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Son Preference, Intergenerational Household Dynamics, and Women's Mental Health in India

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Abstract

We examine how son preference affects women's mental health across generations using original survey data from extended households in rural India. Leveraging exogenous variation in the sex of the firstborn child, we find that mothers-in-law (MILs) whose co-resident daughter-in-law (DIL) had a firstborn son face a 15 percent lower risk of anxiety or depression. In contrast, firstborn sex has no average effect on DIL mental health, although adverse effects of not having a son emerge among older DILs who face a closing reproductive window. We also find that a DIL's firstborn son shifts MIL time allocation toward childcare and increases her support for DIL employment when children are young, boosting younger DILs' labor force participation. These findings reveal an intergenerational pathway linking son preference to women's mental health, intrahousehold dynamics, and economic outcomes beyond fertility alone.

JEL classification

J13, J16, O15, O33, I15, Z13

Keywords

mental health, India, mother-in-law, son preference, fertility, family planning, female labor force participation

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1 Introduction

Mental health is a fundamental dimension of women's well-being and is shaped not only by individual characteristics but also by broader social and environmental conditions, including prevailing social norms (Allen et al., 2014; Patel, 2007; Patel et al., 2023). Despite growing recognition of these determinants, the evidence on how social norms shape women's mental health, particularly in low- and middle-income countries, is limited. In India, son preference is among the most pervasive of these norms, generating intense pressure on women to bear male children and tying their social status to the birth of a son (Barman and Sahoo, 2021; Clark, 2000; Pande and Malhotra, 2006). These pressures may generate chronic stress and anxiety, particularly among women who only have daughters (Das et al., 2012; Hathi et al., 2021; Supraja et al., 2016), while those who fail to conform may face social ostracism, familial conflict, or violence (Oram et al., 2022; Silva et al., 2016). Although a large literature documents the demographic and economic consequences of son preference on fertility, family planning, sex ratios, and children's outcomes (Anukriti et al., 2021a; Jayachandran, 2023; Jayachandran and Pande, 2017; Milazzo, 2018), rigorous causal evidence on its mental health effects remains scarce, and virtually nothing is known about how these effects vary across women within the same household.

The mental health consequences of son preference are likely to ripple through the household rather than falling on a single individual. In the patrilocal, patrilineal household structure prevalent across much of South Asia, the two women who are most directly affected are the daughter-in-law (DIL), who faces intense pressure to bear a son, and her co-resident mother-in-law (MIL), who has her own psychological and material stake in the sex of the child. The DIL enters her husband's natal home upon marriage and occupies a subordinate position, with her agency largely shaped by the MIL, who often serves as the primary authority over her conduct and opportunities within the household (Anukriti et al., 2020; Das Gupta et al., 2003; Dyson and Moore, 1983). As a result, the birth of a son or a daughter carries implications not only for the mother but also for the MIL, whose well-being, attitudes, and behavior may shift in response to the child's sex, with downstream consequences for the DIL's economic opportunities. Understanding the mental health effects of son preference, therefore, requires observing both women and examining how intergenerational relations mediate the transmission of gender norms into individual outcomes.

In this paper, we analyze the effects of son preference on women's mental health and broader well-being in rural India. We surveyed a sample of married women of reproductive age and their co-residing MILs in Jaunpur district, Uttar Pradesh (UP), between November 2023 and May 2024. In addition to collecting extensive socioeconomic and demographic data, we collected information on mental health using the Patient Health Questionnaire-4 (PHQ-4), a validated instrument to screen for the risk of depression and anxiety (Kroenke et al., 2009; Nichols et al., 2024). We focus exclusively on women co-residing with their MILs, as the MIL–DIL relationship is central to the dynamics that we study but is typically not captured in standard household surveys, which rarely

identify these pairs explicitly.[1]

We leverage exogenous variation in the sex of the firstborn child to compare mental health and other outcomes among women whose first child (or, in the case of MILs, whose co-resident DIL's first child) is male versus female. The sex of a firstborn child is plausibly as good as random—prior evidence shows that the proportion of females among first births in India lies within the estimated natural range, even in contexts where sex-selective technologies are available and utilized at higher birth orders (Anukriti et al., 2021a; Bhalotra and Cochrane, 2010)—and our data confirm balance across a wide range of socioeconomic characteristics. This identification strategy has been widely used in the son preference literature (Anukriti et al., 2021a,b; Bhalotra and Cochrane, 2010; Milazzo, 2018; Visaria, 2005).

Although our empirical strategy identifies the reduced-form effects of firstborn child sex, interpreting these effects requires understanding the household dynamics through which son preference operates. In particular, the sex of the firstborn child may shape women's well-being not only through fertility pressures but also via changes in status, expectations, and intrahousehold relationships, particularly between the MIL and the DIL. To clarify these mechanisms, we develop a conceptual framework grounded in the patrilocal household structure that generates testable predictions.

The framework yields three key insights. First, because the MIL has a direct psychological stake in the continuation of the family line, a firstborn grandson should generate larger mental health gains for her than for the DIL, for whom bearing a son may relieve some pressures while intensifying others. Second, these effects should vary by the DIL's age: a younger DIL has more time to bear a son, making firstborn sex less consequential for her own well-being, whereas an older DIL facing a closing reproductive window bears greater psychological costs from not having a son. For the MIL, the pattern runs in the opposite direction, as uncertainty about a grandson is greatest when the DIL is young. Third, improvements in MIL mental health may also shift her behavior within the household, potentially increasing childcare support, reducing opposition to the DIL's employment, and easing the DIL's eldercare burden, with implications for younger DILs' labor force participation. However, because son preference can coexist with other restrictive gender norms that constrain women's economic activity, the net effect on DIL's labor supply is theoretically ambiguous.

We first establish that the DIL's fertility and family planning outcomes in our sample are consistent with son-biased stopping behavior (Anukriti et al., 2021a; Arnold et al., 1998; Clark, 2000; Das Gupta et al., 2003), which confirms that son preference meaningfully shapes reproductive behavior in this setting and motivates our focus on its mental health consequences. DILs with firstborn sons have fewer children and are more likely to use modern contraception than those with firstborn daughters, and MILs with firstborn grandsons have fewer grandchildren than those

[1]Studies using existing household surveys, such as the Indian Human Development Surveys or Demographic and Health Surveys, rely on household rosters to indirectly infer the presence of a MIL and her co-residing DIL through their reported relationship to the household head (Bietsch et al., 2021).

with firstborn granddaughters. Importantly, these effects operate not only through the DIL's own preferences but also through shifts in the MIL's attitudes and behavior; a firstborn grandson increases the likelihood that the MIL discusses family planning with her DIL and approves of methods for limiting births. Husbands, by contrast, play a more limited role in reproductive decision-making, likely reflecting their frequent absence due to migration and the closer alignment of their fertility preferences with those of their wives.

We next examine the mental health effects of firstborn sex. We document that 31 percent of MILs and 18 percent of DILs in our sample are at risk of having anxiety or depression, as measured by the PHQ-4, consistent with evidence showing the high prevalence of mental health challenges among women in India (Banerjee et al., 2023). We find that the MIL's risk of anxiety or depression decreases by 5 p.p. (15 percent) when her co-resident DIL has a firstborn son rather than a daughter, an effect that is comparable in magnitude to recent evidence on the mental health impacts of public pensions (Guimbeau and Menon, 2024) and inheritance rights (Keskar and Mookerjee, 2024). In contrast, we find no average effect of firstborn sex on the DIL's mental health, consistent with the conceptual framework. The improvement in MIL mental health is strongest when the DIL is younger (under age 25), with the mental health effects of firstborn sex on the DIL emerging only later in the life cycle; among older DILs (above age 27), not having a son significantly increases the risk of anxiety or depression.[2]

We then examine DIL labor market outcomes and the mechanisms through which a firstborn son may affect them. A firstborn son can ease the DIL's caregiving constraints by reducing her fertility and increasing childcare support provided by the MIL, while also relaxing MIL opposition to the DIL working outside the home. Consistent with these mechanisms, we find suggestive evidence that a firstborn grandson increases the likelihood that MILs discuss grandchildren with their co-resident DILs, increases the MIL's time spent on childcare among households with younger DILs, and reduces the MIL's time spent outside the home. This pattern is consistent with a reallocation of MIL time toward within-household support. Among younger DILs, joint MIL-DIL childcare declines, suggesting a substitution pattern in which MILs take on a greater share of childcare as DILs shift toward market work.

These shifts in MIL time allocation and attitudes translate into meaningful changes in younger DILs' labor market outcomes. We find no average effect of a firstborn son on DIL labor force participation, consistent with the theoretical ambiguity arising from the coexistence of son preference and other restrictive gender norms. However, among DILs under age 25, a firstborn son increases labor force participation by 15 p.p. relative to DILs with firstborn daughters. This effect is driven by an increase in the probability of having worked in the past year rather than job search, with no comparable effects for older DILs (Fletcher et al., 2017; Heath et al., 2024; Jayachandran et al.,

[2]We analyze heterogeneity by DIL age using three age categories: i) under 25, ii) 25-27, and iii) older than 27. These groups correspond roughly to terciles of the age distribution in our estimation sample and capture different stages of a woman's reproductive life cycle in the Indian context.

2021). These gains are accompanied by an increase in MIL approval of DILs working outside the home when her children are young, suggesting that a firstborn son relaxes constraints on younger DILs' labor supply through increased childcare support and more permissive household attitudes toward women's work.

Our study makes three main contributions to the literature. First, we contribute to a limited but growing body of work on women's mental health in low- and middle-income countries, where nearly 90 percent of those in need of treatment lack access to care (Basu, 2012; Das et al., 2012; Hathi et al., 2021; Rosenfield and Mouzon, 2013).[3] The consequences of this treatment gap are substantial, contributing to poor overall health, reduced productivity, and diminished quality of life (Ridley et al., 2020; Sharac et al., 2010; Thornicroft et al., 2022), with women bearing a disproportionate burden (Banerjee et al., 2023; Baranov et al., 2020; Seedat et al., 2009). In India, patriarchal institutions and women's subordinate status within the household compound these risks of poor mental health outcomes (Basu, 2012; Bau et al., 2022; Sharma and Pathak, 2015). Using original data collected from co-resident DILs and MILs in rural UP, we document substantial risks of depression or anxiety, especially among older women, in a setting shaped by restrictive patrilineal and patrilocal norms. By explicitly observing both women within the same household, we move beyond standard survey approaches to show that mental health is deeply embedded in family structure and intrahousehold dynamics and is not simply an individual outcome.

Second, we contribute to the literature on son preference by showing that its consequences extend beyond fertility, family planning (Anukriti et al., 2021a; Milazzo, 2018), and children's outcomes (Jayachandran, 2023; Jayachandran and Pande, 2017) to women's mental health and intrahousehold relationships.[4] While prior research has documented the demographic and economic effects of son bias (Barman and Sahoo, 2021; Genicot and Hernandez-de Benito, 2023; Milazzo, 2014; Self and Grabowski, 2012; Shah, 2005), far less is known about its psychological consequences for women, and even less about how these consequences differ across women within the same extended household. We fill this gap by showing that the mental health effects of son preference are heterogeneous within the household: a firstborn grandson generates larger and more immediate improvements in MIL mental health, while effects for DILs are muted on average and emerge later in the life cycle. These findings provide a more complete account of how lineage-based gender norms operate through family hierarchies to shape women's well-being.

Third, we contribute to the literature on gender norms and women's economic participation by documenting an intergenerational mechanism linking son preference to the labor market outcomes of younger DILs (Bau and Fernández, 2021; Jayachandran, 2021). We provide suggestive evidence that a firstborn son increases childcare support from MILs and fosters more permissive attitudes toward DILs' work, alongside improved labor market outcomes for younger DILs. These effects are

[3]Depression is the most common mental illness and is the single largest contributor to global disability, affecting more than 300 million people worldwide (World Health Organization, 2017).

[4]The demographic and economic consequences of son preference have also been documented in high-income countries (e.g Dahl and Moretti (2008); Lundberg et al. (2007)).

economically meaningful in a context characterized by persistently low levels of female labor force participation (Fletcher et al., 2017; Jayachandran et al., 2021; Klasen and Pieters, 2015; Mehrotra and Parida, 2017). Our findings suggest that son preference shapes women's economic outcomes not only through fertility decisions but also through changes in intrahousehold time allocation and attitudes towards women's work.

2 Data

Our analysis is based on primary data that we collected from a sample of 1,572 pairs of MILs and DILs residing in the district of Jaunpur in UP, India (Figure A.1). From November 2023 to May 2024, we conducted a listing exercise in 103 villages in two blocks of Jaunpur district (Figure A.2) to identify households that, at the time of the listing, had: a) a married female household member (the DIL) between the ages of 18 and 35 who had given birth to at least one child and who was neither pregnant nor sterilized at the time of the interview; and b) a co-residing MIL. From March to May 2024, we approached the eligible households to conduct separate in-person surveys with the eligible DIL and her co-residing MIL in her home. Only one eligible DIL was surveyed per household; if multiple DILs from the same household were eligible, the youngest eligible DIL who consented to the study was chosen to participate. Written or verbal consent was obtained from each respondent, and all respondents were surveyed in a private room or space in their homes by female enumerators.

Our MIL and DIL survey instruments follow a parallel structure. We collected data on household demographics and women's socioeconomic backgrounds, birth histories, current and prior contraceptive use, marriage and sexual activity, fertility preferences, measures of autonomy and decision-making, social connections, utilization of health services, including family planning and reproductive health services, and broader measures of socioeconomic well-being. For this study, we leverage data from a module that measured respondents' self-reported mental health status, which we describe in greater detail below.

2.1 Descriptive Statistics

Table 1 describes the demographic and socioeconomic characteristics of the women (DILs and their co-residents MILs) in our estimation sample (N = 1,296); detailed definitions of variables are presented in Appendix A. The estimation sample only includes households where both the DIL and the MIL could be interviewed by our survey team and for which all variables included in our regressions are not missing. Table A.1 shows that this restricted estimation sample does not differ systematically from the full MIL and DIL samples across a range of socioeconomic characteristics.

Our estimation sample is predominantly Hindu (95 percent) and from a lower caste: 90 percent of women belong to a Scheduled caste (SC), a Scheduled tribe (ST), or an Other Backward Class (OBC). Roughly 47 percent of surveyed households could be classified as relatively "poor" because they either reported being below the poverty line or in the bottom tercile of the sample wealth

distribution at the time of the survey.[5] An average MIL in our estimation sample is 56 years old, while the average age for DILs is 26 years. Unsurprisingly, DILs are more educated than their MILs, which is commensurate with broader trends in female educational attainment over time in India. Only one-fifth of MILs in our sample can read and write, whereas 37 percent of DILs have completed class 12. While both groups of women lack freedom of movement, physical mobility constraints are more severe for DILs, who are also less likely to have worked last year relative to their MILs. Furthermore, Table A.2 reports the probability that a MIL has at least one male grandson, as well as her total number of grandchildren and grandsons at the time of the survey, and presents sample means by whether the co-resident DIL has a firstborn son. While 93 percent of MILs in our sample have at least one grandson (by any DIL), this proportion falls to 87 percent among those whose co-resident DIL has a firstborn girl. MILs have, on average, 7.2 grandchildren. Consistent with prior evidence that women with a firstborn girl have higher subsequent fertility (Anukriti et al., 2021a; Jayachandran, 2017), MILs whose co-resident DIL has a firstborn girl have more grandchildren on average.

In Table A.3, we compare our DIL sample with a nationally representative sample of married women aged 18-35 who were surveyed in the 2019-21 National Family Health Survey (NFHS) of India (Government of India, 2022). By the same token, Table A.4 presents a comparison between our MIL sample and a nationally representative sample of married women aged 39-85 who were surveyed in the 2017-18 Longitudinal Aging Study in India (LASI) (Government of India, 2020).[6] These tables show that both DILs and MILs in our sample are similar across a range of characteristics relative to women who were surveyed in the NFHS and LASI national samples, and to the subsamples of NFHS and LASI women from UP and rural India. With this said, we note some differences. Specifically, DILs in our sample have more schooling, are more likely to want another child, and are less likely to have ever used a family planning method compared to women from the NFHS sample, while husbands of DILs in our sample also have more schooling and are more likely to have migrated outside the home for at least six months within the last year, among other differences. Compared to women in the LASI sample, MILs in our sample are more likely to have visited a health facility in the last year and have fewer grandchildren. These differences are meaningful when inferring the external validity of our results.

2.2 Risk of Anxiety and Depression

We assess the mental health status of women using the PHQ-4, which is a four-item, validated questionnaire that is used to screen for anxiety and depression (Kroenke et al., 2009). The first two questions in the PHQ-4 are drawn from the Generalized Anxiety Disorder-7 scale (the GAD–7)

[5] We construct a household asset index as a proxy of wealth using principal component analysis over a range of household assets and land ownership, as described in greater detail in Appendix A.

[6] The LASI is, to our knowledge, the only nationally representative survey that interviewed elderly women. We selected married women between 39 and 85 years old in the LASI sample, as this is the age range of the MILs in our sample.

which is commonly used in clinical practice to screen for anxiety disorders; together, these two items are known as the GAD-2. Similarly, the last two questions in the PHQ-4 are drawn from PHQ-9, a multipurpose instrument for screening, diagnosing, monitoring, and measuring the severity of depression; together, these two items are known as the PHQ-2. Kroenke et al. (2009) shows that combining the PHQ-2 and GAD-2 into a composite four-item scale yields an index that can simultaneously screen for anxiety and depression within the same tool.

As part of the PHQ-4 assessment tool, women were asked how frequently they had experienced the following symptoms during the past two weeks: a) feeling nervous, anxious, or on edge, b) unable to stop or control worrying, c) feeling down, depressed, or hopeless, and d) having little interest or pleasure in doing things. For each item, responses could range in severity from 0 ('Not at all') to 3 ('Nearly every day'). Table A.5 presents the complete assessment tool. The total PHQ-4 score is calculated by adding the scores of each of the four items, and can range from 0 to 12, with higher scores indicating greater levels of anxiety or depression. We follow Kroenke et al. (2009) and classify a respondent to be at risk of anxiety if her scores for the first two items in the PHQ-4 tool sum to 3 or higher. Similarly, respondents are classified to be at risk of depression if their scores for the last two items in the PHQ-4 tool sum to 3 or higher. Recent studies have used this tool to measure mental health in the Indian context (Nichols et al., 2024).

Figure 1 presents the prevalence of anxiety and depression risk in our estimation sample. MILs are at higher risk of anxiety or depression than their DILs; 31 percent of MILs and 18 percent of DILs can respectively be classified as being at risk of anxiety or depression based on their self-reported PHQ-4 scores. For MILs, the risk of anxiety (25 percent) is slightly higher than the risk of depression (20 percent), where as for the DILs, the risk of depression is slightly higher than the risk of anxiety. Figure A.3 shows that the full sample and the estimation sample are similar in terms of the prevalence of anxiety or depression for both MILs and DILs.

According to the World Health Organization, an estimated 4 percent of the global population currently experiences an anxiety disorder, with the prevalence being higher for girls and women.[7] Similarly, depression is estimated to occur among 6 percent of adult women (relative to 4 percent for adult men).[8] The risk of anxiety and depression among our sample women is substantially higher. Although some of this difference could be driven by different measurement approaches, the prevalence estimates in other studies from India are also much higher than global estimates. For instance, Banerjee et al. (2023) use data from the 2016-17 LASI and find that 27.5 percent of women aged 61-70 in India have symptoms that indicate a high risk of depression. Although the risk of depression among our MIL sample is lower (21 percent) in comparison to Banerjee et al. (2023), we note that our MIL sample is also younger,[9] and we employ a different set of measurement indicators to capture the risk of depression.[10] Our estimates for DILs, who are between 18 to 35

[7]Source: `https://www.who.int/news-room/fact-sheets/detail/anxiety-disorders`.
[8]Source: `https://www.who.int/news-room/fact-sheets/detail/depression`.
[9]80 percent of the MILs in our sample are younger than 61.
[10]Specifically, Banerjee et al. (2023) used a shortened version of the Center for Epidemiological Studies

years old, are also slightly lower than what Anukriti (2024) estimates for 18-35-year-old married women with children in Tamil Nadu using the PHQ-4 (24 percent risk of anxiety or depression). Although our setting (rural UP) is quite different from Tamil Nadu (a more developed state with more gender equality), a more rigorous comparison between the two states is beyond the scope of this study. We present these comparative estimates from the literature to highlight the scope of the problem in the Indian context.

3 Empirical Strategy

The objective of this study is to examine the extent to which child sex impacts women's mental health and other related outcomes in a setting where son preference is widely prevalent. A simple comparison of outcomes between women who have a male versus a female child (in the case of mothers) or grandchild (in the case of grandmothers) is unlikely to yield an unbiased estimate of the impact of child sex, particularly if families can resort to manipulating the number and sex composition of their (grand)children through prenatal sex-detection and subsequent sex-selective abortion (Anukriti et al., 2021a; Arnold et al., 2002). Not controlling for unobservable factors that are correlated both with the likelihood of having a male (grand)child and our outcomes of interest would therefore lead to biased inference.[11]

To overcome this issue, we adopt an identification strategy that relies on the sex of the *firstborn* child and compare women whose firstborn (grand)child is male versus female. This estimation approach has been extensively used in the literature (Anukriti et al., 2021a,b) and rests on the assumption that the sex of the firstborn child is less likely to be selected and may therefore be as good as random (Bhalotra and Cochrane, 2010; Gellatly and Petrie, 2017; Milazzo, 2014). Prior empirical literature in this space has established that the proportion of females among firstborn children in India lies within the expected range (the "natural" sex ratio at birth) even in the presence of changes in the availability of prenatal sex-selection technology (Anukriti et al., 2021a; Bhalotra and Cochrane, 2010). Concordant with this evidence, Table 1 shows that there are no significant differences between firstborn boy and firstborn girl families in our study sample across a range

for Depression (CESD-10) score that was developed by Andresen et al. (1994) for estimating the risk of depression. The CESD-10 is comprised of seven negatively framed indicators (having a fear of something, having low energy, having trouble concentrating, feeling alone, feeling depressed, being bothered by things, and feeling that everything is an effort) and three positively framed indicators (feeling happy, hopeful, and satisfied). For each of these ten indicators, individuals were asked whether they experienced these symptoms either: 1) rarely or never (less than 1 day in the last week); 2) sometimes (1 to 2 days in the last week); 3) often (3 to 4 days in the last week); or 4) most or all of the time (5 to 7 days in the last week). For negatively framed indicators, responses of 'rarely or never' and 'sometimes' were assigned a score of 0, while responses of 'often' and 'most or all of the time' were assigned a score of 1. Scoring for the three positively framed indicators were scored in reverse. An individual's overall score, calculated as the sum of the 10 individual indicator scores, could range from 0 to 10, and a score of 4 or higher was considered to be indicative of depression.

[11]For instance, richer women may be more likely to have a male birth since they can more easily afford sex-selection, and they may also be more likely to have better mental health outcomes (Ridley et al., 2020); as a result, not accounting for socioeconomic status would likely generate a positive bias in the estimated relationship between having a male birth and women's mental well-being.

of socioeconomic and demographic characteristics. Following McKenzie (2017), the normalized pairwise difference for each characteristic included in Table 1 for the combined sample of MILs and DILs is well below 0.25; moreover, an F-test of joint significance provides additional evidence of balance across covariates by the sex of the firstborn child.[12]

To estimate the effects of firstborn sex, we run the following regression for a woman i from village v (separately for MILs and DILs):

$$Y_{iv} = \alpha + \beta FirstbornBoy_i + \mathbf{X}_i\gamma + \delta_v + \varepsilon_{iv} \tag{1}$$

For MIL specifications (i.e., when woman i is the MIL), the variable $FirstbornBoy_i$ is an indicator variable that refers to the MIL's firstborn grandchild from the co-resident DIL being male; by the same token, $FirstbornBoy_i$ in DIL specifications refers to the DIL's firstborn child being male. We control for village fixed effects and a vector of household, MIL, and DIL characteristics that occasionally vary depending on the outcome variable being studied or whether a robustness check is being conducted. Table A.7 presents the exact sets of controls that are used for different regression tables. For all specifications, we use heteroskedastic-robust standard errors for inference. As a robustness check, we also cluster our standard errors at the village level (see subsection 5.5).

In our MIL regressions, the core set of controls includes indicator variables for whether the MIL belongs to a Scheduled caste, belongs to an Other Backward Class, belongs to a household that can be classified as poor, is literate, is a widow (which is also a proxy for the presence of the father-in-law in the household), owns a personal cellphone, has at least one friend in Jaunpur, visited a health facility last year, and MIL age fixed effects. In addition, we control for three indices that capture the MIL's attitudes towards domestic violence (as a proxy for her gender attitudes), her freedom of physical mobility, and her social desirability. Lastly, we also add a few controls that capture her DIL's characteristics, including whether her DIL is her eldest son's wife, has completed class 12, and has freedom of physical mobility. We also include DIL age fixed effects.[13]

Our DIL regressions include a similar set of controls with a few differences. First, in the DIL regressions, we control for her husband's age, years of schooling, and migration status because these are relevant for outcomes such as the DIL's family planning use and labor force participation. Second, when examining DIL outcomes, the variables capturing cellphone ownership, freedom of physical mobility, attitudes towards domestic violence, social desirability, visits to a health center, and having a friend are defined for the DIL rather than the MIL. Lastly, we add a few controls that capture her MIL's characteristics, including MIL age fixed effects and indicators for the MIL's literacy and widowhood status. It is worth noting that in Table A.7 we control for whether the DIL and the MIL were employed last year in addition to the set of core controls listed above. Nevertheless, to avoid any potential endogeneity between past and current work-related outcomes, we drop these variables when the outcome of interest is related to time allocation and labor market

[12] Table A.6 similarly shows balance for the full sample.

[13] Appendix A describes the exact definitions of all outcome and control variables included in the models.

participation.

We note that when woman i is the MIL, the first grandchild refers to the first child of the youngest eligible co-resident DIL whom we surveyed. However, this grandchild of interest may not, in fact, be the MIL's first grandchild among all her grandchildren.[14] Similarly, the DIL in our sample may not be the wife of the MIL's eldest son.[15] *A priori*, it is unclear whether the MIL cares equally about the sex composition of the children of each of her sons and/or daughters, or whether she places more weight over her co-resident sons' and/ or eldest son's children. To account for these potential differences in sex preferences across grandchildren, we always control for whether the child's father (the DIL's husband) is the MIL's eldest son.[16]

4 Conceptual Framework

Although our empirical strategy identifies the reduced-form effects of firstborn child sex, interpreting these effects requires an understanding of the household dynamics through which son preference operates. The sex of a firstborn child may influence women's well-being not only through fertility pressures but also through changes in status, expectations, and intrahousehold relationships. In this section, we outline a conceptual framework that clarifies these mechanisms and generates the testable predictions that structure the results that follow. Figure 2 summarizes the implied pathways.

In the patrilocal, patrilineal context of north India, a DIL enters her husband's natal household upon marriage and occupies a structurally subordinate position. Her autonomy and well-being are shaped not only by her relationship with her husband but also, and often primarily, by her relationship with her MIL, who serves as the de facto authority over domestic life (Caldwell et al., 1984; Das Gupta, 1995; Das Gupta et al., 2003; Dyson and Moore, 1983). Son preference in this context is not merely a private attitude but a socially enforced norm rooted in the patrilineal system of inheritance, old-age security, and the continuation of the family line (Jayachandran, 2015). The birth of a son signals that the mother has fulfilled her reproductive obligations, securing her position in the marital home (Iyer, 2002; Klaus and Tipandjan, 2015; Kugler and Kumar, 2017). A daughter, by contrast, may be perceived as a failure to meet this obligation and a financial burden in a society with dowry (Calvi and Keskar, 2021; Jayachandran, 2015), generating pressure to continue bearing children until a son is born—a pattern commonly referred to as son-biased stopping behavior (Aksan, 2021; Anukriti et al., 2021a; Char et al., 2010; Das Gupta et al., 2003).

While much of the literature on son preference focuses on mothers, MILs also have a substantial psychological and material stake in the sex of the firstborn grandchild. In patrilineal systems,

[14] While we observe the total number of grandsons and granddaughters reported by the MIL, we do not observe the ages or birth order of grandchildren other than those born to the co-resident DIL. We therefore cannot determine whether the co-resident DIL's firstborn son is the first grandson in the extended family.

[15] In fact, the co-resident DIL whom we surveyed is the DIL who is married to the MIL's eldest son for 56 percent of MILs.

[16] Moreover, the birth order of the child's father does not necessarily invalidate our identification strategy as long as it is uncorrelated with the decision to practice sex-selection for his first birth.

grandsons are central to lineage continuation, the performance of religious rites in Hindu tradition, and the provision of old-age support. The birth of a firstborn grandson may therefore resolve a salient source of uncertainty and chronic anxiety about whether the family line will be continued. Moreover, by reducing the DIL's subsequent fertility (Kugler and Kumar, 2017), a firstborn son may increase per capita household resource availability, further affecting the MIL's well-being. We therefore predict that a firstborn grandson will improve MIL mental health, reflecting both the resolution of anticipatory anxiety and the social reinforcement that accompanies this event in a son-preferring society.

For the DIL, a firstborn son activates countervailing forces. Bearing a son fulfills expectations placed on her by her marital family and the broader community (Das Gupta, 1995), potentially reducing pressure and strengthening her intrahousehold bargaining position (Milazzo, 2018). At the same time, the elevated value placed on sons may increase demands on the DIL by requiring greater investments in childcare, reduced autonomy over childrearing decisions, and stronger expectations to remain at home to ensure the child's well-being. These countervailing forces may attenuate any mental health gains, potentially resulting in small or null average effects of firstborn sex on DIL mental health.

Several additional considerations reinforce this expectation. First, a firstborn daughter still signals that the DIL is able to bear children, which carries value in itself. Second, since the desire for at least one son is the main driver of skewed sex ratios in India (Jayachandran, 2017, 2023), a DIL with a firstborn daughter can reasonably expect to bear a son in the coming years and hence may not face immediate censure for her first birth. For the MIL, by contrast, the urgency is greater: she may wish to see a grandson born within her lifetime, and the firstborn's sex provides an immediate signal about whether this aspiration will be fulfilled. DILs also have weaker son preference than MILs, which may reflect higher educational attainment and generational shifts in gender attitudes.[17] Finally, MILs may simply be more psychologically vulnerable overall: they exhibit nearly twice the prevalence of anxiety or depression risk and experience greater social isolation—only 51 percent report having at least one friend in Jaunpur, compared with 67 percent of DILs—which may further exacerbate this vulnerability.[18]

Although the average effect of firstborn sex on DIL mental health may be small, the balance of these forces is unlikely to be uniform across all DILs. The negative psychological weight of a firstborn daughter depends on how permanent the outcome appears. For a younger DIL, the current gender composition of her children is provisional—the pressure exists, but so does the prospect of resolution through subsequent fertility. For an older DIL, the reproductive window is narrowing, and if a firstborn daughter has not been "corrected", the associated stigma may harden into an

[17] While 37 percent of DILs in our sample have completed class 12, 78 percent of MILs are illiterate. DILs report an ideal proportion of sons of 44 percent, compared with 55 percent among MILs for their own children and 51 percent for their grandchildren.

[18] The gap in psychological vulnerability likely reflects age-related physical decline. Social isolation is also positively associated with depression among older adults (Banerjee et al., 2023).

enduring source of distress. We therefore expect any negative mental health effects of a firstborn daughter to be concentrated among older DILs, especially those without a son.

The MIL's psychological state can also shape the DIL's economic outcomes. A MIL whose mental health has improved following the birth of a grandson may become more willing to provide childcare and more permissive about the DIL working outside the home, particularly if the grandson alleviates concerns about lineage continuation. A growing literature documents that grandparental childcare increases maternal labor force participation (Compton and Pollak, 2014; Del Boca, 2015), and in our setting the MIL plays a central gatekeeping role, with her attitudes mediating the DIL's access to employment opportunities (Anukriti et al., 2020; Khanna and Pandey, 2024). This role is especially consequential when children are young: in our sample, only 42 percent of MILs approve of DILs working outside the home when their children are young, compared with 85 percent when they are older.[19] Greater MIL permissiveness may therefore enable DILs to act on latent labor supply preferences that cannot be exercised without household support—a dynamic consistent with Heath and Tan (2020), who show that gains in women's autonomy within Indian households can increase labor supply even when income effects predict the opposite. In addition, a firstborn son may relax the DIL's time constraints directly: DILs with firstborn sons have fewer children on average (Anukriti et al., 2021a), reducing the total demands of childcare, and improvements in the MIL's well-being from the birth of a grandson may also lower the DIL's responsibilities for eldercare.

At the same time, these channels may be counteracted by conservative gender norms that restrict women's labor supply even when son preference has been satisfied (Anukriti et al., 2020), making the overall effect of a firstborn son on labor outcomes *a priori* ambiguous. Moreover, these channels are not strictly unidirectional: the DIL's labor force participation may in turn affect her own mental health through income, autonomy, or social engagement, and the MIL's mental health through changes in household routine or the perceived status implications of having a working DIL. Our empirical strategy captures the net effect of these feedback loops rather than isolating each pathway in sequence.

The Role of Mother's Age. We argue that the DIL's age at the time of the survey is the most informative dimension to examine heterogeneous effects of firstborn sex because it simultaneously captures several reinforcing sources of variation. First, in comparison to older DILs, younger DILs occupy a lower position in the household hierarchy and have had less time to accumulate social capital or economic independence (Doss, 2013), making them more vulnerable to the pressures of in-laws and more likely to benefit from the status gain of a firstborn son. Second, if a firstborn son triggers MIL support—through improved mental health, willingness to provide childcare, and more permissive attitudes toward the DIL working—this support is most consequential for younger DILs, who have not yet made binding employment decisions and whose young children make grandparental

[19]This difference likely reflects the MIL's belief that childcare is the DIL's primary responsibility when her children are young, and that work outside the home would interfere with this obligation.

childcare most relevant for labor supply (Compton and Pollak, 2014; Del Boca, 2015). Older mothers, by contrast have less need of childcare, have typically already made their labor supply decisions, or face less receptive labor markets. Third, MILs who have a young DIL with a firstborn daughter may face heightened anxiety, since the long remaining childbearing horizon implies a prolonged period of uncertainty regarding the arrival of a grandson. For older DILs, the MIL may have already adjusted her expectations or may have grandchildren through other DILs.

While heterogeneity by stated son preference is a natural alternative, DIL age offers advantages as a pre-determined measure. Stated fertility preferences may be influenced by the gender of existing children (Cleland et al., 2020; Müller et al., 2022), and the limited geographical variation in our sample produces little dispersion in reported son preference. We also prefer mother's age over youngest child age or average child age for heterogeneity analysis because fertility continuation is directly affected by firstborn sex, as shown by previous literature and confirmed by our results. Conditioning on youngest or average child age therefore risks selecting on a post-treatment outcome, as households with firstborn daughters are more likely to have additional children, mechanically resulting in younger children at the time of the survey.

Testable Predictions. The framework generates the following testable predictions:

1. Consistent with son-biased stopping behavior, a firstborn son increases women's contraceptive use and decreases subsequent fertility.

2. A firstborn grandson improves MIL mental health, with larger effects for MILs with younger DILs.

3. The average effect of having a firstborn son on DIL mental health is small or null, with adverse effects of not having a son being concentrated among older DILs.

4. MILs with firstborn grandsons hold more permissive attitudes toward DIL employment and provide more childcare.

5. A firstborn son increases labor force participation among younger DILs.

5 Results

We begin by testing whether a firstborn son increases the DIL's contraceptive use and reduces her subsequent fertility, validating the son preference mechanism that motivates the rest of the analysis. We also examine MIL approval of the DIL's family planning use, given the central role MILs play in shaping DILs' reproductive decisions (Anukriti et al., 2020).

We then turn to whether the sex of the firstborn child affects the mental health of both the DIL and her MIL. Because the MIL plays a central role in determining the DIL's likelihood of working outside the home (Khanna and Pandey, 2024), we also examine whether a firstborn grandson is associated with changes in the MIL's involvement in childcare, her attitudes toward the DIL's employment, and the DIL's labor market outcomes. Following the conceptual framework, we

explore heterogeneity in these effects by the DIL's age to assess whether they are concentrated among younger or older women.

5.1 DIL Fertility and Family Planning Outcomes

A large literature shows that son preference shapes fertility and family planning behavior (Anukriti, 2018; Jayachandran, 2017). Women whose first child is a daughter tend to have more children, and more daughters, in pursuit of a son, reflecting son-biased stopping rules. The desire to achieve a son early also reduces birth spacing and contraceptive use (Jayachandran and Kuziemko, 2011) and, in contexts where sex-selection technologies are available, increases the likelihood of sex-selective abortion (Anukriti et al., 2021a).

Consistent with this literature and Prediction 1, we find that the sex of the firstborn child affects subsequent fertility and the overall sex composition of children. Using our main specification (Equation 1), Panel A of Table 2 indicates that DILs whose firstborn child is a son have, on average, 0.25 fewer children and 1.13 fewer daughters than those whose firstborn is a daughter. Similarly, MILs whose first grandchild from the co-residing DIL is a grandson have, on average, 0.46 fewer grandchildren and 1.28 fewer granddaughters (from all of her DILs) than MILs whose first grandchild from the co-residing DIL is a granddaughter.

Having a firstborn son also increases the use of modern contraception. Column 1 in Panel B of Table 2 shows that DILs with a firstborn son are 7.3 p.p. (32.7 percent) more likely to report using a modern contraceptive method at the time of the survey relative to those with a firstborn daughter. This increase reflects substitution from traditional to modern methods, as we find no effect on the likelihood of using any contraceptive method (Column 2, Panel B).

A key feature of our conceptual framework is the role of the MIL in shaping DIL's fertility and family planning decisions. Prior work documents that MILs actively shape DILs' contraceptive access and fertility timing in north India (Anukriti et al., 2026, 2022, 2020), and our data provide direct evidence in line with this channel. Column 3 of Panel B shows that having a firstborn grandson increases the MIL's likelihood of discussing family planning with her co-residing DIL by 6.9 p.p. (14.6 percent) relative to MILs with a firstborn granddaughter. Column 4 indicates a 3.3 p.p. (5.3 percent) increase in MIL approval of the DIL's use of family planning, although this estimate is not statistically significant at conventional levels.

Although the overall effect on approval is imprecise, the pattern becomes clearer when we distinguish between approval for limiting versus spacing methods. Columns 5 and 6 of Panel B show that having a firstborn grandson increases approval of methods for limiting births by 6 p.p. (8.7 percent) relative to having a firstborn granddaughter, with no corresponding effect on approval of spacing methods. These findings align with contraceptive use patterns in India, where demand for contraception rises following the birth of a son and female sterilization is the most prevalent contraceptive method (Basu and De Jong, 2010; Government of India, 2022; Oliveira et al., 2014).

Taken together, these results suggest that the effects of firstborn sex on fertility and contracep-

tive use operate not only through the DIL's own preferences, but also through intergenerational dynamics within the household. The increased likelihood that MILs discuss family planning and approve of limiting births following the birth of a grandson highlights their role in reinforcing or relaxing son preference-related pressures within the household.

Husbands, by contrast, appear to play a more limited role in shaping these outcomes. Spousal fertility preferences in our sample are largely aligned, whereas disagreement is more pronounced between MILs and DILs, consistent with prior evidence (Anukriti et al., 2026, 2022). For example, MILs report a higher ideal number of grandsons (1.15) than DILs' ideal number of sons (0.9). This intergenerational misalignment further motivates our focus on MIL-DIL dynamics and may partly explain why MILs act strategically towards their DILs (Anukriti et al., 2020). Husbands are also frequently absent due to migration: 46 percent have been away from home for at least six months (Table 1), likely increasing the influence of co-resident MILs. Consistent with this interpretation, Table A.8 shows that the sex of the firstborn child does not significantly affect husbands' approval of contraceptive use for spacing or limiting births. These findings provide evidence of son preference in our setting and highlight the MIL's role in shaping fertility and family planning outcomes.

We now examine whether a firstborn son also affects the mental health of MILs and DILs.

5.2 MIL and DIL Mental Health

Table 3 presents the effects of the sex of the DIL's firstborn child on the mental health of both the MIL and the DIL. Consistent with Prediction 2, Panel A shows that the MIL's risk of anxiety or depression is approximately 5 p.p. (15 percent) lower when her DIL's firstborn child is a son rather than a daughter.[20] This estimate is stable across specifications that sequentially add household, MIL, and DIL controls, as well as village fixed effects (Columns 2-5 of Panel A). In the remainder of the paper, we report estimates from our most conservative specification (Column 5), which includes all controls and village fixed effects.

The magnitude of this effect is noteworthy in light of recent evidence on other determinants of mental health among older Indian women. Keskar and Mookerjee (2024) find that a legal reform expanding women's inheritance rights reduced the self-reported risk of depression after age 45 by about 18.3 percent among women who were exposed to the reform before marriage, relative to a control mean of 32.2 percent. Similarly, Guimbeau and Menon (2024) find that a national pension program for elderly individuals below the poverty line in India reduced women's risk of depression by 5 to 8 p.p. (10 to 17 percent), with stronger effects among widows. The effect that we estimate—a 15 percent reduction following the birth of a grandson—is comparable in magnitude to these policy interventions, despite operating through an entirely different channel. In contrast, Banerjee et al. (2022) find that expanding delivery of old age pensions in Tamil Nadu to eligible, but previously unreached, individuals had no significant effect on mental health.

[20] We define a woman's risk of anxiety or depression as an indicator variable that is equal to one if she is at risk of either or both conditions according to the PHQ-4 scale as described in subsection 2.2.

Panel B shows no evidence that having a firstborn son affects the DIL's own risk of anxiety or depression. The coefficient on $FirstbornBoy_i$ is precisely estimated and close to zero. This null average effect is consistent with Prediction 3, which posits that countervailing pressures on the DIL may offset each other in the aggregate while varying across the life course.

5.2.1 Heterogeneity in Mental Health Effects

The conceptual framework predicts that the mental health effects of a firstborn son should differ by DIL age, since age simultaneously captures the MIL's uncertainty about lineage continuation and the DIL's remaining reproductive horizon. Table 4 presents results from fully interacted models that interact the firstborn son indicator and all control variables with a variable for three DIL age categories (under age 25, age 25-27, and age above 27), while including the corresponding main effects.[21]

Column 1 shows that the reduction in the MIL's risk of anxiety or depression from having a firstborn grandson relative to a granddaughter is concentrated among households where the co-residing DIL is younger than 25. This pattern is consistent with Prediction 2: when the DIL is at an earlier stage of her reproductive life, a firstborn granddaughter heightens uncertainty about whether a grandson will eventually be born, thereby amplifying the MIL's psychological response. Column 2 reinforces this pattern, showing that MILs whose younger DILs have at least one son face a 13 p.p. lower risk of poor mental health relative to MILs whose younger DILs have no sons. We interpret this latter result with caution, given the potential endogeneity between the sex of the firstborn child and subsequent fertility.

For the DIL, the pattern is reversed. Although Table 3 showed no average effect of firstborn son on DIL mental health, the age-disaggregated results indicate substantial heterogeneity. Columns 3 and 4 show that DILs above age 27 have a significantly lower risk of anxiety or depression than DILs under age 25 if they have a firstborn son (versus a firstborn daughter) or at least one son (versus no son) at the time of survey. The total effect of having a son at the time of the survey is also significantly negative for DILs older than age 27 in Column 4. This is consistent with Prediction 3: a younger DIL can still reasonably expect to bear a son, so a firstborn daughter carries less permanence. For an older DIL facing declining fertility, the absence of a son is less likely to be viewed as temporary, and the associated stigma may translate into more persistent psychological distress.

The age heterogeneity thus operates in opposite directions for MILs and DILs, but reflects a common underlying mechanism. The MIL's mental health responds most strongly when the DIL is young, when uncertainty about lineage continuation is greatest. By contrast, the DIL's mental health responds most strongly at older ages, when the absence of a son becomes harder to reverse. In both cases, the key common factor is the perceived permanence of only having (grand)daughters

[21] The age thresholds used in the heterogeneity analysis correspond approximately to terciles of the estimation sample. They also broadly reflect different stages of women's reproductive life cycle in the Indian context.

following the birth of a firstborn (grand)daughter.

We further probe the MIL mental health results by examining whether they vary with the concentration of son preference pressure—specifically, whether the co-residing DIL is the MIL's only DIL, whether she is married to the eldest son, and how recently the firstborn was born.

Column 1 of Table 5 shows that the effect of a firstborn grandson on MIL mental health is stronger when the co-residing DIL is the MIL's only DIL. Among these MILs, a firstborn grandson reduces the risk of anxiety or depression by 5.5 p.p. (16.7 percent) relative to a firstborn granddaughter, while the effect is close to zero and insignificant among MILs with multiple DILs. This pattern is consistent with the idea that when a single DIL bears the entire weight of the MIL's expectations to produce a grandson, the psychological stakes of the firstborn's sex are highest.

By contrast, Column 2, shows no significant difference by whether the DIL is married to the eldest son, suggesting that expectations about producing a male heir do not vary substantially with birth order in this setting, a finding that contrasts with traditional norms of primogeniture (Bhalotra et al., 2019; Gupta, 2011, 2014).

Column 3 examines heterogeneity by the age of the firstborn child. When the first child was born after 2020 (i.e., within five years of the survey), having a firstborn son reduces the MIL's risk of anxiety or depression at the time of the survey by approximately 11 p.p. relative to having a firstborn daughter. This effect is fully offset in households where the firstborn was born before 2020, leaving the net effect close to zero. Two mechanisms may explain this pattern. First, in households with older firstborns, subsequent births may have already produced a grandson, mechanically resolving the MIL's uncertainty. Second, MILs may psychologically adjust to the gender composition of grandchildren over time, regardless of whether a grandson is eventually born. While our data cannot fully distinguish these channels, the results reinforce the broader finding that the MIL's mental health response is strongest when the implications of the firstborn's sex remain most salient and unresolved.

The corresponding analyses for DIL mental health (Columns 4–6) yield small and statistically insignificant estimates across all specifications, indicating that the null average effect on DIL mental health does not mask meaningful heterogeneity along these dimensions of household structure or child age.

5.3 MIL Time Use and Involvement in Childcare

The conceptual framework posits that a firstborn grandson may shift MIL attitudes and time allocation in ways that facilitate DIL labor force participation. We therefore examine whether having a grandson affects the MIL's engagement with grandchildren and her allocation of time between childcare and activities outside the home.

Column 1 of Table 6 shows that MILs with a firstborn grandson are 4.2 p.p. (5 percent) more likely to discuss grandchildren with their co-residing DILs relative to MILs with a firstborn granddaughter. Column 2 indicates that this effect is more pronounced among older DILs, po-

tentially reflecting greater MIL engagement and interest in a grandson's upbringing (relative to a granddaughter's) as the child ages and discussions about schooling and future plans become more relevant.[22]

We next examine whether having a firstborn son translates into changes in how MILs allocate their time. Column 3 shows that MILs with a firstborn grandson spend, on average, 6 percent more time on childcare relative to MILs with a firstborn granddaughter. The age-disaggregated results in Column 4 suggest that this effect is concentrated among households with younger DILs: having a firstborn grandson increases MIL childcare time by approximately 13 minutes per day when the DIL is under 25. Although this estimate is not statistically significant at conventional levels, it is economically meaningful, and the contrast with the null effect among older DILs is consistent with our conceptual framework's prediction that MIL childcare support is most relevant when children are young.

Consistent with a reallocation of time toward within-household activities, Column 6 shows that among households with younger DILs, having a firstborn grandson significantly reduces the MIL's time spent on activities outside the home, such as visiting friends and relatives, by about 22 minutes per day relative to having a firstborn daughter. No comparable effects are observed for older DILs.

Column 7 shows that having a firstborn son increases the likelihood that MILs and DILs engage jointly in childcare activities such as feeding and caring for children, but Column 8 reveals that this effect is concentrated among older DILs.[23] Among DILs younger than 25, joint childcare declines, suggesting a substitution pattern rather than joint production, where MILs take over childcare responsibilities as younger DILs shift time toward work outside the home. This substitution pattern suggests that the MIL's increased willingness to provide childcare following a grandson's birth may directly relax the time constraint that otherwise would prevent younger DILs from participating in the labor market, a pattern that is consistent with the labor market results we present in the next section.

We note two interpretive considerations. First, increased time spent caring for a grandson may directly improve MIL mental health, rather than (or in addition to) reflecting a downstream consequence of it. Prior evidence on the relationship between grandparental caregiving and well-being is mixed and depends on living arrangements (Barman and Sahoo, 2024; Leimer and van Ewijk, 2022). Our data do not allow us to determine whether changes in MIL time use are a cause or consequence of improved mental health, and both pathways are plausible.[24]

Second, our time-use results in Table 6 should be interpreted with caution given the limitations of self-reported time-use data. Our survey collected time-use data based on self-reports for the day

[22]Columns 2, 4, 6, and 8 of Table 6 report estimates from fully interacted models that interact DIL age with the firstborn child sex indicator and all control variables, while including the main effect of DIL age.

[23]Except for Column 1, Table 7 reports estimates from fully interacted models in which DIL age is interacted with the firstborn child sex indicator and all control variables, while including the main effect of DIL age.

[24]In fact, this mechanism may also help explain why the mental health effects are larger for MILs with younger grandsons, as shown in Table 5.

prior to the interview, which may be subject to measurement error, particularly for childcare, which is often performed simultaneously with other activities and hence may be under-reported (Field et al., 2023; Lentz et al., 2019). Social norms may also contribute to under-reporting of certain activities, including work (Jayachandran, 2021). We therefore interpret these results as suggestive evidence on the mechanisms linking firstborn sex to the labor market outcomes that we examine next.

5.4 DIL Labor Market Outcomes

The preceding results show that having a firstborn grandson improves MIL mental health, increases MIL childcare provision for younger DILs, and shifts MIL attitudes toward greater approval of contraceptive use. The conceptual framework predicts that these changes, together with reduced fertility and a potential easing of the DIL's eldercare burden, may lead to higher labor force participation among younger DILs, although the average effect is theoretically ambiguous given that son preference may coexist with restrictive gender norms.

Column 1 of Table 7 confirms this ambiguity: we find no average effect of a firstborn son on DIL labor force participation.[25] However, the effects are sizable among younger women. Among DILs under age 25, a firstborn son significantly increases labor force participation by 15 p.p. relative to DILs with a firstborn daughter, with no comparable effects for older DILs (Column 2). These gains are economically meaningful given the low levels of female labor force participation—24 percent among women aged 15-30 in the 2023 Periodic Labor Force Survey—and the restrictive social and gender norms that constrain women's economic activity in India (Fletcher et al., 2017; Heath et al., 2024; Jalota and Ho, 2024; Jayachandran et al., 2021).

Columns 3 and 4 indicate that the increase in labor force participation among younger DILs is primarily driven by employment rather than job search. Among DILs under age 25, having a firstborn son significantly increases the probability of having worked in the past year by 9.4 p.p. relative to having a firstborn daughter. In contrast, the estimated effect on job search for these women is smaller (5.6 p.p.) and statistically insignificant. No meaningful effects are observed among older DILs.

To further characterize employment, we examine additional outcomes. A firstborn son increases the likelihood that younger DILs work for family members (Column 5) and work outside the home (Column 6), but has no effect on work for pay in cash or in kind (Column 7).[26] This pattern is consistent with the interpretation that a firstborn son relaxes time constraints, through reduced fertility, increased MIL childcare support, and potentially a lighter eldercare burden, rather than

[25] Except for Column 1, Table 7 reports estimates from fully interacted models in which DIL age is interacted with the firstborn child sex indicator and all control variables, while including the main effect of DIL age.

[26] Consistent with these extensive margin results, we find suggestive increases in time spent outside the home and hours worked among younger DILs. Although these estimates are imprecise, their magnitudes are positive and substantially larger than those observed for older DILs, which align with the labor force participation results presented in Table 7. These results are available upon request.

expanding access to paid employment opportunities.[27] The shift toward family-based and outside-the-home work, rather than paid work, suggests that younger DILs are reallocating time into productive activities that were previously constrained by caregiving responsibilities, rather than entering into qualitatively different labor markets.

These labor market changes for younger DILs are accompanied by corresponding shifts in MIL attitudes. Column 8 shows that in households with younger DILs, having a firstborn son increases the MIL's approval of the DIL working outside the home when her children are young by 12 p.p. (32 percent) relative to having a firstborn daughter. No comparable effects are observed for older DILs. This result ties together the findings from the preceding sections: the birth of a grandson improves MIL mental health, increases childcare provision, reduces time spent outside the home, and makes MILs more permissive of their DIL working—all concentrated among households with younger DILs and collectively facilitating their entry into the labor force.

We also examine the role of husbands in the DIL's decision to work. Although we do not directly observe husbands' approval of the DIL working, we measure their involvement in her work decisions. As shown in Table A.9, the sex of the firstborn child does not significantly affect husbands' involvement in their wives' work decisions. Rather, we observe a significant 6.1 p.p. (32 percent) increase in the likelihood that the DIL has the most say in decisions about her own work and, a 4.2 p.p. (23 percent) decrease that the MIL has the most say, due to a firstborn son relative to a firstborn daughter. This is consistent with the conceptual framework's emphasis on the MIL, rather than the husband, as the primary household actor shaping the DIL's labor market outcomes, particularly in a setting where 46 percent of husbands have been absent for at least six months due to migration.

5.5 Robustness Checks

Table A.10 assesses the robustness of our findings to clustering standard errors at the village level and to multiple hypothesis testing for our key outcomes of interest: MIL and DIL mental health and DIL's fertility, family planning, and labor force participation. The left and right panels report the adjusted results for MIL and DIL outcomes, respectively. To adjust for multiple hypothesis testing, we estimate Anderson (2008) sharpened q-values that control for the false discovery rate when evaluating multiple outcomes (McKenzie, 2021). Reassuringly, these adjustments do not alter the statistical significance or qualitative interpretation of our results.

6 Conclusions

We examine how son preference shapes women's mental health and intergenerational household dynamics in rural India. Our results show that the psychological consequences of son preference

[27] Although our surveys lack direct data on whether DILs with firstborn sons reduce their time spent on eldercare, particularly caring for the MIL, we find suggestive evidence that younger DILs reduce their time caring for household members other than their children. These results are available upon request.

are heterogeneous within households and operate through intergenerational channels that have received little attention in prior work. The MIL's mental health responds most strongly when the DIL is young, when uncertainty about lineage continuation is greatest; in contrast, the DIL's mental health responds most at older ages, when the gender composition of her children becomes more fixed. The magnitude of the MIL mental health effect is comparable to recent estimates of the impacts of public pensions and inheritance reforms, underscoring how deeply lineage-based expectations are embedded in older women's psychological well-being. More broadly, our results show that mental health in this context is not simply an individual outcome but is shaped by one's position within the household hierarchy and by the actions and attitudes of other family members.

A central implication of our findings is that gender norms can also shape women's economic outcomes indirectly through their effects on intergenerational relationships within the household. In our setting, it is not son preference per se that determines whether a young DIL enters the labor force; rather, it is whether the birth of a son reconfigures the MIL-DIL relationship in ways that relax the constraints — childcare, mobility, and approval — that otherwise keep her at home. This distinction matters because it implies that the economic costs of son preference for younger women are not fixed features of the norm, but are mediated by household structure and by the attitudes and well-being of older women who exercise authority over domestic life.

Our study is not without limitations. First, the cross-sectional nature of our data precludes any analysis of how mental health and labor supply evolve over time following the birth of a first child. Second, our time-use measures are based on single-day recall and may understate childcare performed simultaneously with other activities (Field et al., 2023; Lentz et al., 2019). Third, we cannot fully disentangle the causal sequencing of improvements in MIL mental health, attitudinal shifts, and time allocation adjustments, as these may operate simultaneously. Finally, because the DIL's labor force participation may itself influence both her own and her MIL's well-being, our reduced-form estimates should be interpreted as capturing the net effect of potentially bidirectional relationships.

Although our study is situated in one district of rural UP, its findings might be relevant to other settings in India and, more broadly, to contexts where gender norms are restrictive, and where women are compelled to navigate their positions within extended household settings (Ghosh and Thornton, 2024). At the same time, our results should be interpreted in light of our sample design, which consists exclusively of co-residing MIL-DIL pairs and thus distinguishes it from nationally representative surveys such as LASI, where a substantial share of older women live independently. In settings where social isolation, rather than intrahousehold hierarchy, is the primary determinant of older women's mental health, the mechanisms that we identify may be less salient (Banerjee et al., 2023).

Future research could extend this study in several directions. Longitudinal data tracking MIL-DIL pairs over time would enable identification of the dynamic pathways through which firstborn sex shapes mental health and labor supply over the life cycle. Experimental evidence on whether

engaging MILs through counseling or information interventions can shift the attitudes and behaviors that we document would help establish the policy relevance of these intergenerational channels. Finally, applying this analysis in settings with weaker son preference or different household structures would clarify the extent to which the mechanisms that we identify are specific to the north Indian patrilocal context or reflect more general features of multigenerational households.

Finally, our findings carry several implications for policy design. The sizeable effects on MIL mental health suggest that efforts to address son preference should incorporate mental health as a key outcome, not only for younger women but also for older women whose well-being is closely tied to lineage expectations. The central gatekeeping role of MILs in shaping DIL employment and family planning reinforces the case for interventions that engage MILs directly, rather than targeting younger women in isolation (Anukriti et al., 2022, 2020; Gupta et al., 2015, 2021; Khanna and Pandey, 2024). In addition, the concentration of labor market gains among the youngest DILs points to the period following the birth of a first child as a critical window for women's labor force attachment. More broadly, our results suggest that moments of normative shift within the household, such as the birth of a son (or child, more broadly), create opportunities that gender-equity programs could strategically exploit.

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8 Data Availability

De-identified data may be made available upon reasonable request, subject to the terms and conditions of the institutional review boards that approved this study. A replication dataset and code is available on the Harvard Dataverse at `TBD`.

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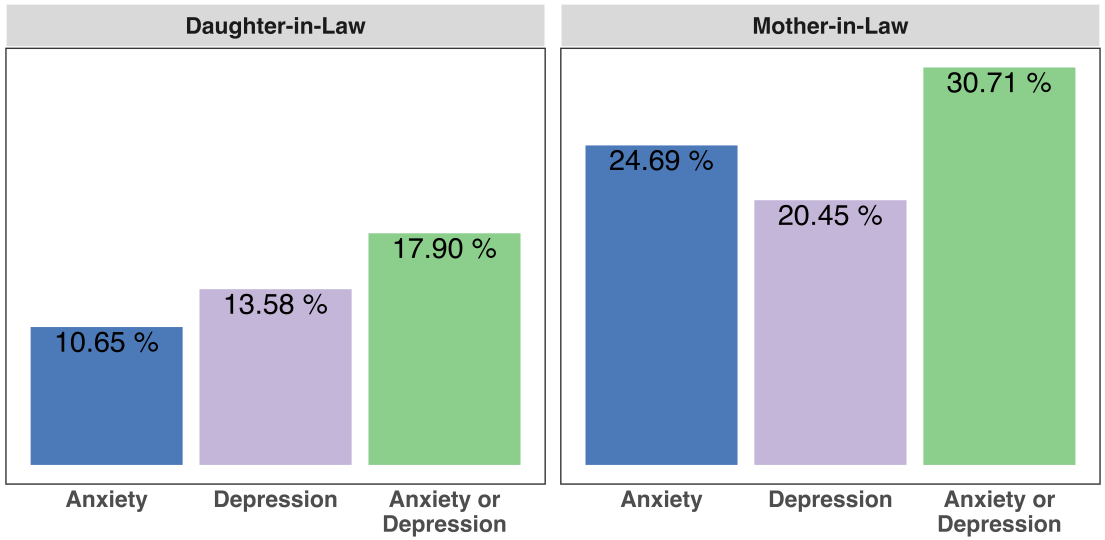
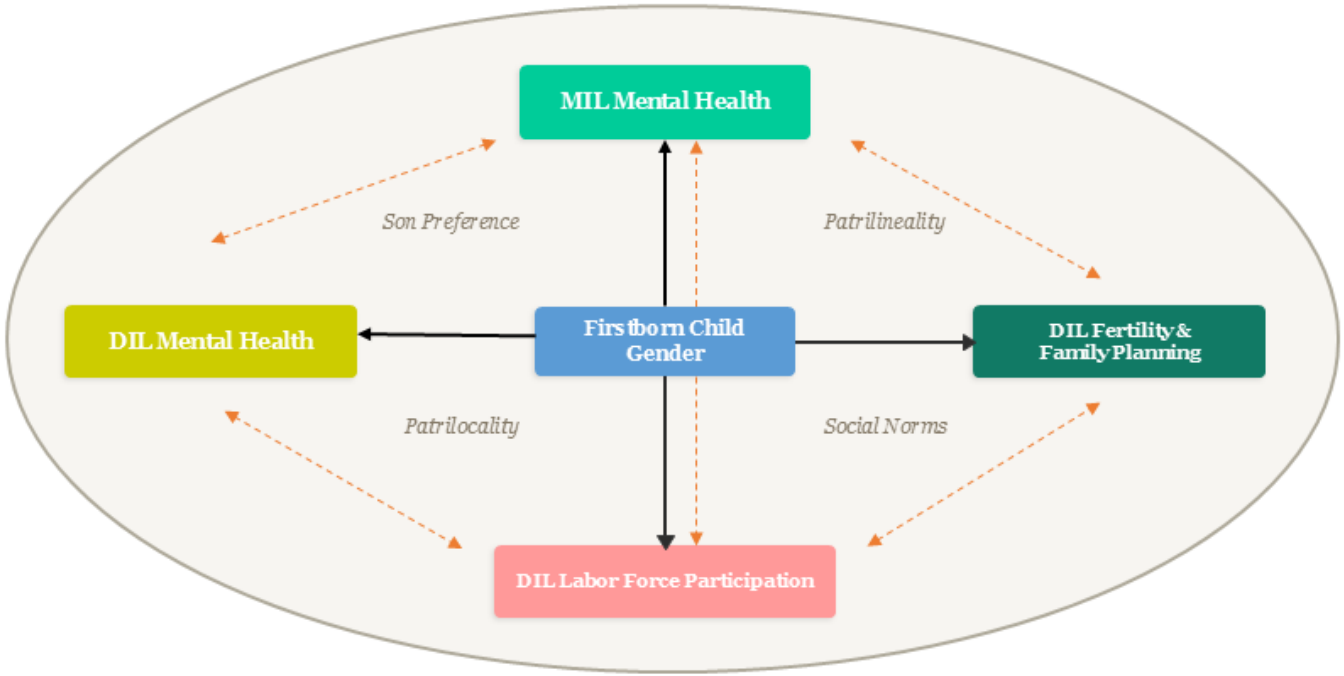
Figures

Figure 1: Prevalence of anxiety and depression



Notes: The figure presents the prevalence of anxiety and depression in the estimation sample (N = 1,296) based on the PHQ-4 assessment tool. The PHQ-4 captures respondents' risk of adverse mental health outcomes in the past two weeks from the time of the survey. Additional details about how anxiety and depression are defined are provided in Appendix A.

Figure 2: Conceptual Framework



Notes: This figure illustrates the relationship between DIL's firstborn sex and the four sets of outcomes that we examine in this study in a context characterized by son preference, patrilocality, patrilineality, and gender-related restrictive social norms. The dashed arrows indicate that the variables are likely to have a two-way relationship with each other.

Tables

Table 1: Balance table, estimation sample

	Estimation sample		DIL's first child is a girl		DIL's first child is a boy		
	N	Mean	N	Mean	N	Mean	Normalized difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Caste: SC-ST	1296	0.335	647	0.306	649	0.364	-0.122
Caste: OBC	1296	0.566	647	0.597	649	0.536	0.122
Household is poor	1296	0.468	647	0.445	649	0.492	-0.093
MIL's age (years)	1296	55.931	647	56.097	649	55.764	0.048
MIL is literate	1296	0.216	647	0.210	649	0.222	-0.028
MIL is widowed	1296	0.189	647	0.206	649	0.173	0.084
MIL owns a cellphone	1296	0.340	647	0.345	649	0.334	0.022
MIL's mobility index	1296	1.725	647	1.736	649	1.713	0.012
MIL has at least one friend in Jaunpur	1296	0.517	647	0.504	649	0.530	-0.052
MIL's domestic violence attitudes index	1296	1.042	647	1.022	649	1.063	-0.025
MIL has visited a health facility last year	1296	0.747	647	0.753	649	0.741	0.027
MIL's social desirability index	1296	8.183	647	8.306	649	8.060	0.135
MIL worked last year	1296	0.424	647	0.425	649	0.424	0.003
DIL is married to MIL's eldest son	1296	0.558	647	0.535	649	0.581	-0.093
DIL's age (years)	1296	26.261	647	26.379	649	26.143	0.081
DIL has completed class 12	1296	0.367	647	0.351	649	0.382	-0.065
DIL owns a cellphone	1296	0.847	647	0.844	649	0.851	-0.018
DIL's mobility index	1296	0.194	647	0.202	649	0.185	0.025
DIL has at least one friend in Jaunpur	1296	0.676	647	0.666	649	0.686	-0.042
DIL's domestic violence attitudes index	1296	0.812	647	0.777	649	0.847	-0.051
DIL has visited a health facility last year	1296	0.731	647	0.764	649	0.698	0.148
DIL's social desirability index	1296	8.245	647	8.320	649	8.171	0.089
DIL worked last year	1296	0.190	647	0.199	649	0.180	0.049
DIL's husband's age (years)	1296	30.045	647	30.121	649	29.969	0.041
DIL's husband's years of schooling	1296	11.201	647	11.121	649	11.280	-0.048
DIL's husband was a migrant for 6+ months	1296	0.458	647	0.467	649	0.448	0.037
Observations for F-test							1296
F-test of joint significance: p-value							0.151

Notes: This table presents summary statistics and tests for balance by the sex of the DIL's firstborn child in the estimation sample. MIL and DIL denote mother-in-law and daughter-in-law, respectively. Column 7 presents normalized differences in variables between DILs whose first child is a girl versus a boy, which are calculated as the absolute differences between the variable means of the two groups, divided by their joint standard deviation. A variable with a normalized difference below 0.25 is considered balanced (McKenzie, 2017). The F-statistic, which is presented at the bottom of the table tests for the joint significance of all covariates for the estimation sample, is calculated by regressing the firstborn boy dummy on all covariates and then testing whether all coefficients are jointly equal to zero. Variable definitions are provided in Appendix A.

Table 2: The effect of the sex of the DIL's firstborn child on fertility and family planning

Panel A	**DIL's number of**			**MIL's number of**		
	Children	Sons	Daughters	Grand children	Grand sons	Grand daughters
	(1)	(2)	(3)	(4)	(5)	(6)
DIL's first child is a boy	-0.243***	0.851***	-1.132***	-0.462*	0.816***	-1.278***
	(0.040)	(0.032)	(0.037)	(0.239)	(0.137)	(0.141)
Observations	1295	1295	1295	1296	1296	1296
R^2	0.363	0.520	0.579	0.498	0.460	0.445
Outcome mean if DIL's first child is a daughter	1.872	0.432	1.503	7.498	3.357	4.141
Panel B	**DIL has used modern FP**	**DIL has used any FP method**	**MIL-DIL discussion about FP**	**MIL approves of DIL's FP use**	**MIL approves of FP for limiting births**	**MIL approves of FP for spacing births**
	(1)	(2)	(3)	(4)	(5)	(6)
DIL's first child is a boy	0.073***	0.029	0.069**	0.033	0.060**	0.010
	(0.026)	(0.027)	(0.029)	(0.027)	(0.027)	(0.023)
Observations	1296	1296	1296	1296	1296	1296
R^2	0.191	0.200	0.214	0.223	0.187	0.187
Outcome mean if DIL's first child is a girl	0.223	0.677	0.471	0.626	0.689	0.807
Controls	x	x	x	x	x	x
Village fixed effects	x	x	x	x	x	x

Notes: In Panels A and B, each column represents a separate regression. MIL and DIL denote mother-in-law and daughter-in-law, respectively. Controls in Columns 1-3 in Panel A and 1-2 in Panel B include: household-level indicator variables for belonging to a Scheduled Caste or Scheduled Tribe (SC/ST), belonging to an Other Backward Class (OBC), and whether the household is poor; MIL-level covariates including age fixed effects and indicator variables for whether she is literate and a widow; DIL-level covariates including age fixed effects and indicator variables for whether she is married to the MIL's oldest son, has completed class 12, worked in the last year, owns a cellphone, has a friend in Jaunpur, visited a health facility during the last year; additional DIL index covariates, including a mobility index, domestic violence attitudes index, and social desirability index; and covariates on the DIL's husband, including her husband's age, her husband's years of schooling, and whether her husband was a migrant for 6 or more months. Controls in Columns 4-6 in Panel A and 3-6 in Panel B include: household-level indicator variables for belonging to a Scheduled Caste or Scheduled Tribe (SC/ST), belonging to an Other Backward Class (OBC), and whether the household is poor; MIL-level covariates including age fixed effects and indicator variables for whether she is literate, a widow, owns a cellphone, worked in the last year, has a friend in Jaunpur, and visited a health facility during the last year; additional MIL index covariates, including a mobility index, domestic violence attitudes index, and social desirability index; DIL-level covariates including age fixed effects and indicator variables for whether she is married to the MIL's oldest son, has completed class 12, and worked in the last year; and additional DIL index covariates, including a mobility index. There are fewer than 1,296 observations in Columns 1-3 of Panel A due to missing data in the outcome variables. Robust standard errors are presented in parentheses. The list of controls used in the regressions is presented in Table A.7. Variable definitions are available in Appendix A. *p < 0.1, **p < 0.05, ***p < 0.01.

Table 3: The effect of the sex of the DIL's firstborn child on MIL and DIL mental health

Panel: A	**MIL has anxiety or depression**				
	(1)	(2)	(3)	(4)	(5)
DIL's first child is a boy	-0.041	-0.045*	-0.057**	-0.053**	-0.051*
	(0.026)	(0.026)	(0.025)	(0.026)	(0.026)
Observations	1296	1296	1296	1296	1296
R^2	0.002	0.009	0.099	0.120	0.220
Outcome mean if DIL's first child is a girl	0.328	0.328	0.328	0.328	0.328
Panel: B	**DIL has anxiety or depression**				
	(1)	(2)	(3)	(4)	(5)
DIL's first child is a boy	-0.004	-0.004	-0.001	-0.004	-0.000
	(0.021)	(0.021)	(0.021)	(0.022)	(0.023)
Observations	1296	1296	1296	1296	1296
R^2	0.000	0.004	0.062	0.086	0.170
Outcome mean if DIL's first child is a girl	0.181	0.181	0.181	0.181	0.181
Household controls		x	x	x	x
MIL controls[a]			x	x	x
DIL controls[b]				x	x
Village fixed effects					x

Notes: Each column represents a separate regression. MIL and DIL denote mother-in-law and daughter-in-law, respectively. Household controls include indicators for belonging to a Scheduled Caste or Scheduled Tribe (SC/ST), belonging to an Other Backward Class (OBC), and whether the household is poor. [a] In Panel A, MIL controls include: MIL age fixed effects; indicator variables for whether she is literate, a widow, owns a cellphone, worked in the last year, has a friend in Jaunpur, and visited a health facility during the last year; and additional index variables, including a mobility index, domestic violence attitudes index, and social desirability index. In Panel B, MIL controls include MIL age fixed effects and indicator variables for whether she is literate and a widow. [b] In Panel A, DIL controls include: DIL age fixed effects; indicator variables for whether she is married to the MIL's oldest son, has completed class 12, worked in the last year; and additional index variables, including a mobility index. In Panel B, DIL controls include: DIL age fixed effects; indicator variables for whether she is married to the MIL's oldest son, has completed class 12, worked in the last year, owns a cellphone, has a friend in Jaunpur, and visited a health facility during the last year; additional index variables, including a mobility index, domestic violence attitudes index, and social desirability index; and covariates on the DIL's husband, including her husband's age, her husband's years of schooling, and whether her husband was a migrant for 6 or more months. Robust standard errors are presented in parentheses. The list of controls used in the regressions is presented in Table A.7. Variable definitions are available in Appendix A. *p $<$ 0.1, **p $<$ 0.05, ***p $<$ 0.01.

Table 4: Heterogeneity in the effect of the sex of the DIL's firstborn child by DIL age on MIL and DIL mental health

	MIL has anxiety or depression		**DIL has anxiety or depression**	
	(1)	(2)	(3)	(4)
DIL's first child is a boy	-0.118**		0.053	
	(0.050)		(0.044)	
DIL's first child is a boy × DIL Age 25–27	0.103		-0.026	
	(0.067)		(0.061)	
DIL's first child is a boy × DIL Age > 27	0.085		-0.121*	
	(0.072)		(0.067)	
DIL has Son		-0.130**		0.019
		(0.053)		(0.046)
DIL has Son × DIL Age 25–27		0.073		0.011
		(0.072)		(0.063)
DIL has Son × DIL Age > 27		0.091		-0.137*
		(0.080)		(0.077)
Controls	x	x	x	x
Village FE	x	x	x	x
Observations	1296	1295	1296	1295
R^2	0.325	0.328	0.342	0.343
p-value: Total effect				
(FB + FB × DIL Age 25-27 = 0)	0.731	0.263	0.529	0.509
(FB + FB × DIL Age > 27 = 0)	0.524	0.499	0.174	0.054
Outcome mean if DIL's first child is a daughter	0.181		0.181	
Outcome mean if DIL has a boy		0.340		0.340

Notes: Each column represents a separate regression. All columns present fully-interacted regressions where all covariates are interacted with DIL age, while the main effect for DIL age is also included as a regressor. MIL and DIL denote mother-in-law and daughter-in-law, respectively. Columns 1-2 include the same set of controls as those in Column 5 Panel A of Table 3. Columns 3-4 include the same set of controls as those in Column 5 Panel B of Table 3. Robust standard errors are presented in parentheses. The list of controls used in the regressions is presented in Table A.7. Variable definitions are available in Appendix A. *p < 0.1, **p < 0.05, ***p < 0.01.

Table 5: Heterogeneity in the effect of the sex of the DIL's firstborn child on MIL and DIL mental health by household structure and child age

	MIL has anxiety or depression			**DIL has anxiety or depression**		
	(1)	(2)	(3)	(4)	(5)	(6)
DIL's first child is a boy	0.012	-0.032	-0.110***	-0.050	-0.027	0.022
	(0.054)	(0.041)	(0.038)	(0.054)	(0.038)	(0.033)
DIL's first child is a boy ×						
MIL has one DIL	-0.067			0.073		
	(0.062)			(0.061)		
DIL's first child is a boy ×						
DIL is married to MIL's eldest son		-0.014			0.052	
		(0.055)			(0.050)	
DIL's first child is a boy ×						
First child born before 2020			0.114**			-0.064
			(0.056)			(0.050)
Controls	x	x	x	x	x	x
Village FE	x	x	x	x	x	x
Observations	1296	1296	1296	1296	1296	1296
R^2	0.307	0.295	0.286	0.308	0.306	0.311
p-value: Total effect						
FB + FB × One DIL = 0	0.081			0.438		
FB + FB × Eldest DIL = 0		0.199			0.458	
FB + FB × First child born before 2020 = 0			0.917			0.262
Outcome mean if DIL's						
first child is a girl	0.328	0.328	0.328	0.181	0.181	0.181

Notes: Each column represents a separate regression. All columns present fully-interacted regressions where all covariates are interacted with the covariate used for assessing heterogeneous effects, while the main effect of that variable is also included as a regressor. MIL and DIL denote mother-in-law and daughter-in-law, respectively. Columns 1-3 include the same set of controls as those in Column 5 Panel A of Table 3. Columns 4-6 include the same set of controls as those in Column 5 Panel B of Table 3. Robust standard errors are presented in parentheses. The list of controls used in the regressions is presented in Table A.7. Variable definitions are available in Appendix A. *p $<$ 0.1, **p $<$ 0.05, ***p $<$ 0.01.

Table 6: The effect of the sex of the DIL's firstborn child on the MIL's time use and involvement in childcare

	MIL discussion about grandchildren		**MIL time spent on childcare**		**MIL time spent outside of home**		**MIL-DIL doing childcare together index [0-3]**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DIL's first child is a boy	0.042*	0.019	0.107	0.211	-0.029	-0.365**	0.120**	-0.031
	(0.023)	(0.041)	(0.073)	(0.140)	(0.078)	(0.142)	(0.059)	(0.111)
DIL's first child is a boy × DIL Age 25–27		-0.006		-0.214		0.654***		0.255
		(0.058)		(0.183)		(0.194)		(0.159)
DIL's first child is a boy × DIL Age > 27		0.061		-0.149		0.356*		0.051
		(0.058)		(0.186)		(0.202)		(0.159)
Controls	x	x	x	x	x	x	x	x
Village FE	x	x	x	x	x	x	x	x
Observations	1296	1296	1296	1296	1296	1296	1296	1296
R^2	0.208	0.301	0.319	0.434	0.210	0.358	0.261	0.413
p-value: Total effect								
(FB + FB × DIL Age 25-27 = 0)		0.759		0.984		0.027		0.047
(FB + FB × DIL Age > 27 = 0)		0.056		0.614		0.951		0.863
Outcome mean if DIL's first child is a girl	0.787	0.787	1.940	1.940	0.674	0.674	1.062	1.062

Notes: Each column represents a separate regression. Columns 2, 4, 6 and 8 present fully interacted regressions, where all covariates are interacted with DIL age, while the main effect for DIL age is also included as a regressor. MIL and DIL denote mother-in-law and daughter-in-law, respectively. Columns 1-6 include the same set of controls as those in Column 5 Panel A of Table 3 except MIL and DIL employment status. Columns 7-8 include the same set of controls as those in Column 5 Panel B of Table 3 except for MIL and DIL employment status. Robust standard errors are presented in parentheses. The list of controls used in the regressions is presented in Table A.7. Variable definitions are available in Appendix A. *p < 0.1, **p < 0.05, ***p < 0.01.

Table 7: The effect of the sex of the DIL's firstborn child on DIL labor market outcomes

	DIL was in labor force last year		**DIL worked last year**	**DIL looked for work last year**	**DIL worked for family members**	**DIL worked outside**	**DIL worked for cash/in kind**	**MIL approves of DIL working outside the home when her kids are young**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DIL's first child is a boy	0.006	0.151***	0.094**	0.056	0.073**	0.067**	-0.003	0.122**
	(0.029)	(0.056)	(0.043)	(0.047)	(0.031)	(0.033)	(0.028)	(0.055)
DIL's first child is a boy × DIL Age 25–27		-0.216***	-0.094	-0.122*	-0.070	-0.056	0.007	-0.074
		(0.078)	(0.062)	(0.066)	(0.048)	(0.050)	(0.039)	(0.074)
DIL's first child is a boy × DIL Age > 27		-0.117	-0.117*	0.000	-0.093*	-0.107**	0.025	-0.099
		(0.078)	(0.064)	(0.068)	(0.049)	(0.051)	(0.043)	(0.076)
Controls	x	x	x	x	x	x	x	x
Village FE	x	x	x	x	x	x	x	x
Observations	1296	1296	1296	1296	1296	1296	1296	1296
R^2	0.187	0.367	0.351	0.362	0.362	0.338	0.301	0.337
p-value: Total effect								
(FB + FB × DIL Age 25-27 = 0)		0.233	0.996	0.162	0.936	0.777	0.883	0.340
(FB + FB × DIL Age > 27 = 0)		0.536	0.629	0.241	0.587	0.315	0.493	0.655
Outcome mean if DIL's first child is a girl	0.430	0.430	0.199	0.230	0.113	0.127	0.073	0.394

Notes: Each column represents a separate regression. Columns 2 to 8 present fully interacted regressions, where all covariates are interacted with DIL age, while the main effect for DIL age is also included as a regressor. MIL and DIL denote mother-in-law and daughter-in-law, respectively. Columns 1-7 include the same set of controls as those in Column 5 Panel B of Table 3 except MIL and DIL employment status. Column 8 includes the same set of controls as those in Column 5 Panel A of Table 3 except for MIL and DIL employment status. Robust standard errors are presented in parentheses. The list of controls used in the regressions is presented in Table A.7. Variable definitions are available in Appendix A. *p < 0.1, **p < 0.05, ***p < 0.01.

ONLINE APPENDIX

Son Preference and Women's Mental Health in India

S Anukriti, Catalina Herrera-Almanza, Shahadat Hossain, and Mahesh Karra

A Variable Definitions

Outcomes:

1. MIL has anxiety or depression: Indicator variable that takes 1 if a mother-in-law (MIL) is either 'Depressed' or 'Anxious' based on the PHQ-4 brief questionnaire (see Table A.5), and 0 otherwise. In the interview, women were asked about their experience over the past two weeks with issues such as a. feeling nervous, b. unable to control worrying, c. having little interest in activities, and d. feeling down and hopeless. Each question is then scored on a scale of 0 to 3, where 0 means 'Not at all' and 3 means 'Nearly every day'. The PHQ-4 score for mental health ranges from 0 to 12, with higher scores indicating greater levels of anxiety or depression: 0-2 indicates minimal symptoms, 3-5 mild symptoms, 6-8 moderate symptoms, and 9-12 severe symptoms. If the combined score of 'feeling nervous' and 'unable to control worrying' is above 3, we classify the woman as 'Anxious'. Similarly, for questions 'having little interest in activities' and 'feeling down and hopeless', if the combined score is over 3, we classify the women as 'Depressed'.

2. DIL has anxiety or depression: Indicator variable that takes 1 if a daughter-in-law (DIL) is either 'Depressed' or 'Anxious' based on the PHQ-4 brief questionnaire, and 0 otherwise. The variable construction follows the same steps as 'MIL has anxiety or depression'.

3. MIL-DIL discussion about grandchildren: MIL-reported indicator variable that takes 1 if the MIL discusses future plans for the grandchildren with her DIL daily or often, and 0 otherwise.

4. Hours spent on childcare by MIL: MIL-reported continuous variable capturing the total hours she spends per day on taking care of the children.

5. Hours spent outside the home by MIL: MIL-reported continuous variable capturing the total hours she spends outside of home per day for outside household chores, visiting friends and relatives, and community and volunteering services.

6. MIL approves of DIL working outside the home: MIL-reported indicator variable that takes 1 if she approves any of her DILs working outside, and 0 otherwise. This response is recorded in three following scenarios: (a) before the daughters-in-law having a child, (b) when the children of daughters-in-law are young, and (c) when when the children of daughters-in-law are old enough.

7. DIL is in the labor force: DIL-reported indicator variable that takes 1 if she was employed or actively looking for work in the last year, and 0 otherwise.

8. MIL is in the labor force: MIL-reported indicator variable that takes 1 if she was employed or actively looking for work in the last year, and 0 otherwise.

9. MIL-DIL discussion about FP: MIL reported indicator variable that takes 1 if she discussed family planning or birth spacing with her DIL sometimes, often, or always in the last year, and 0 otherwise.

10. MIL approves of FP for limiting births: MIL-reported indicator variable that takes 1 when she approves the DIL using family planning for limiting pregnancy, and 0 when she is indifferent or does not approve DIL's family planning use for limiting.

11. MIL approves of FP for spacing births: MIL-reported indicator variable that takes 1 when she approves the DIL using family planning for spacing pregnancy, and 0 when she indifferent or does not approve DIL's family planning use for spacing.

12. MIL approves of DIL's FP use: MIL-reported indicator variable that takes 1 when she approves of the DIL's use of family planning for limiting and spacing births, and 0 otherwise.

13. DIL has used modern FP: DIL-reported indicator variable that takes 1 if the she is currently using or ever used any modern method of family planning to avoid or delay getting pregnant, and 0 otherwise. Modern family planning method includes 'IUD/PPIUD/Multiload for 5 years', 'Injectables', 'Implants', 'Pill', 'Condom', 'Female Condom', and 'Emergency Contraception'.

14. DIL has used any FP method: DIL-reported indicator variable that takes 1 if the she is currently using or ever used any method of family planning to avoid or delay getting pregnant, and 0 otherwise.

15. MIL-DIL doing childcare together index [0-3]: Continuous variable that ranges between 0 and 3 and is calculated as the sum of three DIL-reported indicator variables for whether she and her MIL do the following childcare activities together: 1) bathing and dressing of her children, 2) feeding her children, and 3) helping her children in education.

16. DIL looked for work last year: DIL-reported indicator variable that takes 1 if she was actively looking for work in the last year, and 0 otherwise.

17. DIL worked for family members: DIL-reported indicator variable that takes 1 if she worked for the family members in the last year, and 0 otherwise.

18. DIL worked outside: DIL-reported indicator variable that takes 1 if she worked outside in the last year, and 0 otherwise.

19. DIL worked for cash/in-kind: DIL-reported indicator variable that takes 1 if she was paid in cash or in-kind for work in the last year, and 0 otherwise.

20. MIL's number of grandchildren, grandsons, and granddaughters: MIL's total number of grandchildren, grandsons and granddaughters from all of her DILs and daughters.

21. DIL's number of children, sons, and daughters: DIL's total number of children, sons and daughters.

22. DIL has most say in work: DIL-reported indicator variable that takes 1 when the DIL says that she has the most say in whether she works or not, and 0 otherwise.

23. Husband has most say in work: DIL-reported indicator variable that takes 1 when the DIL says that her husband has the most say in whether she works or not, and 0 otherwise.

24. MIL has most say in work: DIL-reported indicator variable that takes 1 when the DIL reports that her MIL has the most say whether she works or not, and 0 otherwise.

25. Improved DIL's relations with MIL: DIL-reported indicator variable that takes 1 when the DIL says that her relationship with her MIL improved after having her first child, and 0 otherwise.

26. Husband approves of DIL's FP use: DIL-reported indicator variable that takes 1 when the DIL says that her husband approves of her use of family planning for limiting and spacing births, and 0 otherwise.

27. Husband approves of FP for limiting births: DIL-reported indicator variable that takes 1 when the DIL says that her husband approves of her use of family planning for limiting births, and 0 otherwise.

28. Husband approves of FP for spacing births: DIL-reported indicator variable that takes 1 when the DIL says that her husband approves of her use of family planning for spacing births, and 0 otherwise.

Covariates:

1. DIL's first child is a boy: Indicator variable that takes 1 if the DIL's first born child is a boy, and 0 otherwise.

2. Caste: SC-ST: Indicator variable that equals 1 if the MIL/DIL belongs to a Scheduled Caste or a Scheduled Tribe, and 0 otherwise.

3. Caste: OBC: Indicator variable that equals 1 if the MIL/DIL belongs to an Other Backward Class, and 0 otherwise.

4. Household is poor: Indicator variable that equals 1 if, the MIL/DIL's household has a poverty line card (i.e., BPL Card, AAY Card, Red Ration Card, and White Ration Card) or belong to the bottom terciles of the asset index distribution, and 0 otherwise. The asset index is constructed using principal component analysis and the following household variables: indicators for major sources of drinking water (piped, tap water, well), access to toilet facilities (flush, pit, twin-pit), the materials used for the floor and roof of the house, types of cooking fuel used (LPG, dung, and others), whether the household has a separate kitchen, ownership of livestock (cow, goat, chicken), the number of rooms used for sleeping in the household, and land ownership (in acres).

5. MIL's age: MIL-reported variable of her complete age in years on the date of interview, which is included in our analyses as age fixed effects.

6. MIL is literate: MIL-reported indicator variable that takes 1 if the MIL has had at least one year of schooling, and 0 otherwise.

7. MIL is widowed: Indicator variable that takes 1 if the MIL is currently widowed, and 0 otherwise.

8. MIL owns a cellphone: Indicator variable that takes 1 if the MIL owns a cellphone, and 0 otherwise.

9. MIL's mobility index: Continuous variable that ranges between 0 and 6 and is calculated as the sum of six MIL-reported indicator variables for whether she is allowed to visit/go alone the following places: 1) homes of relatives or friends, 2) health facilities, 3) grocery stores, 4) short distances by bus or train, 5) markets, and 6) outside their villages or communities.

10. MIL has at least one friend in Jaunpur: Indicator variable that takes 1 if the MIL has at least one friend outside the household in Jaunpur with whom she discusses personal affairs or private concerns, such as children's illness, schooling, health, work, financial support etc,and 0 otherwise.

11. MIL's domestic violence attitudes index: Continuous variable that ranges between 0 and 7 and is calculated as the sum of seven MIL-reported indicator variables for whether she thinks it is always or sometimes justified for a husband hitting or beating his wife in the following situations: 1) goes out without telling him, 2) she neglects the house or the children, 3) she argues with him, 4) she refuses to have sex with him, 5) she doesn't cook food properly, 6) husband suspects her of being unfaithful, and 7) she shows disrespect for in-laws.

12. MIL has visited a health facility last year: MIL-reported indicator variable that takes 1 if the she visited any health clinic or facility last year to receive care for herself, and 0 otherwise.

13. MIL's social desirability index: Continuous variable ranged between 0 to 13 and following Crowne and Marlowe (1960), is calculated as the sum of 13 indicator variables asked to the MIL for the following questions: a) it is sometimes hard for her to go on with her work if she is not encouraged, b) sometimes feel resentful when she don't get her way, c) on a few occasions, she has given up doing something because she thought too little of her ability, d) there have been times when she felt like rebelling against people in authority even though she knew they were right, e) no matter who she is talking to, she is always a good listener, f) there have been occasions when she took advantage of someone, g) she is always willing to admit it when she make a mistake, h) she sometimes try to get even rather than forgive and forget, i) she is always courteous, even to people who are disagreeable, j) she has never been upset when people expressed ideas very different than her own, k) there have been times when she was quite jealous of the good fortune of others, l) she was sometimes irritated by people who ask favors of her, and m) she has deliberately said something that hurt someone's feelings.

14. MIL is employed: Indicator variable that takes 1 if the MIL reports having worked anytime in the last year, and 0 otherwise.

15. DIL is married to MIL's eldest son: Indicator variable that takes 1 if the DIL is married to the eldest son of the MIL, and 0 otherwise.

16. DIL's age: DIL-reported variable of her complete age in years on the date of interview, which is included in our analyses as age fixed effects.

17. DIL has completed class 12: Indicator variable that takes 1 if the DIL has completed at least 12 years of schooling, and 0 otherwise.

18. DIL owns a cellphone: Indicator variable that takes 1 if the DIL owns a cellphone, and 0 otherwise.

19. DIL has at least one friend in Jaunpur: Indicator variable that takes 1 if the DIL has at least one friend outside the household in Jaunpur with whom she discusses personal affairs or private concerns, such as children's illness, schooling, your health, work, financial support etc, and 0 otherwise.

20. DIL has visited a health facility last year: DIL-reported indicator variable that takes 1 if the she visited any health clinic or facility last year to receive care for herself, and 0 otherwise.

21. DIL's mobility index: Continuous variable ranged between 0 to 6 and calculated as the sum of six DIL-reported indicator variables for whether the she is allowed to visit/go alone the following places: 1) homes of relatives or friends, 2) health facilities, 3) grocery stores, 4) short distances by bus or train, 5) markets, and 6) outside their villages or communities.

22. DIL's domestic violence attitudes index: Continuous variable ranged between 0 to 7 and calculated as the sum of seven DIL-reported indicator variables for whether the she thinks it is always or sometimes justified for a husband in hitting or beating his wife in the following situations: 1) goes out without telling him, 2) she neglects the house or the children, 3) she argues with him, 4) she refuses to have sex with him, 5) she doesn't cook food properly, 6) husband suspects her of being unfaithful, and 7) she shows disrespect for in-laws.

23. DIL's social desirability index: Continuous variable ranged between 0 to 13 and following Crowne and Marlowe (1960), calculated as the sum of 13 indicator variables asked to the DIL. The questions parallel those asked to the MIL.

24. DIL's husband's age (years): DIL-reported complete age of her husband in years on the date of interview.

25. DIL's husband's years of schooling: DIL-reported complete years of schooling of her husband.

26. DIL's husband was a migrant for 6+ months: DIL-reported indicator variable that takes 1 if her husband was away from home for at least six months at a time in the last year.

27. DIL is employed: Indicator variable that takes 1 if the DIL reports having worked anytime in the last year, and 0 otherwise.

28. MIL has one DIL: Indicator variable that takes 1 if the DIL is the only DIL of the MIL, and 0 otherwise.

29. First child born before 2020: Indicator variable that takes 1 if the first child of the DIL was born before 2020, and 0 otherwise.

B Appendix Figures and Tables

Figure A.1: Study area

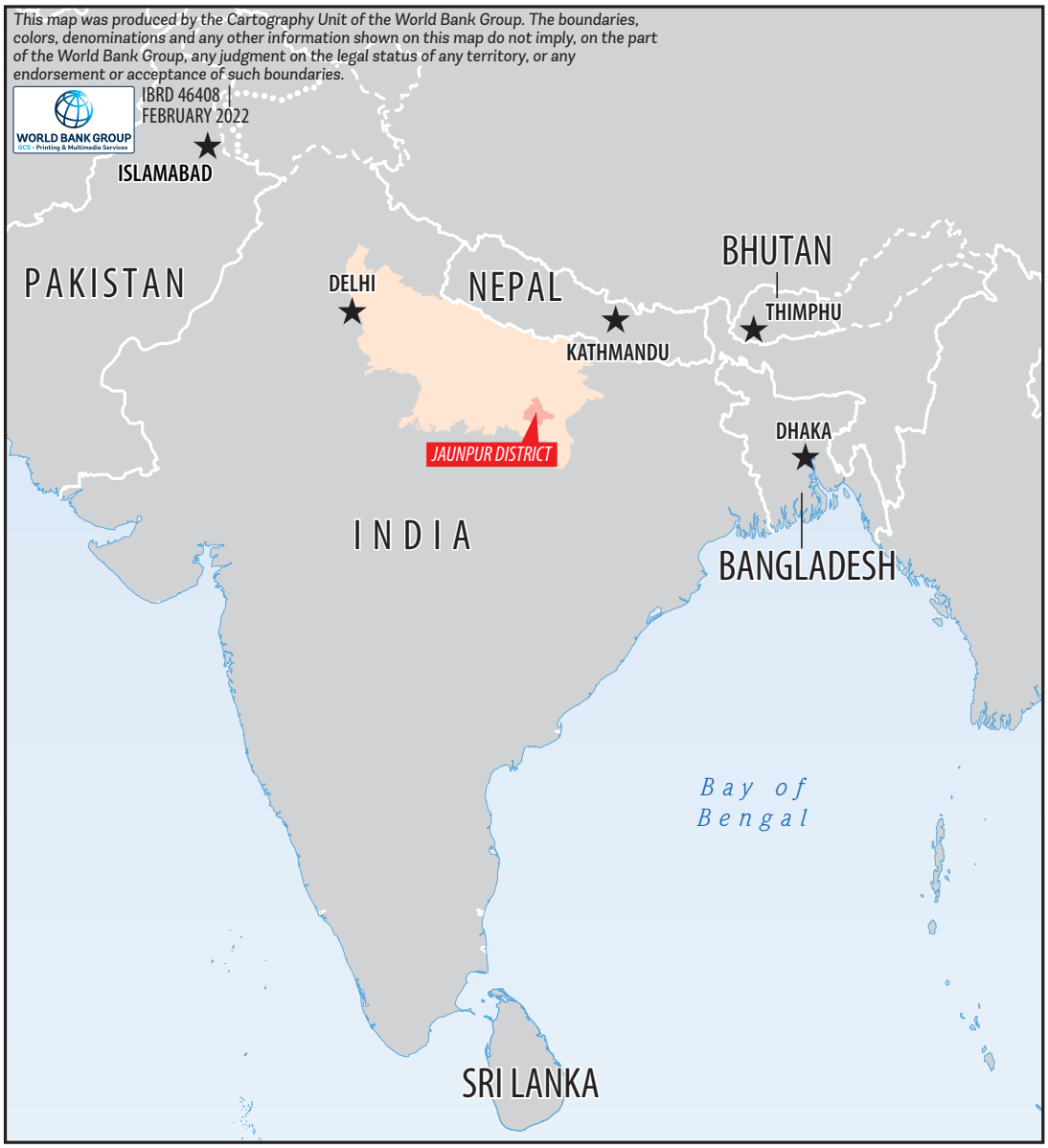


Figure A.2: Study villages in Jaunpur district, UP

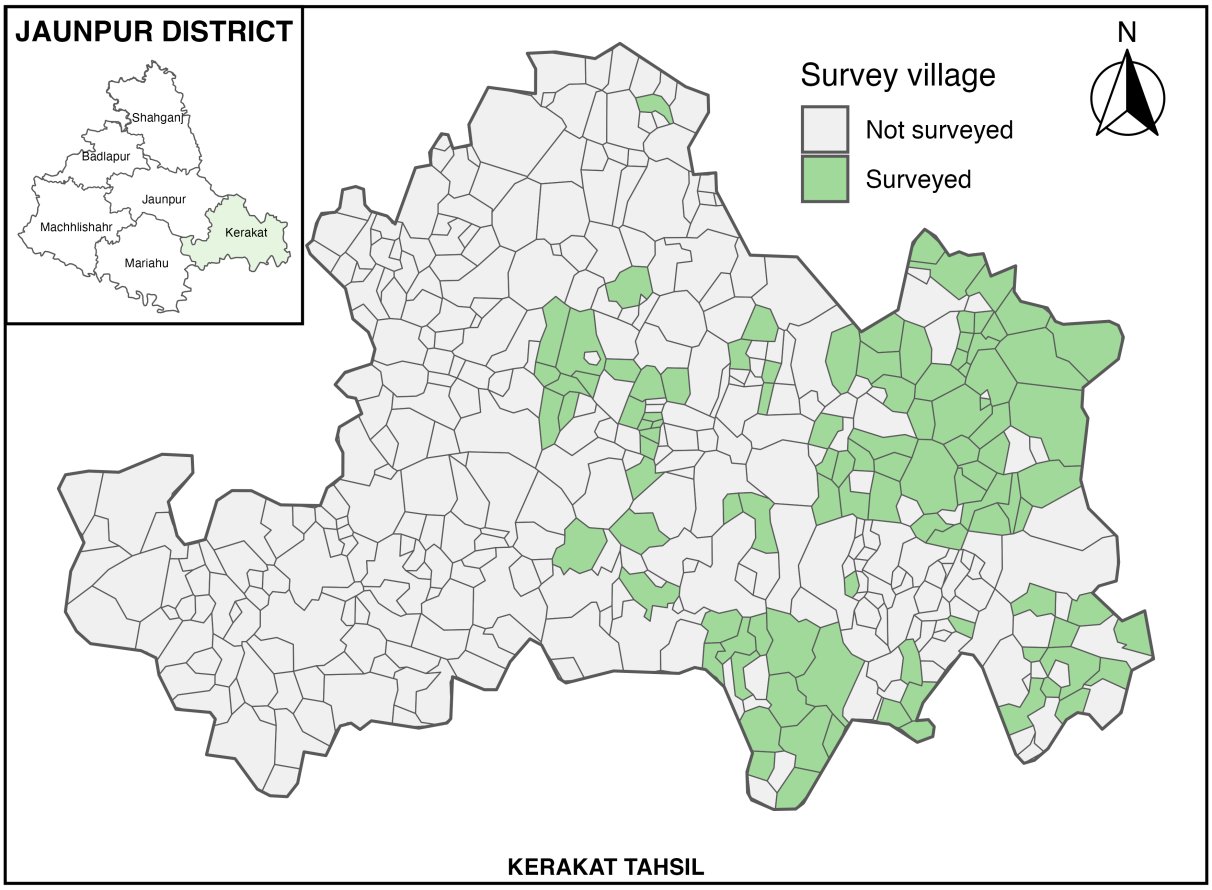
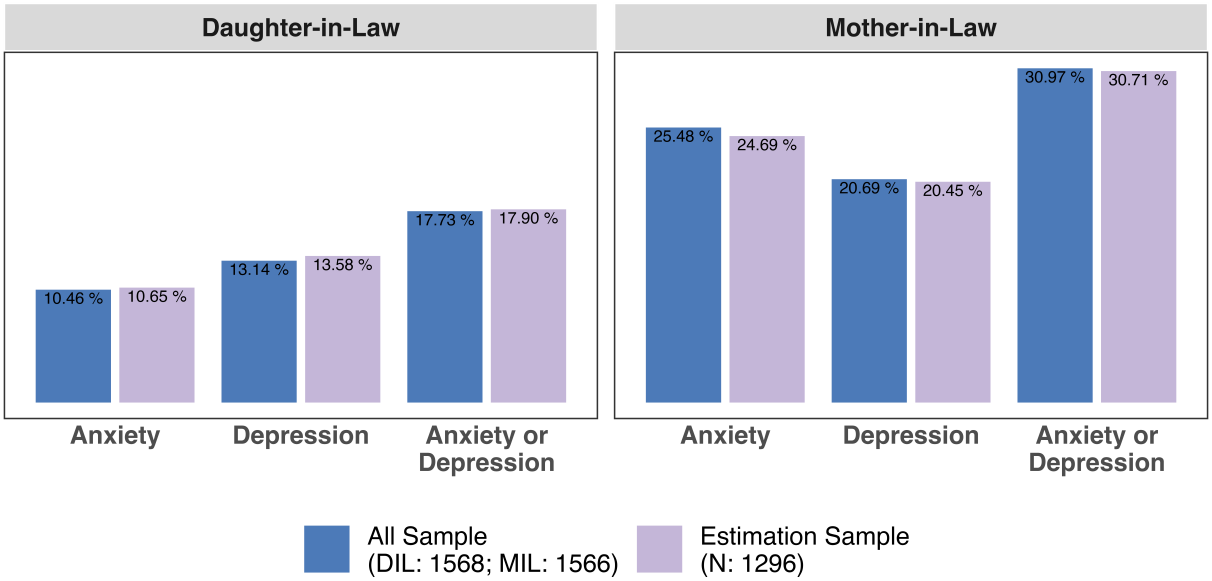


Figure A.3: Prevalence of anxiety and depression: Comparing the full sample to the estimation sample



Notes: This figure shows the prevalence of anxiety and depression in the full sample (N = 1,568 for daughters-in-law and N = 1,566 for mothers-in-law) and the estimation sample (N = 1,296) based on the PHQ-4. The PHQ-4 captures respondents' mental health during the past two weeks before the survey. More details about how we define anxiety and depression are available in Appendix A.

Table A.1: Comparing the full sample with the estimation sample

	All Sample		Estimation Sample		
	N	Mean	N	Mean	Normalized difference
	(1)	(2)	(3)	(4)	(5)
MIL has anxiety or depression	1566	0.310	1296	0.307	0.006
DIL's first child is a boy	1572	0.501	1296	0.501	0.000
Caste: SC-ST	1567	0.329	1296	0.335	-0.012
Caste: OBC	1567	0.563	1296	0.566	-0.007
Household is poor	1564	0.471	1296	0.468	0.004
MIL's age (years)	1572	56.034	1296	55.931	0.015
MIL is literate	1572	0.209	1296	0.216	-0.018
MIL is widowed	1572	0.196	1296	0.189	0.017
MIL owns a cellphone	1567	0.334	1296	0.340	-0.011
MIL's mobility index	1552	1.693	1296	1.725	-0.017
MIL has at least one friend in Jaunpur	1567	0.497	1296	0.517	-0.040
MIL's domestic violence attitudes index	1548	1.093	1296	1.042	0.030
MIL has visited a health facility last year	1563	0.743	1296	0.747	-0.008
MIL's social desirability index	1518	8.111	1296	8.183	-0.039
DIL is married to MIL's eldest son	1568	0.561	1296	0.558	0.005
Hours spent outside of home by MIL	1567	0.996	1296	1.047	-0.029
Hours spent on childcare by MIL	1567	1.986	1296	2.025	-0.029
MIL-DIL discussion about grandchildren	1566	0.791	1296	0.806	-0.038
MIL-DIL discussion about FP	1562	0.478	1296	0.501	-0.045
MIL approves of DIL's FP use	1506	0.660	1296	0.651	0.019
MIL approves of FP for limiting births	1508	0.727	1296	0.723	0.009
MIL approves of FP for spacing births	1508	0.818	1296	0.812	0.015
MIL's number of children	1572	7.207	1296	7.174	0.006
MIL's number of grandsons	1572	3.712	1296	3.688	0.008
MIL's number of granddaughters	1572	3.495	1296	3.486	0.003
MIL approves of DIL working outside of home:					
when kids are young	1565	0.418	1296	0.421	-0.007
MIL worked last year	1567	0.407	1296	0.424	-0.036
MIL looked for work last year	1572	0.013	1296	0.014	-0.005
MIL was in the labor force last year	1567	0.420	1296	0.438	-0.037
DIL has anxiety or depression	1568	0.177	1296	0.179	-0.004
DIL's age (years)	1572	26.293	1296	26.261	0.011
DIL has completed class 12	1572	0.373	1296	0.367	0.013
DIL owns a cellphone	1572	0.837	1296	0.847	-0.029
DIL's mobility index	1515	0.193	1296	0.194	-0.001
DIL has at least one friend in Jaunpur	1572	0.677	1296	0.676	0.003
DIL's domestic violence attitudes index	1531	0.829	1296	0.812	0.012
DIL has visited a health facility last year	1571	0.729	1296	0.731	-0.004
DIL's social desirability index	1530	8.178	1296	8.245	-0.040
DIL's husband's age (years)	1572	30.107	1296	30.045	0.017
DIL's husband's years of schooling	1571	11.248	1296	11.201	0.014
DIL's husband was a migrant for 6+ months	1572	0.452	1296	0.458	-0.011
DIL has used modern FP	1570	0.255	1296	0.251	0.009
DIL has used any FP method	1570	0.696	1296	0.694	0.004
DIL's number of children	1571	1.758	1295	1.751	0.009
DIL's number of sons	1571	0.863	1295	0.862	0.002
DIL's number of daughter	1571	0.895	1295	0.890	0.006
DIL worked last year	1571	0.181	1296	0.190	-0.022
DIL was in the labor force last year	1572	0.424	1296	0.427	-0.006
DIL worked for family members	1572	0.104	1296	0.108	-0.014
DIL worked outside	1572	0.113	1296	0.118	-0.017
DIL worked for cash/in kind	1572	0.070	1296	0.072	-0.007

Notes: This table presents summary statistics for the variables used in our regressions for the full sample and the estimation sample. MIL and DIL denote mother-in-law and daughter-in-law, respectively, and FP denotes family planning. Column 5 presents the normalized differences, which are calculated as the absolute difference between the variable means for the two samples, divided by their joint standard deviation. A variable with a normalized difference below 0.25 is considered balanced (McKenzie, 2017). Variable definitions are available in Appendix A. *p < 0.1, **p < 0.05, ***p < 0.01.

Table A.2: Number of MIL's grandchildren and DIL's children

	All			DIL's first child is a boy			DIL's first child is a girl			
	N	Mean	SD	N	Mean	SD	N	Mean	SD	Mean Diff. (c.5 - c.8)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
MIL has a grandson	1296	0.934	0.249	649	1.000	0.000	647	0.867	0.340	-0.133***
MIL's number of children	1296	7.174	5.143	649	6.852	5.091	647	7.498	5.179	0.646**
MIL's number of grandsons	1296	3.688	2.851	649	4.018	2.749	647	3.357	2.915	-0.661***
DIL's number of children	1295	1.751	0.785	649	1.632	0.663	646	1.872	0.875	0.240***
DIL's number of sons	1295	0.862	0.702	649	1.290	0.529	646	0.432	0.582	-0.858***

Notes: This table presents summary statistics and tests for differences in the number of children (for DILs) and grandchildren (for MILs) by the sex of the DIL's firstborn child among the final estimation sample. MIL and DIL denote mother-in-law and daughter-in-law, respectively. Observations for DIL's number of children and sons are lower due to missing data. Column 10 presents the mean differences in the variables between DILs whose first child is a boy (Column 5) versus a girl (Column 8). Variable definitions are provided in the Appendix of the main paper.

Table A.3: External validity: Comparing DILs in the study sample with women in the DHS sample

	JMDS Baseline		**Rural UP**		**UP**		**Rural India**		**India**	
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age (in years)	1572	26.293	32300	27.370	39051	27.552	232394	27.553	299146	27.757
Years of schooling	1572	11.583	32300	7.032	39051	7.372	232394	7.125	299146	7.701
Hindu	1572	0.948	32300	0.872	39051	0.843	232394	0.780	299146	0.769
Scheduled caste or tribe	1567	0.329	32300	0.283	39051	0.269	232394	0.409	299146	0.380
Other backward class	1567	0.563	32300	0.551	39051	0.547	232394	0.384	299146	0.392
Ever used any FP method	1570	0.696	32300	0.812	39051	0.816	232394	0.749	299146	0.752
Using any FP method	1570	0.504	32300	0.467	39051	0.489	232394	0.348	299146	0.362
Wants another child	1572	0.488	32029	0.377	38737	0.381	230912	0.364	297381	0.368
Owns a cellphone	1572	0.837	4736	0.577	5757	0.599	34764	0.572	44916	0.613
Worked last year	1571	0.181	4736	0.175	5757	0.170	34764	0.309	44916	0.293
Husband's age (in years)	1572	30.107	4736	30.797	5757	31.031	34764	32.155	44916	32.427
Husband's years of schooling	1571	11.248	4727	8.702	5743	8.858	34653	8.178	44781	8.594
Husband was a migrant for 6+ months	1572	0.452	4736	0.177	5757	0.160	34764	0.137	44916	0.125

Notes: Columns 1 and 2 present descriptive statistics for the sample of DILs from our survey. Columns 3 to 10 present descriptive statistics for women using data from the 2019-21 India National Family Health Survey (NFHS); the NFHS sample is restricted to 18-35-year-old married women to allow for more direct comparisons with our sample.

Table A.4: External validity: Comparing MILs in the study sample with women in the LASI sample

	JMDS Baseline		**Rural UP**		**UP**		**Rural India**		**India**	
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
MIL Age (in years)	1572	56.034	3120	56.743	3964	56.412	40995	55.861	63114	55.702
MIL can read and write	1572	0.209	3120	0.173	3964	0.234	40988	0.297	63106	0.419
Hindu	1572	0.948	3120	0.885	3964	0.842	40991	0.745	63109	0.733
Scheduled caste or tribe	1567	0.329	3120	0.320	3964	0.289	40793	0.396	62595	0.345
Other backward class	1567	0.563	3120	0.451	3964	0.442	40793	0.382	62595	0.384
MIL is widowed	1572	0.196	3120	0.159	3964	0.159	40995	0.177	63114	0.181
MIL has visited health facility last year	1563	0.743	3106	0.527	3948	0.552	40730	0.586	62649	0.609
MIL's number of grandchild	1572	2.447	3109	6.777	3951	6.308	40690	5.037	62575	4.449

Notes: Columns 1 and 2 present descriptive statistics for the sample of MILs from our survey. Columns 3 to 10 present descriptive statistics using data from the 2017-18 Longitudinal Aging Study in India (LASI); the LASI sample is restricted to 39-85-year-old married women to allow for more direct comparisons with our sample.

Table A.5: Patient Health Questionnaire-4 (PHQ-4) module

Over the last 2 weeks, approximately how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly everyday	Refused
Feeling nervous, anxious, or on edge	0	1	2	3	99
Not being able to stop or control worrying	0	1	2	3	99
Feeling down, depressed, or hopeless	0	1	2	3	99
Little interest or pleasure in doing things	0	1	2	3	99

Notes: This table presents the set of four questions that are included in the PHQ-4 assessment tool to screen for anxiety and depression.

Table A.6: Balance table, full sample

	All sample		DIL's first child is a girl		DIL's first child is a boy		
	N	Mean	N	Mean	N	Mean	Normalized difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Caste: SC-ST	1567	0.329	784	0.301	783	0.358	-0.121
Caste: OBC	1567	0.563	784	0.594	783	0.531	0.127
Household is poor	1564	0.471	783	0.458	781	0.483	-0.049
MIL's age (years)	1572	56.034	785	56.208	787	55.861	0.049
MIL is literate	1572	0.209	785	0.203	787	0.215	-0.030
MIL is widowed	1572	0.196	785	0.200	787	0.192	0.020
MIL owns a cellphone	1567	0.334	782	0.349	785	0.320	0.062
MIL's mobility index	1552	1.693	774	1.705	778	1.680	0.014
MIL has at least one friend in Jaunpur	1567	0.497	783	0.490	784	0.504	-0.027
MIL's domestic violence attitudes index	1548	1.093	774	1.071	774	1.115	-0.026
MIL has visited a health facility last year	1563	0.743	781	0.750	782	0.737	0.031
MIL's social desirability index	1518	8.111	753	8.239	765	7.984	0.139
MIL worked last year	1567	0.407	782	0.421	785	0.392	0.058
DIL is married to MIL's eldest son	1568	0.561	784	0.546	784	0.575	-0.059
DIL's age (years)	1572	26.293	785	26.425	787	26.160	0.091
DIL has completed class 12	1572	0.373	785	0.362	787	0.384	-0.045
DIL owns a cellphone	1572	0.837	785	0.834	787	0.839	-0.011
DIL's mobility index	1515	0.193	761	0.197	754	0.188	0.012
DIL has at least one friend in Jaunpur	1572	0.677	785	0.675	787	0.680	-0.010
DIL's domestic violence attitudes index	1531	0.829	764	0.797	767	0.860	-0.045
DIL has visited a health facility last year	1571	0.729	784	0.764	787	0.694	0.158
DIL's social desirability index	1530	8.178	763	8.228	767	8.128	0.059
DIL worked last year	1571	0.181	785	0.195	786	0.168	0.070
DIL's husband's age (years)	1572	30.107	785	30.205	787	30.009	0.053
DIL's husband's years of schooling	1571	11.248	785	11.175	786	11.322	-0.044
DIL's husband was a migrant for 6+ months	1572	0.452	785	0.465	787	0.440	0.051
Observations for F-test							1359
F-test of joint significance: p-value							0.118

Notes: This table presents summary statistics and tests for balance by the sex of the DIL's firstborn child among the full sample. MIL and DIL denote mother-in-law and daughter-in-law, respectively. Column 7 presents normalized differences in variables between DILs whose first child is a girl versus a boy, which are calculated as the absolute differences between the variable means of the two groups, divided by their joint standard deviation. A variable with a normalized difference below 0.25 is considered balanced (McKenzie, 2017). The F-statistic, which is presented at the bottom of the table tests for the joint significance of all covariates for the full sample, is calculated by regressing the firstborn boy dummy on all covariates and then testing whether all coefficients are jointly equal to zero. Variable definitions are provided in Appendix A.

Table A.7: List of covariates used in the main analysis

Covariates for all regression	**Controls for MIL outcomes**	**Controls for DIL outcomes**
DIL's first child is a boy	x	x
Caste: SC-ST	x	x
Caste: OBC	x	x
Household is poor	x	x
MIL's age	x	x
MIL is literate	x	x
MIL is widowed	x	x
MIL owns a cellphone	x	
MIL's mobility index	x	
MIL has at least one friend in Jaunpur	x	
MIL has visited a health facility last year	x	
MIL's domestic violence attitudes index	x	
MIL's social desirability index	x	
DIL is married to MIL's eldest son	x	x
DIL's age (years)	x	x
DIL has completed class 12	x	x
DIL's mobility index	x	x
DIL owns a cellphone		x
DIL has at least one friend in Jaunpur		x
DIL has visited a health facility last year		x
DIL's domestic violence attitudes index		x
DIL's social desirability index		x
DIL's husband's age		x
DIL's husband's years of schooling		x
DIL's husband was a migrant for 6+ months		x
Additional covariates for mental health, family planning, and fertility outcomes		
MIL was employed last year	x	x
DIL was employed last year	x	x

Table A.8: The effect of the sex of the DIL's firstborn child on the husband's approval of family planning

	Husb. approves of DIL's FP use	**Husb. approves of FP for limiting births**	**Hubs. approves of FP for spacing births**
	(1)	(2)	(3)
DIL's first child is a boy	0.012	0.007	-0.008
	(0.027)	(0.025)	(0.019)
Controls	x	x	x
Village FE	x	x	x
Observations	1279	1286	1284
R^2	0.215	0.225	0.183
Outcome mean if DIL's first child is a girl	0.688	0.762	0.876

Notes: Each column represents a separate regression. MIL and DIL denote mother-in-law and daughter-in-law, respectively. The number of observations in Columns 1-3 is less than 1,296 due to missing data in the outcome variables. All columns include the same set of controls as those in Column 5 Panel B of Table 3. Robust standard errors are presented in parentheses. The list of controls used in the regressions is presented in Table A.7. Variable definitions are available in Appendix A. *p < 0.1, **p < 0.05, ***p < 0.01.

Table A.9: The effect of the sex of the DIL's firstborn child on having say in the DIL working

	Has most say in work		
	DIL	Husband	MIL
	(1)	(2)	(3)
DIL's first child is a boy	0.061***	-0.007	-0.042
	(0.024)	(0.028)	(0.027)
Controls	x	x	x
Village FE	x	x	x
Observations	1296	1296	1296
R^2	0.202	0.186	0.183
Outcome mean if DIL's first child is a girl	0.192	0.388	0.311

Notes: Each column represents a separate regression. MIL and DIL denote mother-in-law and daughter-in-law, respectively. All columns include the same set of controls as those in Column 5 Panel B of Table 3 except DIL and MIL employment status. Robust standard errors are presented in parentheses. The list of controls used in the regressions is presented in Table A.7. Variable definitions are available in Appendix A. *p < 0.1, **p < 0.05, ***p < 0.01.

Table A.10: Robustness checks: Standard error and multiple hypothesis testing adjustments

	MIL has anxiety or depression	**MIL's number of grandchildren**	**DIL has anxiety or depression**	**DIL is in labor force last year**	**DIL's number of children**	**DIL has used any FP method**
	(1)	(2)	(3)	(4)	(5)	(6)
DIL's firstchild is a boy	-0.051	-0.462	-0.001	0.006	-0.249	0.073
Robust (p-value)	(0.050)	(0.053)	(0.979)	(0.837)	(0.000)	(0.004)
Clustered (p-value)	(0.068)	(0.070)	(0.977)	(0.850)	(0.000)	(0.006)
Sharpened (q-value)	(0.056)	(0.056)	(0.960)	(0.960)	(0.001)	(0.007)

Notes: p-values are presented in parentheses. MIL denotes mother-in-law, DIL denotes daughter-in-law, and FP denotes family planning. *Robust* represents p-values from robust standard errors. *Clustered* represents p-values based on standard errors clustered at the village level. *Anderson (2008) Sharpened q-value* presents sharpened q-values that are computed using the Anderson (2008) approach; this correction allows for the correction of false discovery rates (FDR) when testing multiple outcomes. Columns 1-2 and Columns 3-6 correct for Anderson (2008) sharpened q-values for MIL and DIL regressions separately. Columns 1-2 include the same set of controls as those that were included in column 5 Panel A of Table 3. Columns 3, 5, and 6 include the same set of controls as those that were included in in Column 5 Panel A of Table 3. Column 4 include the same set of controls as those that were included in in Column 5 Panel A of Table 3 except for MIL and DIL employment status. The list of controls used in the regressions is presented in Table A.7. Variable definitions are presented in Appendix A.