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Curse of the Mummy-ji: The Influence of Mothers-in-Law on Women in India*

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Abstract

Restrictive social norms and strategic constraints imposed by family members can limit women's access to and benefits from social networks, especially in patrilocal societies. We characterize young married women's social networks in rural India and analyze how inter-generational power dynamics within the household affect their network formation. Using primary data from Uttar Pradesh, we show that co-residence with the mother-in-law is negatively correlated with her daughter-in-law's mobility and ability to form social connections outside the household, especially those related to health, fertility, and family planning. Our findings suggest that the mother-in-law's restrictive behavior is potentially driven by the misalignment of fertility preferences between the mother-in-law and the daughter-in-law. The lack of peers outside the household lowers the daughter-in-law's likelihood of visiting a family planning clinic and of using modern contraception. We find suggestive evidence that this is because outside peers (1) positively influence daughter-in-law's beliefs about the social acceptability of family planning and (2) enable the daughter-in-law to overcome mobility constraints by accompanying her to health clinics.

JEL Codes: J12, J13, J16, O15

Keywords: family planning, India, mobility, mother-in-law, reproductive health, social networks

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Social networks influence individuals in a myriad of ways. In countries where markets are either missing or may function imperfectly, informal community networks, such as caste-based networks in India, provide a range of benefits and services to their members (Munshi and Rosenzweig 2006; Munshi 2014). However, in traditional patriarchal societies, women may have limited ability to access and benefit from existing networks due to restrictive social norms and strategic constraints that are imposed on them by their family members. In this article, we characterize the social networks of young married women in rural Uttar Pradesh[1]—a north Indian state where patrilocality is the norm and women have extremely low levels of empowerment (Malhotra et al., 1995; Duflo 2012; Jayachandran 2015). We then analyze how inter-generational power dynamics within the marital household affect their ability to access and form social networks. We find that women in our study setting have remarkably few social connections outside their homes, and co-residence with the mother-in-law (MIL) is a significant barrier to a woman's mobility and ability to tap into her caste-based village networks, resulting in detrimental impacts on her access and utilization of reproductive health services.

We collected primary data on the social networks of 18-30-year-old married women in Jaunpur district, Uttar Pradesh, in 2018. We find that women in our sample are quite isolated—besides her husband and MIL, an average woman interacts with 1.6 individuals in Jaunpur about issues that are important to her ("general peers") and with 0.7 individuals in Jaunpur about more private matters like reproductive health, fertility, and family planning ("close peers"). Nearly 36 percent of women in our sample have no close peers in Jaunpur, and the modal woman has only one close peer in Jaunpur. In fact, the proportion of women in our sample who have no close peers anywhere (inside or outside Jaunpur) is also substantial (22 percent). The mobility restrictions experienced by our sample women are severe—only 14 percent of the women are

allowed to go alone to a health facility and only 12 percent are permitted to visit the homes of friends or relatives in their village by themselves. In addition, consistent with other empirical evidence from India (e.g., Kandpal and Baylis 2013; Kandpal and Baylis 2019), we find that the social network of our sample women displays homophily by caste, gender, marital status, and religion.

We then examine whether co-residence with the MIL influences a daughter-in-law's ability to form social connections outside the home. In patrilocal-patrilineal societies where extended households are common, such as India, household members other than the husband can play a crucial role in determining a woman's level of autonomy and well-being.[2] Several sociological and anthropological studies have found that a woman's MIL plays an especially significant role in shaping her decision-making in such societies (see Gram et al. 2019 for a review).[3] Arguably, the MIL may be an even stronger influence on a woman than her husband, especially during the early years of the arranged marriage. However, the extent to which the MIL plays a constraining or supporting role in shaping the social network of her daughter-in-law (DIL) is *a priori* unclear and requires empirical investigation. On the one hand, the MIL may restrict the DIL's social circle aiming to prevent outside influence from deviating the DIL's behavior and outcomes from the MIL's preferences. On the other hand, co-residence with the MIL may enable the DIL to tap into the MIL's social network, which is likely to be larger and more connected, given her age and length of residence in the village.

We find that, compared to a woman who does not reside with her MIL, a woman who lives with her MIL has 18 percent fewer close peers in her village with whom she interacts about issues related to health, fertility, and family planning and has 36 percent fewer such peers outside the home (i.e., "close outside peers"). Our estimates suggest that the MIL restricts her DIL's

social network by not permitting her to visit places outside the home alone, potentially to control the DIL's fertility and family planning behavior. The negative relationship between MIL-co-residence and DIL's number of close outside peers is stronger if the MIL does not approve of family planning, if she wants more children than the DIL desires, and if she wants her DIL to have more sons than she already has. These findings suggest that the MIL's restrictive behavior is ultimately driven by her preferences and attitudes about fertility and family planning.

The restrictions that are imposed by the MIL on her DIL's access to social networks can potentially have significant detrimental impacts on the DIL. In our setting, women who have fewer close outside peers are less likely to visit health facilities to receive reproductive health, fertility, or family planning services, and are less likely to use modern contraceptive methods. Indeed, we perform mediation analysis to show that the DIL's number of close outside peers is an important mechanism through which a DIL's co-residence with her MIL alters her family planning outcomes.

In addition, we adopt an instrumental variables (IV) strategy to identify the causal effect of close outside peers on a woman's family planning outcomes. We instrument a woman's number of close peers outside the household with the interaction of two variables: 1) the proportion of married women in a woman's village who belong to her caste group and 2) an indicator for whether a woman co-resides with her MIL. We use the former as a proxy for the pool of individuals from which a woman's outside peers can be drawn since social interactions in India tend to be gender- and caste-based—this has been argued in previous literature (Hoff and Pandey 2006; Munshi and Rosenzweig 2006; Mukherjee 2017; Kandpal and Baylis 2019) and is demonstrated by our data. Thus, the interaction IV seeks to capture the negative effect of the MIL on women's access to the pool of potential close peers in her village. In our preferred

regression specification, we control for women's socio-economic characteristics and for village-by-caste group fixed effects, thereby leveraging the variation in MIL-co-residence among women who belong to the same caste-group in the same village for the first-stage of the IV analysis. We conduct several robustness checks and placebo tests to support the validity of our instrument and to address the potential selection into co-residence with the MIL.

Our IV estimates imply that having an additional close outside peer increases a woman's likelihood of visiting a family planning clinic by 67 percentage points (p.p.), relative to the 30 percent probability among women who do not have any close outside peers in their village. Similarly, an additional close outside peer increases a woman's likelihood of using modern contraceptive methods by 11 p.p., relative to the 16 percent probability among women who do not have a close outside peer in their village—although the magnitude of this effect is sizable, it is not statistically significant at conventional levels. We present suggestive evidence that the peer effects underlying these IV results operate through at least two channels: information diffusion and peer support through companionship. First, women who have more close outside peers believe that a larger proportion of women in their village are using family planning, suggesting that peers affect women's beliefs about the social acceptability of family planning. This mechanism is consistent with prior evidence on the role of social networks in information diffusion.[4] Second, a woman's close outside peers accompany her to seek care at a family planning clinic, thereby enabling her to overcome the mobility constraints that are imposed on her by the MIL.

Our paper makes several important contributions to the literature in family economics as well as to the economics of networks in developing countries. Although collective models of household behavior have recognized the importance of interactions among family members in

determining individual welfare (see Chiappori and Mazzocco 2017, and the studies cited therein), this literature has primarily focused on bargaining between husbands and wives, and that too predominantly within a nuclear household structure. Therefore, the role and the influence of household members other than the husband on women's welfare has largely been ignored in economics. However, several descriptive studies in other disciplines, mostly in the South Asian context, where arranged marriage and patrilocality are the norm, have documented the significant role of the MIL in affecting women's autonomy. The bulk of this work finds a negative correlation between female autonomy and the presence of the MIL in the household (Cain, Khanam, and Nahar 1979; Jejeebhoy 1991; Bloom, Wypij, and Gupta 2001; Jejeebhoy and Sathar 2001; Gram et al. 2018), except for some studies that have found that living with the MIL can also be beneficial for women in some dimensions, such as health during pregnancy (Allendorf 2006; Varghese and Roy 2019).[5] To the best of our knowledge, ours is the first study to explore the influence of the MIL on the formation of women's social networks and the resulting effects on their access to health services, care-seeking behavior, and health outcomes. While previous research has shown that disagreements between spouses on desired fertility can affect contraceptive use (Ashraf, Field, and Lee 2014; McCarthy 2019), we demonstrate that the misalignment of fertility preferences between the MIL and the DIL may also be a crucial determinant of the DIL's family planning outcomes.

More broadly, despite rapid growth in research on social networks in economics (Jackson 2007; Jackson 2008; Jackson 2014; Breza 2016; Jackson, Rogers, and Zenou 2016; Banerjee et al. 2019), the literature on the role of gender in network formation and peer effects is relatively limited, especially in developing country contexts. We contribute to this literature in several ways. First, through our primary data collection effort, we characterize women's networks in the

domain of reproductive health, which have not received much attention in prior research. Given the private nature of interactions about fertility and family planning, the members of such networks are potentially the most influential, and hence the most policy-relevant, peers or individuals for young married women in settings such as ours.

Second, we add to the literature on the role of peers in affecting women's well-being in developing countries by focusing on a new set of outcomes—utilization of reproductive health services and modern contraceptive use; prior work has examined peer effects in the adoption of new women's health technology (Oster and Thornton 2012), female entrepreneurship (Field et al. 2016), job referrals (Beaman, Keleher, and Magruder 2018), freedom of movement, and investments in children (Kandpal and Baylis 2019). Furthermore, our finding that women have few outside peers with whom they discuss private matters also contributes to the narrow set of studies that examine the consequences of women's social isolation, for instance, on female empowerment (Kandpal and Baylis (2019) in India) and agricultural technology adoption (Beaman and Dillon (2018) in Mali).

Finally, as was previously mentioned, we are the first to examine how co-residence with the MIL influences the formation of her DIL's social network and thereby prevents her from experiencing beneficial peer effects. In this manner, we highlight an under-appreciated explanation for the relative sparsity of women's social networks in contexts where patrilocality and restrictive social norms are prominent.

Data

The data that we use in this study is from a household survey that we designed to specifically characterize the social networks of young married women in Uttar Pradesh, India. The household

survey is the baseline wave of a randomized controlled trial that aimed to increase women's access to family planning services.[6] Therefore, our sample is comprised of women who were currently married, were aged 18 to 30, had at least one living child, were not sterilized nor had had a hysterectomy, and were neither currently pregnant nor more than six months post-partum at the time we conducted the baseline survey. These inclusion criteria were chosen to identify a sample of young married women of reproductive ages, with a potential unmet need for family planning, and for whom we believe that a family planning intervention would be appropriate and effective. We excluded married women who had not begun childbearing from our study due to the presence of cultural norms that dictate that newly married couples should prove their fertility as soon as possible after marriage (Jejeebhoy, Santhya, and Zavier 2014).[7]

We conducted a complete household listing in 28 Jaunpur villages that were located within a 10-kilometer radius from the family planning clinic that we partnered with for the randomized experiment. Our fieldwork team screened a total of 2,781 households and a total of 698 households were identified to have at least one eligible woman. We contacted the youngest eligible woman from each of these households; a total of 671 eligible women consented to participate in the study and were administered the baseline survey between June and August in 2018.

To map the social network of our sample women, we first asked each of them to name up to five individuals in Jaunpur, besides her husband and her MIL, with whom she discusses her personal affairs related to issues such as children's illness, schooling, health, work, and financial support. We call these individuals her *"general peers."* We then asked each woman to name up to five individuals in Jaunpur with whom she discusses issues around family planning, fertility, and reproductive health; we name these individuals her *"close peers."* [8,9] We collected detailed

socio-economic, demographic, family planning related, and network related information (e.g., measures of trust and connectedness) from the surveyed woman for each of her close peers in Jaunpur.[10] We also asked about her interactions with her husband, with her MIL, and with other close peers outside Jaunpur.

As part of the survey, we also collected information on women's socio-economic characteristics, birth history, marriage, fertility preferences, decision-making, and freedom of movement. Our survey instrument also gathered data on health services utilization in which we asked each woman about her access to health clinics, including whether she has ever visited a health clinic; the distance and the travel-time to the closest clinic; and whether she goes to the clinic with others (such as, relatives and friends).

Table 1 presents summary statistics for the main variables used in our empirical analysis. Our sample women are predominantly from lower castes, with 43 percent belonging to a Scheduled Caste (SC) and 44 percent belonging to Other Backward Classes (OBC). Over 67 percent of the sample women live with the MIL and the average marital duration is seven years. The lack of women's mobility in our study area is striking: less than 20 percent of women are allowed to go alone to the market, to a health facility, or to the homes of friends or relatives in the village. Moreover, only 14 percent of the women worked in the last seven days and 88 percent practice *ghunghat* or *purdah*, both of which reflect the conservative norms that are practiced within our study area. Lastly, 18 percent of the women were using a modern contraceptive method at the time of the survey and 35 percent of them had visited a health facility for reproductive health, fertility, or family planning services at some point in their lives.

Characterization of Women's Social Networks

We find that young married women in rural Uttar Pradesh interact with very few individuals, besides their husbands and mothers-in-law, about their personal affairs or private concerns. An average woman in our sample mentions 1.6 general peers in Jaunpur district. About 9 percent of women have no such peers; 40 percent of women mention one person, and 33 percent of women mention two people. Women's interactions with others are even more limited within the domains of family planning, fertility, and reproductive health. Nearly 36 percent of women speak to no one in Jaunpur district, besides their husband and MIL, about these issues. The modal woman has only one such close peer, and the proportion of women in our sample who have no close peers anywhere (inside or outside Jaunpur) is also substantial (22 percent).

Most (86 percent) of women's close peers in Jaunpur are relatives. The average duration of a woman's close-peer relationships in Jaunpur is highly correlated with her marital duration, which is consistent with the fact that most women in our sample moved to their marital villages from elsewhere after their marriage. Almost 60 percent of the close-peer relationships in Jaunpur were formed more than 5 years ago, and 62 percent of the women report talking with their close peers every day, while 27 percent of them talk with their close peers every other week. Furthermore, 58 percent of the women reported that they would feel very comfortable leaving their children for an afternoon with their close peers, while 50 percent of them reported having discussed marital problems and intra-household conflicts with their close peers. Thus, women's social networks in our context are strongly embedded within their extended households, which is not surprising given the severe mobility constraints that they face. These results are consistent with the evidence from other contexts indicating that women's networks tend to be comprised of a larger proportion of kin-ties compared to men's networks (Fischer and Oliker 1983; Moore 1990; Gillespie et al. 2015).

If we narrow our focus geographically to the woman's village, an average woman has only 0.55 close peers in her village, roughly half of whom live in her household while the other half live outside her household.[11] Only 49 percent of the women have at least one close peer in their respective villages, and the proportion of women who have such a close peer *outside* her household is even smaller (24 percent). Thus, our sample women have severely limited interaction with people outside their homes.

Our results are similar to the evidence in Kandpal and Baylis (2019), who find that a modal woman in Uttarakhand, a neighboring state of Uttar Pradesh, has on average three friends who live outside her household.[12] Similarly, Magnan et al. (2015) find low levels of social connectivity in agriculture among women and men in three districts of northeastern Uttar Pradesh. In contrast, an average woman in the United States reported having eight close friends in a 2004 Gallup poll (Gallup Inc 2004), while in a more recent global study of 10,000 male and female participants from Australia, France, Germany, India, Malaysia, Saudi Arabia, the United Arab Emirates, the United Kingdom, and the United States, the average person reported having 4.3 close friends and more than 20 distant friends or acquaintances (Protein Inc. Study 2019).

Consistent with previous evidence on social networks in India (Munshi and Rosenzweig 2006, Banerjee et al. 2013; Jackson 2014), we find that the social network of women in our sample displays caste-homophily: 94 percent of a woman's close peers in Jaunpur are of the same caste. Moreover, we observe homophily in terms of gender, marital status, and religion: almost all of the close peers are women; 90 percent of them are married; and all of them are from the same religion. These findings reflect the strong homophilous ties that are typically observed within women's social networks and which have been observed in other contexts (Brashears 2008). Nonetheless, we also note that women in our sample differ from their close peers in Jaunpur in

terms of age, education, and economic status. For instance, close peers appear to be older; the average age of these peers is 30; and 40 percent of them are older than 30. This may be due in part to the design of our survey, given that we selected the youngest eligible woman from our sampled households to participate. Only 26 percent of the close peers were reported to have the same level of education as the sample woman, while 50 percent of close peers were reported to be more educated. Lastly, our sample women reported that 75 percent of their close peers have the same economic status as them, while 21 percent of the close peers were reported to be economically better-off. We note that this social network characterization is based on peer characteristics as reported by the surveyed woman, who may have imperfect information on her peers' age, education, and economic status. In this sense, these descriptive statistics capture the perceptions of surveyed women about their peers.[13]

The Influence of the Mother-in-Law

We now examine how co-residence with the MIL restricts her DIL's social network; why and how the MIL exerts her influence; and the consequences of these restrictions for the DIL. We begin by estimating the correlation between living with the MIL and her DIL's number of close peers who reside in her village. We focus on the number of peers in the same village for various reasons. Physical proximity has been shown to be important for developing close friendships or relationships as it enables more frequent interactions (Hipp and Perrin 2009; Beaman and Dillon 2018). Moreover, for outcomes such as mobility and access to health services, a woman's peers who live in the same village are likely to be more relevant than her peers who live outside the village since the former can more easily offer companionship and support. Lastly, given that mobile phone ownership among women in India is generally low—only 33 percent of women own

mobile phones (Barboni et al. 2018)—women's interactions with long-distance peers are limited, making peers who live in the same village even more relevant.

We estimate the following OLS specification for a woman i from caste-group c living in village v:

$$(1) \qquad Y_{icv} = \alpha + \beta MIL_i + \boldsymbol{X}_i'\boldsymbol{\gamma} + \theta_v + \theta_c + \varepsilon_{icv}$$

The variable Y_{icv} denotes the outcome of interest; MIL_i is a dummy variable that equals one if the woman's MIL lives in the same household as her; $\boldsymbol{X}_i$ is a vector of individual-level controls that includes the woman's age and years of education, an indicator for her being Hindu, and the amount of land her household owns.[14] We also control for indicators for caste category (SC-ST, OBC, Upper caste), θ_c, and include village fixed effects (θ_v). We use heteroskedasticity-robust standard errors to make inference and cluster standard errors at the village level.

Column (1) in Panel A of Table 2 shows that co-residence with the MIL is significantly negatively associated with the number of close peers that a woman has in her village. The coefficient of -0.120 implies that a woman who lives with her MIL has, on average, 20 percent fewer close peers in her village than a woman who does not reside with her MIL. The negative influence of MIL-co-residence on the number of a woman's close peers outside her household, but in the same village, is even larger. The coefficient of -0.133 in column (1) of Panel B in Table 2 suggests that a woman who co-resides with her MIL has 37 percent fewer close peers outside her household relative to a woman who does not reside with her MIL.

Columns (2) – (5) of Table 2 demonstrate that the influence of the MIL on her DIL is significantly larger and more negative relative to the influence of other household members. Co-residence with the father-in-law is not significantly correlated with a woman's number of close peers inside or outside the household. The presence of other adult women in the household (for

example, sisters-in-law) is positively correlated with a woman's number of close peers in the village but not with her number of close peers outside the household. This finding implies that although the presence of these more proximate women expands the pool of individuals with whom a woman can discuss private matters within the household, it does not result in more outside peers.[15] This suggests that a woman's sisters-in-law may also be affected by the dominant position of the MIL.[16]

Exploring plausible explanations for the results in Table 2, we find that the MIL may prevent her DIL from forming social connections by imposing constraints on her mobility. Although the ability to access spaces outside the home is low even for women who do not live with their MIL, those who reside with their MIL fare much worse in terms of their freedom of movement. Table 3 (using specification (1)) shows that co-residence with MIL is significantly negatively correlated with women's physical mobility. For instance, a woman who lives with her MIL is 9.6 p.p., or 44 percent less likely to be allowed to visit the homes of relatives or friends in the village or neighborhood alone, relative to a woman who does not reside with her MIL. Similarly, a woman who lives with her MIL is 53 percent less likely to be permitted to visit a health facility alone than a comparable woman who does not live with her MIL. The pattern is similar for mobility restrictions on visiting alone other places outside the home, such as, the market, the grocery store, and places outside the village or community. These results are consistent with our previous finding that the negative influence of living with the MIL on a woman's number of close peers in her village is even greater if we examine such peers who live outside the woman's home (37 percent *versus* 20 percent in Table 2).

We acknowledge that our results in Tables 2 and 3, although strong and statistically significant, are correlations and may not identify the true causal effect of co-residence with the

MIL. Our β estimates will be biased if there is selection into living with the MIL, i.e., if women who live with the MIL are different from women who do not live with the MIL in terms of characteristics that are correlated with our outcomes of interest. For instance, if women whose husbands are more conservative are more likely to live with their parents-in-law, then such women would have fewer close peers and have lower mobility even in the absence of living with the MIL. In Table 4, we explicitly compare the observable socio-economic and demographic characteristics of women who live with their MIL with those who do not live with their MIL. These two types of women do not have statistically significant differences in terms of caste, religion, husband age, employment status, the spousal gap in educational attainment, the amount of land owned by the household, and the number of living sons. However, women who live with their MIL are younger, have been married for a shorter duration, and are *more* educated than those who do not live with their MIL. On the one hand, the bias due to the differences in age and marital duration is likely be in the same direction as our results in Tables 2 and 3 as younger women and women who have lived in their village for a shorter duration are likely to have fewer social connections irrespective of their co-residence with the MIL. On the other hand, the differences in educational attainment are likely to bias us against finding a negative effect on the number of close outside peers if more educated women enjoy greater autonomy irrespective of living with the MIL. Thus, *a priori*, the direction of selection bias is unclear. To address the potential bias due to these observable differences, we control for women's age and education in our specifications.

An additional source of statistical endogeneity may be reverse causality; e.g., the DIL's family planning use may lead to conflict with the MIL if the latter disapproves of family planning, resulting in the DIL and her husband moving out of the joint family. Based on our

understanding of the context, this is unlikely to be a major concern. Co-residence with the MIL is typically determined at the time of the arranged marriage, which precedes the DIL's family planning choices. The dissolution of joint families mainly occurs due to the death of the patriarch (Caldwell, Reddy, & Caldwell 1984; Khuda 1985; Foster 1993; Debnath 2015), or because of discord among sub-households over income-pooling when the relative contributions are disproportionate, or due to migration for work. The DIL's family planning use is unlikely to cause partition of joint families. Moreover, contraceptive use before marriage is negligible in our study setting and, hence, we do not expect it to influence a woman's marriage market outcomes.

Although it is difficult to establish causality without a credible source of exogenous variation in co-residence with the MIL, we present two pieces of evidence to address the potential sources of bias in our OLS estimates. First, as Table 5 shows, our findings remain qualitatively similar if we restrict the sample to households where the father-in-law is a member of the household. Since divorce is highly unlikely in our context, especially among older generations, the absence of MIL in households where the father-in-law is present is almost certainly due to her death, a likely exogenous event. Thus, the coefficients of MIL_i in Table 5 are potentially closer to the true causal impact of co-residence with the MIL than those in Tables 2 and 3. The negative association between a woman's number of close outside peers and co-residence with her MIL in Table 5 is even stronger than what we observe in Table 2, demonstrating that any potential selection-bias makes us underestimate the true effect of the MIL on her DIL's number of close outside peers in Table 2. Second, our sample comprises of relatively young (18-30-year-old) women, who are unlikely to have a choice in whether or not to live with the parents-in-law, particularly during the early years of their marriage. The decision to leave the extended household is typically made by the couple several years after marriage. In

column (1) of Online Supplementary Appendix Table A.3, we confirm that our results hold when we restrict the sample to women who have been married for no more than five years; co-residence with the MIL is more likely to be exogenous for these women.

In order to understand why the MIL may restrict her DIL's interactions with outsiders about matters related to health, fertility, and family planning, we examine the heterogeneity in our previous results by the MIL's preferences and attitudes about fertility and family planning. As we show in Table 6, the negative influence of the MIL on her DIL's number of close peers is stronger, both in magnitude and in significance, when she disapproves of family planning (columns 1-2)), when her ideal number of children for her DIL is larger than the DIL's own ideal number of children (columns 3-4)), and when she desires more sons for the DIL than the DIL's current number of living sons (columns 5-6)). This heterogeneity suggests that the MIL fears that outside influence may cause her DIL's fertility outcomes and family planning use to deviate from her, i.e., the MIL's, preferences. In fact, among the sample of women whose mothers-in-law disapprove of family planning, 71 percent believe that this is because the MIL wants them to have (more) children—this is by far the most cited reason, followed by 25 percent of women who believe that their MIL is worried about the side effects from using contraceptive methods. Moreover, Online Supplementary Appendix Table A.3 demonstrates that the negative correlation between MIL-co-residence and her DIL's outside connections is larger when her son (i.e., the DIL's husband) also disapproves of family planning (columns (3)-(4)) and when he is a migrant, i.e., has been away from home for one month or more at a time (columns (5)-(6)). These findings imply that the MIL's authority is even stronger when the woman's husband is often away from home and when his family planning attitudes are aligned with those of his mother.

In Table 7, we find that women who have fewer close outside peers in their village are significantly less likely to have ever visited a health facility for reproductive health, fertility, or family planning services (column (1)). They are also less likely to use a modern method of contraception (column (2)). Thus, the mobility restrictions imposed by the MIL, and the subsequently fewer number of close peers that her DIL has, might have additional significant detrimental impacts on her DIL in terms of her access to health clinics and contraceptive choices.

Mediation Analysis

Our results so far have shown two main patterns: (1) women who live with their mothers-in-law have fewer close social connections outside the home than those who do not, and (2) women who have fewer close outside connections are less likely to visit a family planning clinic and have lower modern contraceptive use than those who have more such connections. In this section, we perform mediation analysis to assess whether a woman's number of close outside peers ($ClosePeers_i$) is a likely mechanism through which co-residence with her MIL alters her family planning outcomes.

Figure 1 demonstrates the probable causal pathways between our variables of interest. A MIL can potentially affect her DIL's family planning outcomes (a) directly, (b) indirectly via our mediator of interest, $ClosePeers_i$, and (c) indirectly via other mediators, such as mobility constraints that are imposed on the DIL. To test whether $ClosePeers_i$ is a relevant mediator, we use *sequential g-estimation*, a methodological approach proposed by Acharya et al. (2016) that relies upon a comparison of the average total effect (ATE) of MIL-co-residence with the estimated average controlled direct effect (ACDE) of MIL-co-residence that does not operate through the mediator of interest, $ClosePeers_i$.

The ATE is equal to the estimated coefficient β in equation (1). The ACDE is estimated using a two-step method proposed by Acharya et al. (2016). In the first step, we regress the outcome of interest (Y_{icv}) on the treatment (MIL_i), the mediator ($ClosePeers_i$), pre-treatment covariates, post-treatment covariates, and intermediate confounders:

$$(2) \qquad Y_{icv} = a + b \cdot MIL_i + c \cdot ClosePeers_i + \boldsymbol{Z}_i'\boldsymbol{d} + \boldsymbol{X}_i'\boldsymbol{e} + \boldsymbol{K}_i'\boldsymbol{f} + \theta_v + \theta_c + u_{ic\imath}$$

The vector $\boldsymbol{Z}$ denotes intermediate confounders that are likely affected by MIL-co-residence and that potentially also affect both $ClosePeers_i$ and the outcome, Y_{icv}. In our analysis, $\boldsymbol{Z}$ is comprised of two variables: an index of DIL's mobility and an index of DIL's decision-making autonomy related to her health and her visits to family and relatives.[17] The vector $\boldsymbol{X}$ includes pre-treatment covariates, i.e., woman's age, and indicators for woman's years of education and for being Hindu. The vector $\boldsymbol{K}$ denotes post-treatment covariates, i.e., the amount of land that is owned by the household.[18]

In the second step, we regress a de-mediated version of the predicted outcome ($\tilde{Y}_{icv}$) on the treatment and pre-treatment covariates.

$$(3) \qquad \tilde{Y}_{icv} = Y_{icv} - \hat{c} \cdot ClosePeers_i$$

$$(4) \qquad \tilde{Y}_{icv} = g + \boldsymbol{h} \cdot MIL_i + \boldsymbol{X}_i'\boldsymbol{m} + \boldsymbol{K}_i'\boldsymbol{n} + \theta_v + \theta_c + r_{icv}$$

The coefficient h measures the ACDE of MIL-co-residence that does not operate through $ClosePeers_i$. The difference between the ATE (β) and the ACDE (h) captures the extent to which $ClosePeers_i$ is a mediating mechanism through which MIL-co-residence affects the outcomes of interest.

Table 8 presents the estimated ATE and ACDE of co-residence with the MIL on four outcomes of interest: i) the woman's likelihood of visiting a family planning clinic, ii) the woman's modern contraceptive use, iii) the woman's beliefs about family planning use in her

village, and iv) whether the woman visited a health facility with someone. In columns (1) and (2), we estimate the ATE and ACDE of co-residence with the MIL on the outcome of interest, while column (3) shows the difference between these two estimates. In columns (4) to (6), we present the same estimates but from specifications that also control for caste-by-village fixed effects. Since the second-stage regression in equation (4) has an estimated variable nested within it, we use bootstrapping to calculate unbiased and consistent standard errors in columns (1) and (2).[19] We also test whether the difference between the ATE and the ACDE in both specifications is statistically different from zero. Panel A shows that the ACDE of MIL-co-residence is 19 percent to 24 percent smaller, and significantly so, than the ATE of MIL-co-residence on the likelihood that the DIL has visited a family planning clinic. Consistently, we also observe significant declines of 4 percent and 13 percent in the coefficient of MIL-co-residence when we de-mediate the outcomes in Panels C and D, namely the DIL's beliefs about family planning use in the village and her ability to visit a health facility with someone.[20]

Thus, our mediation analysis provides suggestive evidence that the number of DIL's close outside peers in the village is a significant channel through which MIL co-residence acts on DIL's family planning outcomes. We refrain from making a causal claim here since we lack quantitative data for an exogenous source of variation in MIL-co-residence.[21]

Instrumental Variables Estimation

In this section, we attempt to explicitly estimate the causal effect of close outside peers on women's family planning outcomes. The estimates in Table 7 may not capture the causal effect of close outside peers as women who have more such peers may be more likely to visit health clinics and to use modern contraception for reasons other than peer effects. Therefore, we adopt an instrumental variables (IV) approach to causally estimate the coefficients of interest.

Our mediation analysis suggests that MIL-co-residence, MIL_i, may be a potentially relevant instrument for the DIL's number of close outside peers. However, MIL_i may not satisfy the exclusion restriction if women who co-reside with the MIL are different in terms of unobservable characteristics than women who do not co-reside with the MIL, or if MIL co-residence directly affects the outcomes or affects the outcomes through channels other than the number of close outside peers. Therefore, we interact MIL_i with the fraction of women in woman *i*'s village *v* who belong to her caste group *c* ($Prop_{cv}$)[22] and use this interaction as an instrument for woman *i*'s number of close outside peers in her village. As we discuss later in this section, the interaction instrument ($Prop_{cv} \cdot MIL_i$) is more likely to satisfy the exclusion restriction than MIL_i alone. Then, we estimate the following two-stage least squares (2SLS) model:

$$ClosePeers_{icv} = \mu + \delta(Prop_{cv} \cdot MIL_i) + \boldsymbol{X}_i'\boldsymbol{\tau} + \eta_c + \eta_v + \eta_{cv} + \nu_{icv} \quad (5)$$

$$Y_{icv} = \pi + \phi\, \widehat{ClosePeers}_{icv} + \boldsymbol{X}_i'\boldsymbol{\varphi} + \lambda_c + \lambda_v + \lambda_{cv} + u_{icv} \quad (6)$$

The variable Y_{icv} is the outcome of interest (e.g., the likelihood of visiting a family planning clinic) and $ClosePeers_{icv}$ is the number of a woman's close peers who live outside the household in her village *v*. In the first stage, we exploit the variation in the number of close outside peers that is driven by the interaction term, $Prop_{cv} \cdot MIL_i$, after controlling for a woman's socio-economic characteristics ($\boldsymbol{X}_i$) and fixed effects for village (η_v), for caste-group (η_c), and for their interaction (η_{cv}).[23] Subsequently, we use the predicted number of close outside peers from the first stage, $\widehat{ClosePeers}_{icv}$, to explain a woman's outcomes in the second stage.

The variable $Prop_{cv}$ is a proxy for the available pool or the supply of individuals in the village from which a woman's close outside peers are likely to be drawn. In our preferred definition of $Prop_{cv}$, we focus on the pool of 18-30-year-old married women in the village, and

calculate the fraction of such women who belong to various caste groups. The exact formula is as follows, where ${N_v}^{1830,married}$ denotes the total number of married 18-30-year-old women in the village and ${N_{cv}}^{1830,married}$ is the number of such women who belong to the caste-group *c*:

$$(7) \qquad {Prop_{cv}}^{1830,married} = \frac{{N_{cv}}^{1830,married}}{{N_v}^{1830,married}}$$

We define the peer-pool in terms of caste because social networks in India have been shown to be predominantly caste based (Hoff and Pandey 2006; Munshi and Rosenzweig 2006; Mukherjee 2015; Kandpal and Baylis 2019).[24] Moreover, the social norms in our setting are such that they prevent young married women from forming peer-relationships with men other than their husbands or male kin such as fathers and brothers. Similarly, taboos surrounding discussions about conjugal relations imply that unmarried women are less likely to participate in interactions about issues such as reproductive health and family planning with married women. In fact, as we described in the earlier section, our network exhibits significant homophily by caste, gender, and marital status. We also focus on the 18-30 age group because 60 percent of the close peers of our sample women fall within this age range. Nevertheless, we also estimate our models by defining the caste-based pool in terms of the number of all 18-30-year-old women in the village (i.e., ignoring their marital status) and in terms of the number of all women in the village (i.e., ignoring both age and marital status) as robustness checks.[25]

The interaction variable, $Prop_{cv} \cdot MIL_i$, captures the differential effect of the available pool in the village on a woman's number of close outside peers in the village by co-residence with the MIL. Through this interaction, we seek to capture the constraints imposed by the MIL on her DIL's access to the pool of available outside peers.[26] The village-level fixed-effects control for village-specific factors that are correlated with the outcomes and that affect women from all castes in the village. For instance, women who live in less populated or more

conservative villages may have fewer close outside peers irrespective of co-residence with their MIL. Similarly, caste-level fixed-effects incorporate differences across caste groups that are common across villages; e.g., if upper-caste families are more conservative, women who belong to upper castes may face more severe constraints independently of whether or not they live with their MIL. Lastly, in our preferred specification, we allow for caste-by-village fixed effects to flexibly control for all factors that vary at the caste-village level and that are correlated with our outcomes of interest. We cluster the standard errors at the village level to control for within-village error correlation. As our sample comprises only 28 villages, in Online Supplementary Appendix Table A.5, we show that our inference remains robust to the use of wild-cluster bootstrap confidence intervals and corresponding p-values.

The identifying assumption underlying our IV approach is that, conditional upon $\boldsymbol{X}_i$ and the extensive set of fixed effects, our instrument affects the outcomes, such as a woman's likelihood of visiting a family planning clinic, only through her interactions with close outside peers. The interaction term, i.e., $Prop_{cv} \cdot MIL_i$, allows us to control for caste-by-village fixed effects, which implies that the variation in our first-stage is obtained from a comparison of women who belong to the same caste group and who live in the same village, but who differ in terms of co-residence with the MIL. The exclusion restriction will be violated if there are unobservable individual- or household-level differences in women belonging to the same caste-group and village but who differ in terms of living with the MIL. Earlier, in Table 4, we have already shown that co-residence with the MIL does not significantly differ by caste, religion, husband age, employment status, the spousal gap in educational attainment, the amount of land owned by the household, and the number of living sons. There are some differences in terms of woman's age and education, so we include woman's age fixed effects and control for woman's

years of schooling in both stages of the 2SLS regressions. Additionally, we control for the distance from the woman's home to the closest health facility as a proxy for household-level availability of health services. While it is always difficult to prove that the exclusion restriction is never violated, later, we perform a series of robustness checks to further validate our findings.

For the instrument to be valid, it needs to be strongly correlated with the number of close outside peers. Table 9 presents the estimates from the first-stage regression specification (2) using the three definitions of the peer-pool that was described earlier. In all columns, the coefficient of the interaction term, i.e., of our instrument, is negative and highly significant. In columns (1), (3), and (5), we exclude the caste-by-village fixed effects so that we can also estimate the main effect of $Prop_{cv}$. We find that if a woman does not live with her MIL, her number of close peers outside the household increases with the proportion of women in the village that belong to her caste, but living with the MIL decreases the positive effect of $Prop_{cv}$. As column (1) shows, when there is no MIL present, a unit (or a 100 percent) increase in $Prop_{cv}$ (i.e., going from having no other woman from one's caste group in the village to living in a village where all other women belong to one's caste group), increases the number of close outside peers by 0.16. Co-residence with the MIL reduces the influence of the pool on a woman's number of close outsider peers, which is consistent with our hypothesis that the MIL prevents her DIL from accessing or forming outside networks. In all columns, the coefficient of the instrument is statistically significant at the one percent level and is of a similar magnitude; the F-statistic of the first stage is also above the standard threshold of 10 used in the literature (Staiger and Stock 1997), re-assuring us about the strength of our instrument. Our preferred specification is presented in column (6), where the interaction coefficient of -0.229 implies that for the average value of $Prop_{cv}$, which is 0.50, living with the MIL decreases a woman's number

of close outside peers by 0.11. This translates into a 31 percent decline in a woman's number of close outside peers, relative to an average woman who does not live with her MIL (who has 0.36 close outside peers).

To check if the relationship between $ClosePeers_{icv}$ and the IV ($Prop_{cv} \cdot MIL_i$) is monotonic, we estimated the non-parametric relationship between the two variables using the ***npregress*** command in STATA with the kernel option. As Figure 2 shows, the relationship is strongly monotonic for different kernels functions, estimators (local-linear and local-constant), and bandwidths.

Table 10 presents the second-stage and reduced-form estimates from our IV analysis using our preferred definition of $Prop_{cv}$ (i.e., peer-pool of 18-30 married women). Among women who do not have any close outside peers in their village, the average likelihood of having visited a family planning clinic is 30 percent. The statistically significant 2SLS coefficient of 0.664 in column (1) of Table 9 implies that if such women get just one close outside peer in their village, their average likelihood of visiting a family planning clinic would go up by 67 p.p. to 96 percent. Moreover, consistent with our OLS results, column (2) shows that women who have more close outside peers in their village are more likely to use modern methods of contraception; although the point estimate is large, it is not statistically significant at conventional levels. The reduced form coefficients in Panel B of Table 10 validate the relevance condition of our instrument (Angrist and Pischke 2009).

There are several channels through which peers may influence a woman's family planning outcomes.[27] First, a woman's peers may accompany her to a family planning clinic, thereby enabling her to overcome the mobility constraints imposed on her by her MIL, and improving her access to reproductive health services. This is consistent with the OLS and IV

coefficients in columns (4) of Tables 7 and 10, respectively, which show that women who have more close outside peers in their village are more likely to be permitted to visit a health facility with someone. We term this the "companionship" channel. This mechanism is especially important in settings such as ours where women's physical mobility is severely curtailed.

Second, women who have more outside peers may be better informed about the true contraceptive prevalence rates in their villages, either because their peers provide this information directly or because they learn about it during their visits to the family planning clinics ("information" channel). If we assume that women who have limited interaction with individuals outside their homes underestimate family planning use in their communities, then having more close outside peers can correct their beliefs. Consistent with this information channel, the OLS and IV results in columns (3) of Tables 7 and 10, respectively, show that women who have more close outside peers in their village believe that more women in their village use family planning.[28] Since our 2SLS specifications control for caste-by-village fixed effects, this result cannot be driven by women with more close outside peers living in villages with higher actual contraceptive prevalence. However, we cannot say how much closer the beliefs of our sample women are to the actual contraceptive prevalence rates in their villages because we do not have data on the latter.

The omitted-variable bias in the OLS regressions of outcomes, such as the likelihood of visiting a family planning clinic, on the number of close outside peers is likely to be positive, which would suggest that our OLS estimates should be larger than the IV estimates. However, in our case, the opposite is true. This could be due to the fact that the IV estimates capture the local average treatment effect (LATE), which is the response for those women whose number of close outside peers is affected by the instrument ("compliers"), while the OLS captures the *average*

effect of an additional close outside peer for the entire sample (Imbens and Angrist 1994). If compliers are women who face stronger mobility constraints due to co-residence with the MIL, they might benefit more from having outside peers than the average woman, explaining the larger magnitude of the IV coefficients.

In order to characterize the compliers, we estimate our first-stage regression specification for various sub-samples (see Online Supplementary Appendix Table A.6). We do not observe any significant heterogeneity by age and years of schooling of the DIL. The first stage appears to be mainly driven by daughters-in-law whose husbands have been migrant, i.e., have been away from home for one month or more at a time, whose mothers-in-law disapprove of family planning, whose mothers-in-law's ideal number of children for the DIL is greater than the DIL's ideal number of children, and whose mothers-in-law want them to have more sons that the DIL already have. These patterns suggest that our LATE is based on women whose mothers-in-law have more conservative attitudes towards family planning, fertility, and son preference than they do and on women whose mothers-in-law are able to enforce these restrictions (e.g., due to the absence of the DIL's husband, her son).

Robustness Checks

Next, we perform a series of tests to further establish that our IV approach identifies the causal effect of a woman's close peers outside home on her family planning outcomes.

We have already demonstrated that women who live with the MIL are similar to women who do not live with the MIL along several dimensions; moreover, we flexibly control for variables such as woman's age and education that differ across the two groups. As our IV specifications include fixed effects for caste category, village, village-by-caste category, and a vector of individual and household characteristics, the exclusion restriction will be violated only

if there are any remaining individual- or household-level differences between women belonging to the same caste-group and village but who differ in terms of living with the MIL. In column (1) of Online Supplementary Appendix Table A.7, we show that our IV results for visiting a family planning clinic in Table 9 are also robust to further controlling for the fertility preferences of the woman, of her husband, and of her MIL. In the next two columns, we show that our results hold even when we use the two alternate definitions of the pool. In column (4), we restrict our sample to villages that have at least 10 sample women; the results continue to hold.

Lastly, in Table 11, we conduct several placebo tests. If our IV interaction $(Prop_{cv}*MIL)$ potentially identifies the effect of close outside peers on a woman's health outcomes, we should not observe significant "effects" if we replace the outcomes with variables that are unrelated to our hypothesized channels. We examine four such placebo indicator outcomes—a woman's firstborn-child being a son, whether the woman's household is involved in a land dispute, whether the woman's mother attended school, and whether the woman father's attended school. It is well-established that the sex of a first child is as-good-as-random in India (Das Gupta and Bhat 1997; Visaria 2005; Bhalotra and Cochrane 2010; Anukriti, Bhalotra, and Tam 2016). Moreover, we do not expect that living with the MIL or having more close outside peers should impact the household's probability of being involved in a land dispute or a woman's parents' school attendance in the past. Reassuringly, none of the second-stage or the reduced form coefficients in Table 11 are significantly different from zero.

Policy Implications and Conclusion

In traditional patrilocal societies, such as India, restrictive social norms and co-residence with the MIL are ubiquitous. Using primary data, we first characterize the social networks of young married women in rural Uttar Pradesh, and then analyze how inter-generational power

dynamics within the marital household influence women's social network formation. We document that co-residence with the MIL is strongly negatively associated with her DIL's mobility and ability to form close social connections outside the home. Using mediation analysis, we find that a DIL's number of peers outside her home is a relevant channel through which MIL-co-residence alters her family planning outcomes. Third, using an instrumental variable approach, we find that a woman's social connections outside their home can improve her family planning outcomes.

Although the social networks of our sample women are sparse, the benefits of having even a few close peers outside the household are substantial in terms of women's health-seeking behavior. Our IV estimates suggest that women with a higher number of close peers outside their household are more likely to visit a family planning clinic and to use modern contraceptive methods. These outside connections positively influence a woman's beliefs about family planning use in their community and help her overcome the mobility restrictions that are imposed by the MIL by accompanying her to the clinic. Future research should unpack other channels through which peers could potentially empower women such as by increasing their physical mobility, self-confidence, and aspirations. For instance, Field et al. (2016) provide suggestive evidence that greater freedom of movement and the ability to more freely form social connections can improve women's aspirations. In addition, Kandpal and Baylis (2019) show that having more empowered peers increases a woman's mobility in rural Uttarakhand, India.

Although this article does not study a social-networks-based intervention, our results are informative for the design of policies that leverage social networks to increase women's access and uptake of family planning and reproductive health services. First, recent empirical evidence shows that family planning interventions could be successful in increasing contraceptive use and

reducing unmet need by tapping into women's social networks; however, these findings are obtained from settings where women's social networks are dense and extended.[29] If women only have a few close peers, as is the case in our study setting, then it would be more challenging to reach them and to diffuse information or other policy interventions through their networks. This issue is even more relevant in contexts such as rural Uttar Pradesh, where there is a significant unmet need for family planning (18 percent) and where at-home reach of health workers is quite low—only 13 percent of health workers have ever talked to female non-users about family planning (Indian Institute of Population Sciences and Ministry of Health and Family Welfare 2016), implying that a woman's inability to access a family planning clinic effectively translates into no interaction with a family planning provider.

Second, our results point out that the MIL might act as a gatekeeper for women's social interactions and the potential benefits that networks provide their members. Thus, future interventions that aim to reach women would benefit from addressing the gatekeeper-role of the MIL into their targeting strategies, or by directly targeting the MIL in a joint family to inform her about the benefits of family planning and reproductive health services (Varghese and Roy 2019). These future policies should address the potential misalignment of fertility preferences and asymmetry of information and bargaining power between the MIL and DIL in a manner similar to the family planning interventions that have aimed to challenge the intra-household allocation issues between husbands and wives (Ashraf, 2014; McCarthy, 2019). Nevertheless, whether and what types of policies can counter the negative influence of the MIL and expand women's networks remains to be explored.

While our results are most relevant to north and northwest India, where sociocultural norms that restrict women's autonomy are the strongest, our findings may also speak to other

settings where households extend beyond the nuclear family unit. Future work should extend our analysis to other Indian states and to other developing countries to identify potential heterogeneity in the characteristics of women's social networks and in the influence of the MIL. For instance, Kumar et al. (2019) find that women's self-help groups expand women's social networks and improve their mobility in India. With this in mind, there is a need for further research that would inform policymakers on the relative importance of other household members in determining women's autonomy and well-being, particularly in patrilocal societies like rural Uttar Pradesh, where extended households continue to remain prevalent.

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Figures

Figure 1: Directed Acrylic Graph

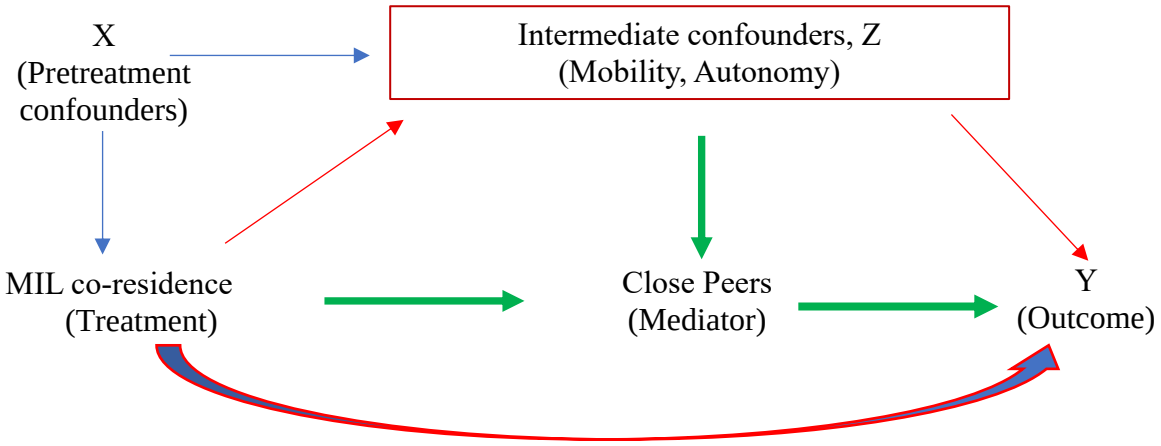
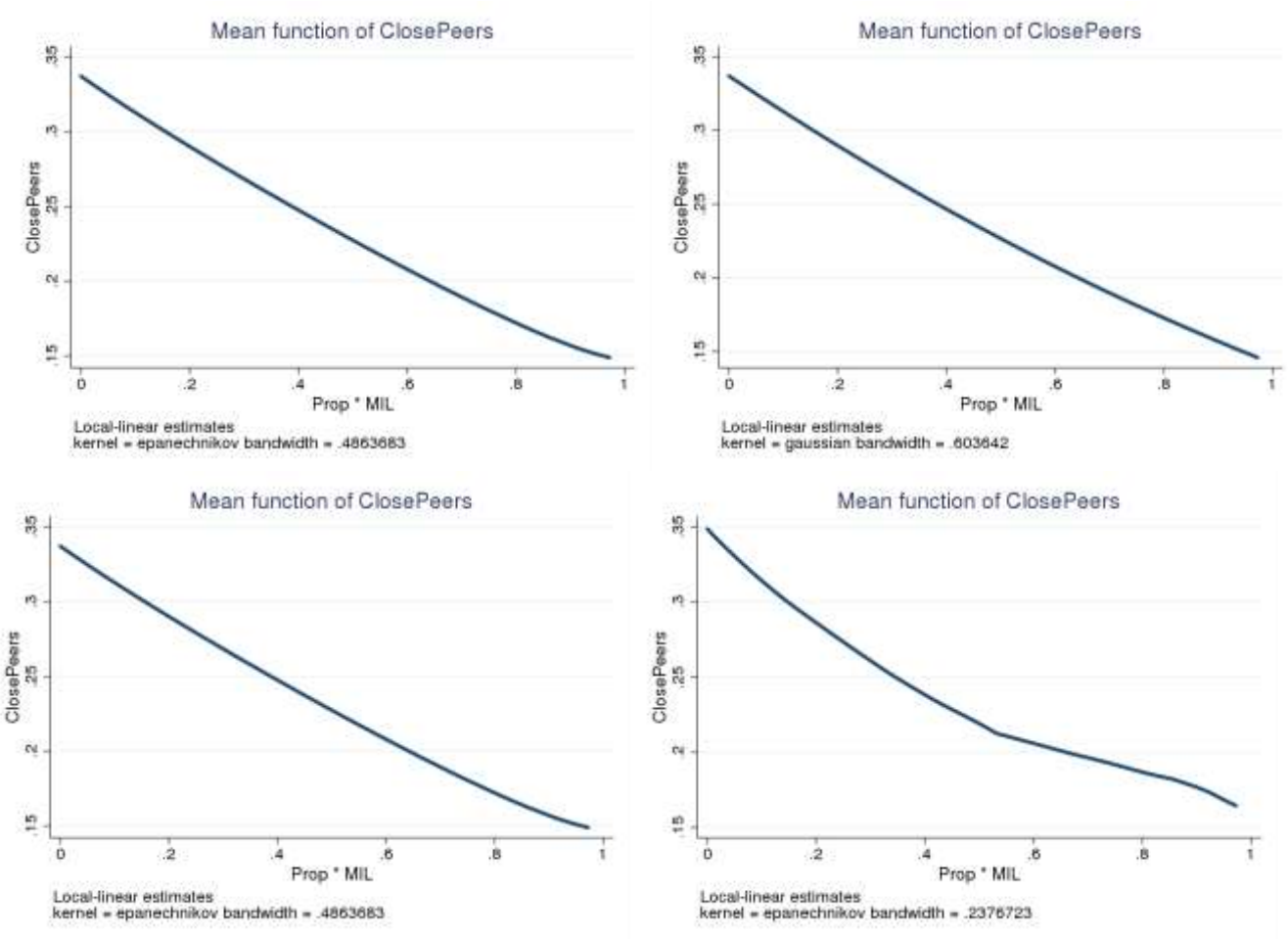


Figure 2: Non-parametric relationship between $ClosePeers_{icv}$ and IV



NOTES: These graphs plot the non-parametric relationship between a woman's number of close outside peers in her village and our IV, $(Prop_{cv} \cdot MIL_i)$. In the top left figure, we use the Epanechnikov kernel function and a local-linear estimator. In the top right figure, we use the Gaussian kernel function and a local-linear estimator. In the bottom left figure, we use the Epanechnikov kernel function and a local-constant estimator. The bottom right figure uses the Epanechnikov kernel function, a local-linear estimator, and improved AIC instead of cross-validation to compute optimal bandwidth.

Tables

Table 1: Summary statistics

Variable	N	Mean	Std. Dev.	Min	Max
	(1)	(2)	(3)	(4)	(5)
Age	671	25.67	2.65	18	30
Husband age	644	32.57	9.45	18	73
SC	671	0.43	0.50	0	1
ST	671	0.01	0.12	0	1
OBC	671	0.44	0.50	0	1
Upper caste	671	0.12	0.32	0	1
Hindu	671	0.93	0.25	0	1
Years of schooling	671	9.53	4.47	0	15
Marriage duration (years)	655	7.31	3.61	0	21
Age at marriage	655	18.36	2.52	6	28
Live with MIL	671	0.68	0.47	0	1
Own land	638	0.60	0.49	0	1
Amount of land owned (acres)	671	5.43	2.72	1	26
No. of living sons	671	0.96	0.76	0	4
No. of living children	671	1.95	0.92	1	5
Firstborn is a son	671	0.50	0.50	0	1
Allowed to visit alone:					
Home of relatives/ friends	671	0.12	0.32	0	1
Health facility	671	0.14	0.35	0	1
Grocery store	671	0.16	0.37	0	1
Short distance train/ bus	671	0.08	0.27	0	1
Market	671	0.19	0.39	0	1
Outside village/ community	671	0.21	0.40	0	1
Wears *ghunghat*/ *purdah*	671	0.88	0.32	0	1
Worked in the last 7 days	666	0.14	0.35	0	1
Using modern contraception	670	0.18	0.38	0	1
Has visited family planning clinic	671	0.35	0.48	0	1

NOTES: This table describes the characteristics of our sample. Columns (1)-(5) report, respectively, the number of observations, the mean, and the standard deviation, the minimum, and the maximum value for each variable. SC, ST, and OBC denote, respectively Scheduled Caste, Scheduled Tribe, and Other Backward Class.

Table 2: Influence of the MIL on DIL's number of peers, OLS

Co-residence with:	(1)	(2)	(3)	(4)	(5)
	A. Outcome: # close peers in the village				
Mother-in-law	-0.120**	-0.114*	-0.117**	-0.128**	-0.129**
	[0.045]	[0.062]	[0.050]	[0.049]	[0.053]
Father-in-law		-0.0004	-0.020	-0.010	-0.011
		[0.056]	[0.041]	[0.039]	[0.039]
# other women > age 18			0.072**		
			[0.029]		
# other 18-30 women				0.079**	
				[0.033]	
# other 18-30 married women					0.129***
					[0.039]
Control mean	0.606	0.606	0.606	0.606	0.606
	B. Outcome: # close outside peers in the village				
Mother-in-law	-0.133***	-0.138**	-0.137***	-0.133***	-0.134***
	[0.035]	[0.053]	[0.044]	[0.044]	[0.045]
Father-in-law		0.003	0.010	0.007	0.005
		[0.048]	[0.045]	[0.045]	[0.044]
# other women > age 18			-0.028*		
			[0.016]		
# other 18-30 women				-0.032	
				[0.020]	
# other 18-30 married women					-0.035
					[0.023]
Control mean	0.361	0.361	0.361	0.361	0.361
N	671	653	653	653	653

NOTES: This table reports coefficients from specification (1). Each column is a separate OLS regression. The outcome variables in panels A and B are the DIL's number of close peers in the same village and the number of close peers that are not household members, respectively. In all cases, we control for the DIL's age, years of schooling, Hindu dummy, amount of land owned by the household, and fixed effects for her caste category (SC-ST, OBC, or Other caste) and village. In addition, we gradually add an indicator for residence with the FIL, the number of other women in the HH that are above 18, in the 18-30 age group, and in the married 18-30 group, as controls across columns. Control mean refers to the dependent variable mean for women who do not live with their MIL. Robust standard errors in brackets are clustered by village. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Influence of the MIL on DIL's mobility, OLS regressions

	Outcome: DIL is usually allowed to visit the following places alone:						
	Home of relatives/ friends	**Health facility**	**Grocery store**	**Short distance bus/ train**	**Market**	**Outside village/ community**	**Wears ghunghat/ purdah**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lives with MIL	-0.096**	-0.134***	-0.157***	-0.043*	-0.167***	-0.083***	0.064***
	[0.036]	[0.037]	[0.038]	[0.021]	[0.035]	[0.026]	[0.019]
N	671	671	671	671	671	671	671
Control Mean	0.218	0.255	0.310	0.125	0.329	0.296	0.838

NOTES: This table reports coefficients from specification (1). Each column is a separate regression. The outcome variables are indicators that equal one if the DIL is usually allowed to visit the respective places alone. In all cases, we control for the DIL's age, years of schooling, Hindu dummy, amount of land owned by the household, and fixed effects for her caste category (SC-ST, OBC, or Other caste) and village. Control mean refers to the dependent variable mean for women who do not live with their MIL. Robust standard errors in brackets are clustered by village. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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Table 4: Test for selection into living with MIL

	Live with MIL = 0		**Live with MIL = 1**		**Difference**
Variables:	N	Mean	N	Mean	(2)-(4)
	(1)	(2)	(3)	(4)	(5)
Age	216	26.38	455	25.336	1.043***
Husband age	211	31.938	433	32.875	-0.937
Marriage Duration	210	8.595	445	6.697	1.899***
Years of schooling	216	8.102	455	10.207	-2.105***
Spousal schooling gap	211	0.275	432	-0.155	0.430
SC	216	0.472	455	0.429	0.044
ST	216	0.014	455	0.033	-0.019
OBC	216	0.454	455	0.431	0.023
Hindu	216	0.926	455	0.938	-0.013
Amount of land owned (acres)	216	5.374	455	5.460	-0.085
Employed	213	0.131	453	0.146	-0.014
No. of living sons	216	1.028	455	0.925	0.103

NOTES: This table compares the average characteristics of women who do not live with the MIL (columns (1)-(2)) and women who do (columns (3)-(4)). Column (5) reports the difference in the sample mean for the two groups. SC, ST, and OBC denote, respectively Scheduled Caste, Scheduled Tribe, and Other Backward Class. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Influence of the MIL on DIL's mobility if FIL is co-resident, OLS regressions

		Outcome: DIL is usually allowed to visit the following places alone:						
	# Close outside peers	**Home of relatives/ friends in village**	**Health facility**	**Grocery store**	**Short distance bus/ train**	**Market**	**Outside village/ community**	**Wears ghunghat/ purdah**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Sample restriction: FIL co-resident							
MIL	-0.234***	-0.134**	-0.098**	-0.131***	-0.054	-0.168**	-0.091	0.020
	[0.081]	[0.059]	[0.045]	[0.047]	[0.042]	[0.061]	[0.060]	[0.036]
N	406	406	406	406	406	406	406	406
Control mean	0.422	0.234	0.203	0.250	0.109	0.312	0.436	0.891

NOTES: This table reports coefficients from specification (1). Each column is a separate regression. The outcome variables are the same as those in Tables 2 and 3. The sample is restricted to households where the father-in-law (FIL) is co-resident. In all cases, we control for the DIL's age, years of schooling, Hindu dummy, amount of land owned by the household, and fixed effects for her caste category (SC-ST, OBC, or Other caste) and village. Control mean refers to the dependent variable mean for women who have a co-resident FIL but who do not live with their MIL. Robust standard errors in brackets are clustered by village. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: Heterogeneity in the influence of the MIL on DIL's number of peers, by MIL's fertility preferences, OLS regressions

	A. Outcome: # close peers in the village					
	MIL disapproves of FP	**MIL approves of FP**	**Ideal Kids^{MIL} > Ideal Kids^{DIL}**	**Ideal Kids^{MIL} <= Ideal Kids^{DIL}**	**Ideal Sons^{MIL} > DIL's sons**	**Ideal Sons^{MIL} <= DIL sons**
	(1)	(2)	(3)	(4)	(5)	(6)
Lives with MIL	-0.160**	-0.115*	-0.117**	0.0003	-0.127**	0.074
	[0.061]	[0.060]	[0.045]	[0.145]	[0.052]	[0.144]
Control Mean	0.556	0.691	0.572	0.744	0.573	0.733
	B. Outcome: # close outside peers in the village					
Lives with MIL	-0.149***	-0.119*	-0.103**	-0.169	-0.098**	-0.164
	[0.041]	[0.064]	[0.041]	[0.125]	[0.043]	[0.134]
Control Mean	0.348	0.383	0.329	0.488	0.316	0.533
N	320	351	519	152	530	141

NOTES: This table reports coefficients from specification (1). Each column within a panel is a separate regression. The outcome variable is the number of close peers a woman has in her village in Panel A and the number of such peers outside the household in Panel B. Columns (1) and (2) split the sample by whether the MIL approves of using FP or not. Columns (3) and (4) compare the number of children the MIL would like the DIL to have (Ideal Kids^{MIL}) and the DIL's ideal number of children (Ideal Kids^{DIL}). Columns (5) and (6) compare the number of sons the MIL would like the DIL to have (Ideal Sons^{MIL}) and the DIL's number of sons at the time of the survey (DIL sons). In all cases, we control for the DIL's age, years of schooling, Hindu dummy, amount of land owned by the household, and fixed effects for her caste category (SC-ST, OBC, or Other caste) and village. Control mean refers to the dependent variable mean for women who do not live with their MIL. Robust standard errors in brackets are clustered by village. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7: The influence of peers on women's access and use of family planning, OLS regressions

	Has visited FP clinic	**Uses modern method**	**Beliefs about FP use in village**	**Allowed to visit health facility with someone**
	(1)	(2)	(3)	(4)
# close outside peers	0.130**	0.067	0.233	0.024***
	[0.054]	[0.039]	[0.188]	[0.008]
N	671	670	671	671
Control mean	0.303	0.164	2.295	0.971

NOTES: This table reports coefficients from specification (1). Each column is a separate regression. The key explanatory variable is a woman's number of close peers who live in her village but not in her household. The outcome variables are: an indicator for whether a woman has visited a health facility for reproductive health, fertility, or family planning services in column (1); an indicator for whether a woman is using a modern method of contraception at the time of survey in column (2); a categorical variable that takes values 0 to 6 with higher values indicating a woman's belief that more women in her village use family planning in column (3); and an indicator for whether a woman is usually allowed to visit a health facility with someone in column (4). In all cases, we control for the DIL's age, years of schooling, Hindu dummy, amount of land owned by the household, and fixed effects for her caste category (SC-ST, OBC, or Other caste) and village. Control mean refers to the dependent variable mean for women who do not have a close outside peer in their village. Robust standard errors in brackets are clustered by village. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 8: Mediation analysis

	ATE (1)	**ACDE (g-est)** (2)	**Decline: (2) - (1)** (3)	**ATE** (4)	**ACDE (g-est)** (5)	**Decline: (5) - (4)** (6)
			A. Has visited FP clinic			
MIL_i	-0.066*		24%	-0.079*	-0.064	19%
	[0.037]	-0.050		[0.040]	[0.040]	
		[0.038]				
N	671	(0.0407)		671	671	
p-value: (3) vs (1)		671	0.0002			0.0002
			B. Uses modern method			
MIL_i	-0.005			-0.011	-0.002	
	[0.047]	0.004		[0.049]	[0.050]	
		[0.047]				
N	670	(0.036)		670	670	
p-value: (3) vs (1)		670	0.0009			0.0006
			C. Beliefs about FP use in village			
MIL_i	-0.436**		6%	-0.478**	-0.458**	4%
	[0.180]	-0.412		[0.187]	[0.185]	
		[0.178]**				
N	671	(0.165)**		671	671	
p-value: (3) vs (1)		671	0.0002			0.0002
			D. Allowed to visit health facility with someone			
MIL_i	-0.020**		15%	-0.023**	-0.020**	13%
	[0.009]	-0.017		[0.010]	[0.010]	
		[0.009]*				
N	671	(0.010)		671	671	
p-value: (3) vs (1)		671	0.0002			0.0002

NOTES: The p-values test if the estimates of ACDE from sequential g-estimation are significantly different from the estimated ATE. In columns (4) and (5), the specification includes Caste x Village FE. Standard errors in brackets are clustered at the village level and in parentheses are bootstrapped. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9: First-stage results from 2SLS regressions

	Outcome: No. of close outside peers in village					
	$Prop_{cv}$		$Prop_{cv}^{1830}$		$Prop_{cv}^{1830,married}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$Prop_{cv} * MIL_i$	-0.256***	-0.214***	-0.261***	-0.232***	-0.260***	-0.229***
	[0.066]	[0.068]	[0.066]	[0.066]	[0.069]	[0.068]
$Prop_{cv}$	0.162*		0.134		0.130	
	[0.094]		[0.098]		[0.099]	
N	671	671	671	671	671	671
First stage F-stat	14.93	10.05	15.70	12.51	14.22	11.35
X_i		x		x		x
Caste FE		x		x		x
Village FE		x		x		x
Caste x village FE		x		x		x

NOTES: This table reports coefficients from two versions of specification (5); in columns (1), (3), and (5), we only include $Prop_{cv} * MIL_i$ and $Prop_{cv}$ as explanatory variables, while the rest of the columns estimate the full version of specification (5). Each column is a separate regression. The outcome variable is a woman's number of close peers who live in her village but not in her household. Across columns, we use the three definitions of the peer-pool described in the text. Robust standard errors in brackets are clustered at the village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 10: Second stage and reduced form results from 2SLS regressions

	Visited FP clinic	**Uses modern method**	**Beliefs about FP use in village**	**Allowed to visit health facility with someone**
	(1)	(2)	(3)	(4)
A. Second stage				
# close outside peers	0.664*	0.111	2.607***	0.103
	[0.345]	[0.350]	[0.966]	[0.072]
B. Reduced form				
$Prop_{cv} * MIL_i$	-0.152*	-0.024	-0.596*	-0.024
	[0.083]	[0.082]	[0.321]	[0.017]
N	671	670	671	671

NOTES: This table reports coefficients from specification (6) in Panel A and the reduced form estimates for our IV estimation in Panel B. Each coefficient is from a separate regression. The outcome variables are: an indicator for whether a woman has ever-visited a health facility for reproductive health, fertility, or family planning services in column (1); an indicator for whether a woman is using a modern method of contraception at the time of survey in column (2); a categorical variable that takes values 0 to 6 with higher values indicating a woman's belief that more women in her village use family planning in column (3); and an indicator for whether a woman is usually allowed to visit a health facility with someone in column (4). Robust standard errors in brackets are clustered at the village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 11: Placebo tests

	Firstborn is a son	**Involved in land dispute**	**Mother attended school**	**Father attended school**
	(1)	(2)	(3)	(4)
A. Second stage				
# close outside peers	-0.204	-0.038	0.320	-0.489
	[0.353]	[0.182]	[0.304]	[0.308]
B. Reduced form				
$Prop_{cv} * MIL_i$	0.047	0.009	-0.073	0.112
	[0.083]	[0.045]	[0.075]	[0.075]
N	451	671	671	671

NOTES: This table reports coefficients from specification (6) in Panel A and the reduced form estimates for our IV estimation in Panel B. Each column is a separate regression. The outcome variables are indicators that equal one if the firstborn child of the woman is a son in column (1), if her household is involved in a land dispute in column (2), if her mother attended school in column (3), and if her father attended school in column (4). Robust standard errors in brackets are clustered at the village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

[1] With an estimated population of 200 million people in 2012, Uttar Pradesh would be the world's fifth most populated country by itself.

[2] Patrilocality refers to the practice of a married couple residing with or near the husband's parents. Patrilineality is a kinship system in which an individual's family membership derives from the father's lineage.

[3] Other prominent studies on this topic include Merrill 2007; Simkhada et al. 2008; Char, Saavala, and Kulmala 2010; Shih and Pyke 2010; and Gangoli and Rew 2011.

[4] Empirical evidence has extensively shown that in contexts where formal sources of information are missing, peers can play an important role in disseminating information about new health technologies (H. P. Kohler, Behrman, and Watkins 2001; Miguel and Kremer 2004; Godlonton and Thornton 2012), including family planning (H.-P. Kohler, Behrman, and Watkins 2000, 2002; Behrman, Kohler, and Watkins 2002), employment opportunities (Munshi and Rosenzweig 2006), and agricultural technologies (Foster and Rosenzweig 1995; Conley and Udry 2010; Magnan et al. 2015), among other issues in developing countries (for a review, see Breza 2016).

[5] Unlike other correlational studies on this topic, Varghese and Roy (2019) estimate the causal impacts of co-residence with the MIL on health during pregnancy.

[6] Ethical approval to conduct the trial and all related study activities was received from the Northeastern University Institutional Review Board (protocol number 18-04-24) and from the University of Delhi Research Council. An informed consent form to participate in the study was provided to each woman that we contacted and only women who consented were recruited into

the study. The trial was also registered at the American Economic Association Registry for randomized controlled trials on September 16, 2018 (AEARCTR-0003283).

[7] Since we are interested in the MIL's influence on women's social networks, the relevant group for this article is the population of married women. Our sample-selection criteria mean that two types of married women are missing from our analysis: those who had no children and those who were older than 30 at the time of our baseline survey. The direction in which the omission of these two groups could bias our results is, *a priori*, unclear. On the one hand, childless married women are likely to have moved into their marital villages more recently than our sample women, and may, therefore, have fewer close outside peers and weaker bargaining power with respect to the MIL. On the other hand, women who are older than 30 are likely to have resided in their villages for a longer duration and, hence, may have more peers and greater bargaining power with respect to the MIL, in comparison to our sample women.

[8] Specifically, close peers are individuals who are mentioned by the woman in response to the following question: "I would like to ask about the list of people, different from your husband and mother-in-law, with whom you talk about family planning, fertility, and reproductive matters and whose opinions are important to you. They are the people with whom you discuss your personal affairs or private concerns related to family planning, pregnancy, childbearing, and health."

[9] Chandrasekhar and Lewis (2011) show that a large downward bias can result when top-coding is used to sample peer networks. However, in our survey, all participants reported fewer than five close peers, besides their husband and MIL; in fact, the modal woman listed only one close peer. Thus, five appears to be an effective upper limit on network size in our sample.

[10] We did not collect such information about general peers since the primary focus of our experiment was on women's health, fertility, and family planning related networks.

[11] The average number of close peers in the village among women who have at least one such peer is 1.14.

[12] Although the estimates in Kandpal and Baylis (2019) are larger than ours, we note that our sample is younger and that Uttar Pradesh is a more conservative state relative to Uttarakhand, especially in terms of gender norms.

[13] In our baseline data, all social network information about the peers is self-reported by the surveyed woman, and we are unable to construct the reciprocal links between women and their close peers, except for a few cases where the close peers turned out to be a part of our sample. It is plausible that these "out-degree" measures of social ties are less reliable as they cannot be corroborated by the "in-degree" measures, i.e., where others report having a link with the individual in question. Thus, it is worth noting that the variables used to characterize the close peers might induce some bias in our network depiction.

[14] One concern with the inclusion of household landholdings as a control in specification (1) is that co-residence with the MIL may alter the amount of land the DIL's sub-family owns. Therefore, in the Online Supplementary Appendix Tables A.1 and A.2 we show that the β estimates from specification (1) are robust to the exclusion of the landholding variable. Nevertheless, we retain landownership as a control in our main tables as a proxy to control for a woman's household economic status, which is likely to be a relevant determinant of her access to health services. Ideally, we would like to control for economic status using a covariate that is entirely independent of co-residence with MIL; however, we lack such data in our survey.

[15] We do not make a causal claim here as the number of close peers in the household may be simultaneously determined with the number of close peers outside the household.

[16] The influence of other adult women in the household becomes somewhat more restrictive when the MIL is absent from the household. This suggests that adult females-in-law in the household (e.g., older sisters-in-law) may become substitutes for the MIL upon her departure from the household as the enforcers of mobility restrictions on the younger DIL. Nevertheless, the negative influence of these adult females-in-law on the DIL's number of close peers in the absence of the MIL is smaller than that of the MIL when she is present, implying that they are imperfect substitutes for the MIL.

[17] The mobility index is the sum of the six indicator variables used in columns (1)-(6) of Table 3. The autonomy index is the sum of two indicator variables that equal one if the DIL has a say in decisions about her healthcare and about her visits to family or relatives.

[18] We consider the area of landholdings as a post-treatment variable since co-residence with their MIL may influence the amount of land that the household owns.

[19] We cannot estimate bootstrapped errors for columns (4)-(5) that control for caste-by-village fixed effects because we lack enough degrees of freedom due to our small sample size.

[20] To assess the sensitivity of our estimates to the assumptions that we make about the pathways in Figure 1, we also estimated the ACDE under the "no intermediate confounders" assumption—the estimates are similar to those obtained after accounting for intermediate confounders using sequential g-estimation. Results are available upon request.

[21] Following Acharya et al. (2016), the ACDE is identified under the following assumptions. First, conditional on pre-treatment covariates, there are not omitted variables for the effect of

MIL-co-residence on the outcomes and no omitted variables for the effect of $ClosePeers_i$ on the outcome, conditional on MIL-co-residence, pre-treatment covariates and intermediate confounders. Second, the effect of $ClosePeers_i$ on the outcomes is independent of the intermediate confounders.

[22] We divide the sample into three distinct caste groups: scheduled castes or tribes (SC-ST), OBC, and upper castes. As previously mentioned, 44 percent of the sample is OBC, 11 percent belongs to an upper caste, and the rest are SC-ST, with the ST share being negligible (1.5 percent).

[23] Given the potential influence of co-residence with the MIL on the household's landholdings, we show in Online Supplementary Appendix Table A.4 that our IV results are robust to the exclusion of this variable.

[24] Our use of $Prop_{cv}$ as a proxy for a woman's potential local peer group is motivated by the work of Luke and Munshi (2006) who use a similar proxy to define a man's available pool of brides in his marriage market. In their context, marriage is clan-based and exogamous (i.e., a man must marry outside his own ethnic clan or any related ethnic clan); so the authors create a concentration measure of local clan relatedness as an instrument for marriage in a location—if a higher fraction of clans in a marriage market are related to a man's own clan, then his pool of eligible brides is smaller, and so on.

[25] The exact definitions are as follows: $Prop_{cv}{}^{1830} = \frac{N_{cv}{}^{1830}}{N_v{}^{1830}}$ and $Prop_{cv} = \frac{N_{cv}}{N_v}$, where $N_v{}^{1830}$ and $N_{cv}{}^{1830}$ respectively denote the total number of 18-30-year-old women in the village and the number of such women who belong to the caste-group c, while N_v and N_{cv} respectively denote

the total number of women in the village and the total number of women who belong to caste-group *c* in the village.

[26] Our use of co-residence with the MIL as a proxy for a woman's access to her network is motivated by Posades and Vidal-Fernandez (2013), Debnath (2015), and Dhanaraj and Mahambare (2019) who employ a range of family structure-based instruments (e.g., death of the woman's father-in-law, co-residence with the father-in-law, co-residence with other matriarchal figures (grandmothers), and joint family residence) as proxies for women's access, mobility, potential for employment outside the home, and empowerment.

[27] While the influence of peers on women's family planning outcomes is likely to differ by peers' beliefs and attitudes towards family planning as well as other observable characteristics, we are unable to robustly conduct heterogeneity analysis due to our relatively small sample. Moreover, peer characteristics are unlikely to be exogenous and peer influence is likely to be bi-directional—for instance, almost 79 percent of peers have both given family planning advice to and received family planning advice from our sample women.

[28] The outcome variable is a categorical variable that takes values 0 to 6 with higher values indicating a woman's belief that more women in her village use family planning.

[29] Most of these interventions take place in Sub-Saharan Africa (Colleran and Mace, 2015; Institute of Reproductive Health, 2019).