai, K. (2017). Are mothers of sons more traditional? The influence of having son(s) and daughter(s) on parents' gender ideology. *The Journal of Chinese Sociology*, *4*(1), 1–19.

How Does Children's Sex Affect Parental Sex Preferences: Online Appendix

A Children's Sex and Men's Sex Preferences

Our main analysis focuses on women since the questions about sex preference were primarily administered to women. However, these questions were also administered to a sample of men in the 1996 survey, although the sample size was much smaller. Using this data, we examine the effects of children's sex on men's sex preferences and find that having daughters leads men to prefer a smaller proportion of sons and a larger proportion of daughters, consistent with the findings for women.

The data are prepared as follows. The sex of children is obtained from the complete history of women's birth records, which is not readily available for men. Therefore, we link each man to his partner who shares the same birth history. We focus on couples where the man and woman are currently spouses, excluding couples where either partner has previously married or cohabited with another person to avoid cases where a man might have fathered a child with another woman or a woman might have borne children with another man. Next, we exclude couples where the husband and wife report different numbers of children ever born or different numbers of living children. Finally, we exclude men with twin births, as in the analysis for women. This leaves us with a restricted sample of 705 men.

We replicate the baseline analysis for men and present the results in Tables A.1 and A.2. The findings show that having daughters leads men to prefer a smaller proportion of sons and a larger proportion of daughters. Specifically, Table A.1 indicates that if the first child is a daughter, the ideal proportion of sons will decrease by 5.9-6.6 pp, while the ideal proportion of daughters increases by 7.4-7.8 pp. Table A.2 demonstrates that if the first two children are daughters instead of sons, the ideal proportion of sons decreases by 12.5-14.7 pp, while the ideal proportion of daughters increases by 10.2-10.7 pp. These findings are in line with those for women.

Table A.1: Effect of the first child's sex on a man's sex preference

	Ideal proportion of sons		Ideal proportion of daughters	
	(1)	(2)	(3)	(4)
First-born daughter	-0.066**	-0.059*	0.078***	0.074***
	(0.025)	(0.025)	(0.021)	(0.021)
Children ever born		-0.002		0.006
		(0.009)		(0.007)
Years since first birth		-0.001		0.001
		(0.004)		(0.003)
Age		0.000		-0.004
		(0.003)		(0.003)
Years of schooling		0.000		-0.000
		(0.004)		(0.004)
Employed		0.017		-0.008
		(0.056)		(0.050)
Urban		-0.034		-0.026
		(0.039)		(0.032)
State fixed effect	No	Yes	No	Yes
N	705	705	705	705
R^2	0.017	0.087	0.030	0.114

Notes. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.2: Effect of the first two children's sex on a man's sex preference

	Ideal proportion of sons		Ideal proportion of daughters	
	(1)	(2)	(3)	(4)
Proportion of daughters	-0.147***	-0.125**	0.102**	0.107**
	(0.042)	(0.043)	(0.038)	(0.038)
Children ever born		0.004		0.004
		(0.010)		(0.008)
Years since first birth		-0.001		0.001
		(0.005)		(0.004)
Age		-0.001		-0.005
		(0.004)		(0.003)
Years of schooling		-0.000		-0.001
		(0.004)		(0.004)
Employed		0.025		0.037
		(0.079)		(0.065)
Urban		-0.003		-0.014
		(0.043)		(0.035)
State fixed effect	No	Yes	No	Yes
N	542	542	542	542
R^2	0.040	0.138	0.025	0.133

Notes. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

B Selection into a Second Birth

Norling (2018) documents substantial heterogeneity in sex preferences and shows that their effects on aggregate fertility can offset one another. The similar average second-birth progression ratios following first-born sons and daughters in Figure 1 may therefore mask offsetting fertility responses among parents with different preferences. We examine this possibility by assessing whether differences in progression by first-child sex vary with maternal characteristics and whether restricting the sample to women with at least two children changes the balance of these characteristics by first-child sex.

First, we regress an indicator for having at least two children on a first-born-daughter indicator, maternal birth year, age at first birth, schooling, and interactions between first-child sex and these characteristics. Schooling is treated as approximately predetermined. Table A.3 reports specifications with and without interview-year fixed effects. The coefficients on all three interactions are small and statistically insignificant in both specifications. The estimates thus reveal little heterogeneity in progression by first-child sex across the maternal characteristics examined.

We next examine whether restricting the sample to women with at least two children changes observable balance by first-child sex. Table A.4 shows that differences in maternal birth year and age at first birth are close to zero in both samples. Women with first-born daughters have 0.065 fewer years of schooling in the full sample and 0.073 fewer years in the restricted sample–a change of only 0.008 years. Restricting the sample therefore preserves the close balance in observed maternal characteristics by first-child sex. Together, these diagnostics support the comparability of women with first-born sons and daughters in the second-birth sample and provide an empirical basis for extending the analysis to the first two births.

Table A.3: Heterogeneity in second-birth progression by maternal characteristics

	At least two children	
	(1)	(2)
First-born daughter	-0.100	-0.080
	(0.644)	(0.633)
First-born daughter	0.0616	0.050
× Birth year (10^{-3})	(0.327)	(0.321)
First-born daughter	-0.001	-0.001
× Age at first birth	(0.001)	(0.001)
First-born daughter	-0.151	-0.157
× Years of schooling (10^{-3})	(0.771)	(0.751)
Birth year	-0.021***	-0.027***
	(0.000)	(0.000)
Age at first birth	-0.027***	-0.031***
	(0.001)	(0.001)
Years of schooling	-0.008***	-0.009***
	(0.001)	(0.001)
Year of interview fixed effect	No	Yes
N	107,560	107,560
R^2	0.262	0.319

Notes. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.4: Maternal characteristics by first-child sex before and after restricting the sample to women with at least two children

Panel A: Full sample			
	First-born son	First-born daughter	Daughter - Son
Birth year	1969.127	1969.143	0.017
	(0.057)	(0.058)	(0.081)
Age at first birth	20.943	20.963	0.020
	(0.027)	(0.028)	(0.039)
Years of schooling	8.359	8.295	-0.065
	(0.026)	(0.026)	(0.037)
Panel B: Women with at least two children			
	First-born son	First-born daughter	Daughter - Son
Birth year	1966.811	1966.854	0.044
	(0.059)	(0.061)	(0.085)
Age at first birth	20.390	20.383	-0.007
	(0.029)	(0.029)	(0.041)
Years of schooling	7.671	7.599	-0.073
	(0.031)	(0.031)	(0.044)

Notes. Standard errors are in parentheses.

C Additional Analyses of Family-Size Heterogeneity

This appendix examines whether the family-size pattern reported in Table 4 also appears in two supplementary analyses.

First, we restrict the sample to women who report wanting no more children, have been sterilized, or have become infertile. This restriction reduces the relevance of anticipated future childbearing. Table A.5 repeats the family-size comparison, with Columns (3) and (6) additionally allowing the first-child effect to vary with years since first birth. The interaction with having at least two children is 0.096 for the ideal proportion of sons and -0.109 for the ideal proportion of daughters in these extended specifications. The attenuation of the first-child effects among women with multiple children therefore persists.

Second, we examine heterogeneity by reported ideal family size. Table A.6 shows that the first-child effect is weaker among women reporting larger ideal families. This pattern persists when we add the interaction between first-child sex and years since first birth: the interactions with ideal family size are 0.011 for the ideal proportion of sons and -0.014 for the ideal proportion of daughters in Columns (3) and (6), respectively. These supplementary results are consistent with the family-size pattern in Table 4. Finally,

note that because ideal family size also enters the denominator of the outcome measures, we interpret these estimates as descriptive evidence on heterogeneity in reported fertility ideals.

Table A.5: Effect of the first child's sex on sex preference among women reporting no further childbearing plans, sterilization, or infecundity

	Ideal proportion of sons			Ideal proportion of daughters		
	(1)	(2)	(3)	(4)	(5)	(6)
First-born daughter	-0.169***	-0.168***	-0.186***	0.174***	0.175***	0.192***
	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)
First-born daughter	0.122***	0.121***	0.096***	-0.133***	-0.133***	-0.109***
× At least two children	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)
At least two children	-0.047***	-0.045***	-0.032***	0.070***	0.081***	0.069***
	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)
First-born daughter			0.003***			-0.003***
× Years since first birth			(0.000)			(0.000)
Other control variables	No	Yes	Yes	No	Yes	Yes
State fixed effect	No	Yes	Yes	No	Yes	Yes
Year of interview fixed effect	No	Yes	Yes	No	Yes	Yes
N	76,638	76,638	76,638	76,638	76,638	76,638
R^2	0.017	0.041	0.043	0.016	0.027	0.028

Notes. Other control variables include children ever born, years since first birth, age, years of schooling, employment status, and urban residence. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.6: Effect of the first child's sex on sex preference for women with different ideal family sizes

	Ideal proportion of sons			Ideal proportion of daughters		
	(1)	(2)	(3)	(4)	(5)	(6)
First-born daughter	-0.100***	-0.100***	-0.118***	0.097***	0.097***	0.116***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)
First-born daughter	0.015***	0.015***	0.011***	-0.017***	-0.017***	-0.014***
× Ideal number of children	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Ideal number of children	-0.004**	-0.001	0.000	0.000	0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
First-born daughter			0.002***			-0.002***
× Years since first birth			(0.000)			(0.000)
Other control variables	No	Yes	Yes	No	Yes	Yes
State fixed effect	No	Yes	Yes	No	Yes	Yes
Year of interview fixed effect	No	Yes	Yes	No	Yes	Yes
N	107,560	107,560	107,560	107,560	107,560	107,560
R^2	0.014	0.038	0.038	0.011	0.022	0.023

Notes. Other control variables include children ever born, years since first birth, age, years of schooling, employment status, and urban residence. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

D Birth-Sequence Differences among Women with Exactly Two Children

The main birth-sequence analysis includes women with at least two children. Although daughter–son and son–daughter sequences have the same composition among the first two births, subsequent children may differ. We therefore repeat the analysis among women with exactly two children, so that the comparison groups have identical overall sex composition.

Table A.7 shows that the daughter–son sequence is associated with a 2.3 pp lower ideal proportion of sons and a 2.0 pp higher ideal proportion of daughters in the specifications with controls. The differences are statistically significant at the 0.1 percent and 1 percent levels, respectively. Thus, the sequence pattern also appears among women whose families contain exactly one son and one daughter.

Table A.7: Effects of the first two children's sex and birth order on sex preference for women with two children

	Ideal proportion of sons		Ideal proportion of daughters	
	(1)	(2)	(3)	(4)
Daughter-Son	-0.023***	-0.023***	0.021**	0.020**
	(0.006)	(0.006)	(0.006)	(0.006)
Son-Son	0.070***	0.071***	-0.029***	-0.029***
	(0.007)	(0.007)	(0.006)	(0.006)
Daughter-Daughter	-0.084***	-0.084***	0.077***	0.077***
	(0.007)	(0.007)	(0.008)	(0.007)
Other control variables	No	Yes	No	Yes
State fixed effect	No	Yes	No	Yes
Year of interview fixed effect	No	Yes	No	Yes
N	26,495	26,495	26,495	26,495
R^2	0.037	0.061	0.017	0.030

Notes. The omitted sequence is son–daughter. Other control variables include years since first birth, the interval between the first two births, age, years of schooling, employment status, and urban residence. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

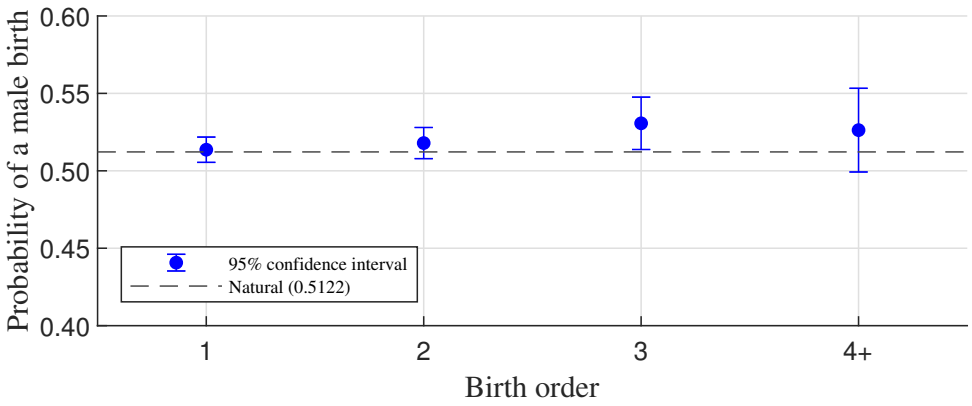
E Indian Sample

The data are from the 2015–2016 Indian Demographic and Health Survey. We construct the analysis sample as follows. First, we exclude women with twin births. The analysis focuses on the sex of the first child. When the first birth involves twins of different sexes, it is both difficult and meaningless to determine the sex of the first child. Second, we restrict the sample to women whose first child is younger than ten years old. In India, female children experience higher mortality rates than male children, and recall bias may arise if a first-born daughter dies in infancy and is not reported by the mother (Rosenblum, 2013). After applying these restrictions, the final sample consists of 32,415 women aged 15–49.

Figure A.1 plots the probability that a birth is male by parity. The probability is approximately 0.51 at the first birth, which lies within the biologically normal range. However, it increases to 0.52 at the second birth and to 0.53 at the third and higher-order births, suggesting the presence of prenatal sex selection at higher parities.

Figure A.2 further plots the probability that the next birth is male conditional on the sex composition of previous children. When the first child is a daughter, the second child is more likely to be a boy. Similarly, relative to parents whose first two children are sons,

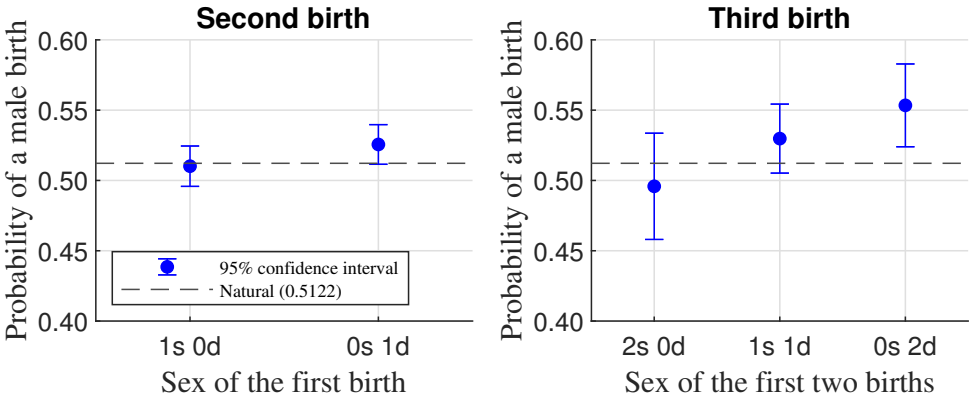
Figure A.1: Probability of a Male Birth at Each Parity



Notes: Data are from the Indian Demographic and Health Survey in 2015-2016.

parents whose first two children are daughters are more likely to have a son at the third birth. These patterns are consistent with prenatal sex selection at higher parities. We therefore focus the Indian analysis on first births, for which the observed sex ratio falls within the biologically normal range.

Figure A.2: Probability of a Male Birth Conditional on the Sex of Previous Children



Notes: Data are from the Indian Demographic and Health Survey in 2015-2016. "1s 0d" means that parents previously had one son and zero daughters. Other abbreviations can be interpreted similarly.

Table A.8 reports summary statistics for the analysis sample. On average, women want 47.9% of their children to be boys and 41.0% to be girls, with a difference of 7.0 pp (p-value < 0.001). This gap reflects a strong preference for sons in the Indian context.

Table A.8: Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Panel A. Individual characteristics					
Children ever born	32,415	1.819	0.862	1	7
First-born daughter	32,415	0.486	0.500	0	1
Years since first birth	32,415	5.159	2.975	0	10
Age	32,415	26.525	4.457	15	49
Years of schooling	32,415	7.725	5.082	0	20
Employed	32,415	0.178	0.382	0	1
Urban residence	32,415	0.338	0.473	0	1
Panel B. Sex preferences					
Ideal proportion of sons	32,415	0.479	0.215	0	1
Ideal proportion of daughters	32,415	0.410	0.200	0	1

Appendix References

Norling, J. (2018). Measuring heterogeneity in preferences over the sex of children. *Journal of Development Economics*, *135*, 199–221.

Rosenblum, D. (2013). The effect of fertility decisions on excess female mortality in India. *Journal of Population Economics*, *26*(1), 147–180.