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Abstract

We study the effects on intimate partner violence (IPV) of new information received by women only, men only, or both, relevant to a high-stakes joint household decision. We model communication between spouses as Bayesian persuasion where disagreements elevate the risk of IPV. Our framework predicts that IPV will be lower when only one spouse is informed, compared to when both are, as the opportunity for persuasion by one spouse leads to more agreement. To test the model's predictions we leverage an existing randomized controlled trial of an edutainment intervention addressing child marriage decisions for girls in rural Pakistan, targeted at men, women, or both. Our empirical findings confirm the prediction that the likelihood of IPV is highest when men and women are jointly targeted. Due to systematic gender differences in preferences, our persuasion model further predicts that marriage delays are largest when targeting men alone or jointly with women and smallest when targeting women alone, predictions that are also confirmed in the data.

JEL-Codes: J120, J160.

Keywords: gender, intimate partner violence, Bayesian persuasion, targeting, edutainment, field experiment.

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1 Introduction

When targeting women with interventions, we should be concerned about the potential for causing an increase in intimate partner violence (IPV). Globally, one-third of women in relationships report to have experienced some form of physical or sexual violence by their partner (WHO, 2018), and interventions that seek to further women's economic resources or opportunities have been found to affect IPV incidence either positively or negatively (e.g., Luke and Munshi, 2011; Bobonis et al., 2013; Hidrobo et al., 2016; Bulte and Lensink, 2019; Kotsadam and Villanger, 2024). However, little is known about the impact on IPV of other types of interventions that do not directly affect women's economic position – one important type being interventions that provide new information. Such interventions are common (see, e.g., Bursztyn et al., 2020; Bandiera et al., 2020; Lowe and McKelway, 2021; Ashraf et al., 2022) and have a potential for affecting IPV incidence if they address important household decisions, potentially sparking disagreements and conflict between spouses. How new information affects households and their decisions will generally depend on who receives this information and the degree to which it is shared between partners.

The current paper makes three distinct contributions. First, we put forward a novel framework for IPV based on Bayesian persuasion (Kamenica and Gentzkow, 2011; Bergemann and Morris, 2019), that analyzes how new information about a key household decision influences decision outcomes and, specifically, the incidence of disagreements and conflict. We apply this framework to information interventions that target different members in the household, in a context where IPV prevalence is high. Our second contribution is therefore to develop general testable implications for information interventions where the spouse who receives new information is varied. Our third contribution is to test the predictions of our model by leveraging an existing randomized controlled trial (RCT) that randomizes whether fathers, mothers or both receive new information – through an edutainment intervention – about benefits of delaying marriage, in a context of high rates of girl child marriages and IPV. We show that the predictions of our model are borne out by the data, and that, indeed, who is targeted with the new information matters for both the decision outcome and IPV incidence.

Through the Bayesian persuasion framework, we endogenize intra-household communication following the arrival of new information. In our setting, parents decide whether or not to delay their daughter's marriage in the presence of a community age-of-marriage norm that condones child marriage, but they do so with incomplete information about the potential benefit to delaying marriage. There are systematic gender differences in the perceived costs of stigma resulting from deviation from the age-of-marriage norm, which mothers weigh more heavily than fathers. As a consequence, the model predicts that information about the benefit to delaying marriage can cause an increase in disagreements and IPV particularly when both spouses receive the information. When only one spouse receives the information privately, they gain an information advantage and will have an opportunity to strategically relay that information to their partner to secure agreement around their own preferred choice of marriage timing. In contrast, when spouses receive the information jointly, persuasion through strategic communication is not possible.

Three sets of predictions follow from the framework that we can test on our data. First, given the nature of the edutainment intervention, parents' beliefs about the benefit to delaying marriage should improve. Moreover, parents should update their beliefs the same whenever they themselves are directly informed, either alone or jointly with their spouse. In contrast, rational belief updating can be lower for parents who are informed only indirectly via their partners – as both mothers and fathers will, in some households, strategically conceal information.

A second set of predictions pertains to disagreements and conflict in the household. The new information will generally resolve disagreements in some households and induce disagreements in others. Consequently, predictions are ambiguous with respect to the impact on IPV incidence relative to the no-information control group. However, comparing across information recipients, disagreements and hence IPV should be the largest when both parents are targeted and no strategic relaying of information is possible. In contrast, IPV incidence should be lower when either parent is targeted alone, and hence obtains an information advantage and an opportunity to use persuasion to secure agreement for their preferred option.

The third set of predictions pertains to the effect of new information on the timing of marriage. This effect should be systematically related to who is targeted by the intervention, as mothers and fathers are predicted to engage in persuasion in opposite directions due to having systematically different preferences. As mothers are relatively more concerned about the risk of stigma associated with deviating from the age-of-marriage norm, they will, in some cases, have incentives to conceal information that favours marriage delay. In contrast, some fathers would have an incentive to exaggerate such information. As a result, the effect on marriage delay should be positive when fathers are informed alone, and larger compared to when mothers are informed alone. A positive effect on marriage delay is also predicted when both parents are provided with information that favours marriage delay.

The marriage of daughters is a high-stakes household decision, involving both parents, that carries important implications both for parents and their daughters, both emotionally and financially.[1]

[1] Divorces are rare in Pakistan, making marriage a life-long commitment between the husband, the wife, and their families, and marriages often involve substantial transfers through dowry or bride price, for which parents typically save during a large part of their daughter's life.

The RCT leveraged in the current study is an existing multi-arm cluster-randomized edutainment intervention aimed at reducing child marriage, delivered in 177 villages across two provinces in rural Pakistan. The results of the RCT on its primary and other secondary outcomes are reported in Cassidy et al. (2024). Pakistan is a context with persistent gender inequality (United Nations Development Programme, 2022), where IPV prevalence is strongly positively associated with patriarchal norms, and women's (economic) decision-making power, and negatively with women's education (Murshid and Critelli, 2020). It is also a context with particularly high rates of early marriage: even among girls currently aged 20-24, 21 percent were married before 18 (UNICEF, 2019). The intervention consists of a mobile cinema screening of a pre-recorded street-theater performance, developed by local NGOs and performed by local actors, followed by facilitated group discussions. In one treatment arm, only the women from target households are invited to attend the cinema screening, in another arm only the men from target households are invited, and in the final treatment arm both women and men are invited. Target households in the control group receive no intervention. We use a large-scale dataset (5,100 individuals, 1,700 households) with a baseline survey, and a midline and endline survey at 6 and 18 months after the intervention, respectively, measuring marriage outcomes, experiences of and attitudes towards IPV, and beliefs about the link between marriage timing and marriage outcomes.

To test our model's predictions, we first consider the effects of the intervention on mothers' and fathers' beliefs about the educational attainment of the daughter's future spouse if marrying at different ages. An improved belief about the link between marrying later and spousal educational attainment represents a key perceived benefit to marriage delay. We find that both mothers' and fathers' beliefs about the benefits to delaying marriage improve significantly as a result of the intervention. Consistent with the model's predictions, parents – both mothers and fathers – update their beliefs the same when targeted directly alone as compared to when targeted directly alongside their partner. In contrast, and also consistent with the predictions, neither mothers nor fathers update their beliefs significantly more strongly when only their partner is targeted as compared to when they themselves are directly targeted. If anything, fathers update their beliefs relatively less when mothers alone are directly targeted in the intervention.

Next, we turn to our model's predictions on disagreements and conflict in the household. We observe the highest incidence rate of physical IPV experienced by mothers when parents are targeted jointly, as compared to all other arms. The incidence rate is significantly higher as compared to when fathers are targeted alone, while the difference is not statistically significant compared to when mothers are targed alone. The effect on physical IPV is insignificant in each treatment arm compared to the control group – as noted, the model makes no clear prediction in this regard.

We argue that the results on IPV incidence are unlikely to be driven by experimenter demand effects (as the intervention was not focused on IPV). We also conduct a set of robustness checks to mitigate concerns about possible reporting bias arising from potential treatment effects on women's attitudes and beliefs of IPV acceptability, understanding of violence survey questions, and trust in the enumerators.

Finally, we consider the decision to delay marriage. In line with our predictions, the effects on the probability of child marriage are linked with who is targeted. Signficant reductions in the annual hazard rate of child marriage are observed when men are targeted alone and when men and women are targeted jointly, but no reductions are observed when women are targeted. At midline, the effects on marriage delay when women are targeted alone are significantly smaller than when men are targeted alone. At endline we cannot reject that the effects across arms are the same.

Our contributions expand three distinct literatures. First, the paper adds to the literature on economic theories of IPV (e.g., Tauchen et al., 1991; Farmer and Tiefenthaler, 1997; Bloch and Rao, 2002; Aizer, 2010; Haushofer et al., 2019; Eggers del Campo and Steinert, 2020). Three classes of models have been developed that aim to explain the economic drivers of IPV, all focusing on changes in women's economic resources and opportunities. Household bargaining models predict that women whose economic opportunities are improved will bargain for reduced abuse with their partners who have preferences for acts of violence (Farmer and Tiefenthaler, 1997; Aizer, 2010; Haushofer et al., 2019). The other two classes of models, of male backlash (Macmillan and Gartner, 1999; Atkinson et al., 2005) and spousal resource extraction (Bloch and Rao, 2002; Bobonis et al., 2013; Calvi and Keskar, 2023), make opposing predictions to the bargaining models. The male backlash hypothesis posits that improvements in women's relative economic status pose a threat to their husband's dominance and male "breadwinner" identity, triggering IPV. The spousal resource extraction theory suggests that an increase in women's income or wealth may incentivize husbands to use violence to extract resources. Our paper contributes to this literature by developing an alternative economic theory of IPV based on the notion that violence arises from spousal disagreements over important household decisions. Our framework does not assume direct preferences for violence by perpetrators, nor does it assume that IPV represents perpetrators' attempts to preserve identity or extract resources. In our setting, disagreements may spill over into violence due to frustration and loss of control. In this respect our framework naturally relates to Card and Dahl (2011) who stress the role of emotional cues in precipitating violence. Similar to them, we expect cue-triggered loss of control to lead to physical violence, which is hence our main outcome of interest. However, whereas their work focused on cues external to the household – namely professional soccer game outcomes – affecting male perpetrators, in our case the cues triggering violence are internal household disagreements about important decisions. When decisions are made under conditions of incomplete information, IPV incidence may in fact be reduced by intra-household information asymmetries and communication ("persuasion") as an informed spouse seeks to forge agreement, reducing conflict.

Second, we contribute to the literature on information-sharing within households. One strand of this literature establishes the existence of gender differences in the diffusion of information between spouses in contexts where full information-sharing is deemed rational (e.g., Conlon et al., 2021; Fehr et al., 2022). Another strand of this literature investigates strategic motives for spouses to hide information from their partners in non-cooperative household settings. For example, Ashraf et al. (2014) find that women – when given the opportunity – strategically hide contraceptive use from their spouses, translating into lower fertility outcomes. Lowe and McKelway (2021) show that providing information about job opportunities for women to spouses jointly rather than individually reduces enrollment into the job by giving each spouse veto power.[2] Our setting contrasts the above as it presents a context where a couple face a joint decision with no hiding of actions or options, only a lack of full information about the potential utility of the available options. Because fathers and mothers have systematically different preferences, a spouse who receives private information about this utility will not seek to hide that they received information, but may strategically conceal its content. That is, they may communicate truthfully or not, to manipulate their partner's beliefs in order to persuade them about which option to support. Partners – knowing that their preferences may differ – will anticipate that their spouse will use any private information strategically. Bayesian persuasion models (Kamenica and Gentzkow, 2011; Bergemann and Morris, 2019) have been applied in a number of domains, for example financial sector stress (Goldstein and Leitner, 2018), employee feedback (Habibi, 2020), voter coalition formation (Alonso and Câmara, 2016), and matching platforms (Romanyuk and Smolin, 2019). We use it here as a framework for modelling intra-household communication and decision-making.

Lastly, we make a contribution to the literature on interventions that target men, women or both directly to change women's or children's outcomes. Targeting women with interventions has been shown to successfully improve women's labor market outcomes (Bandiera et al., 2020), educational outcomes (Ashraf et al., 2020; Edmonds et al., 2023), and health (Duflo et al., 2015). Recently, targeting men with interventions has also been shown to produce positive impacts on female labor force participation and health (Bursztyn et al., 2020; Stopnitzky, 2017). While some studies report

[2] Income hiding by spouses has been observed both in experimental settings (Ashraf, 2009; Castilla, 2019) and in survey settings (Zhang, 2023), diverting resources towards hard-to-monitor consumption. Relatedly, Apedo-Amah et al. (2020) study household input allocations for agricultural plots owned by men and women, and find that the wife's incentive to conceal her plot's productivity lead to inefficiencies in input allocations to plots.

IPV impacts from interventions targeted at men (Doyle et al., 2018; Vaillant et al., 2020), women (Roy et al., 2019), or both (Shah et al., 2023), direct comparisons between different targeting strategies are difficult due to differences in the content and aim of the interventions studied. Our study contributes to this literature by studying IPV impacts from exactly the same intervention in exactly the same context, targeted at men, at women or at both genders jointly. Our results indicate that IPV is a concern especially when targeting men and women jointly.

This study has important implications for policy-making. Our results indicate that interventions aimed at changing household decisions can have long-lasting adverse effects on IPV outcomes for women, especially when men and women are jointly targeted. Overall IPV impacts are smaller when targeting men or women separately. These results show that paying special attention to the mitigation of IPV impacts when designing and implementing interventions to change outcomes for women – especially when targeting men and women jointly – is crucial in order for an intervention to have positive net effects on welfare.

2 Theoretical framework

In this section we formulate a Bayesian persuasion model where spouses have to make an important household decision but have incomplete information about a key factor relevant to that decision. Either one or both of them may then receive this information. If only one spouse receives information they can communicate to their partner and will do so strategically, knowing that the partner has different preferences and will update their beliefs rationally using Bayes' rule. When the spouses disagree on the decision, we take their conflict in views to imply an elevated risk of IPV.

The model is phrased in terms of the context of the RCT setting we link it to – although without loss of generality, the model could equally be applied to other important household decisions where one partner weighs a key decision factor more than the other partner does. The decision facing the spouses is whether their daughter should have an early or delayed marriage. They have incomplete information about the potential benefit to delaying marriage and trade this off against potential stigma associated with deviating from a prevailing community age-of-marriage norm. Benefits to delaying marriage can be thought of as arising from improved welfare of the daughter, for example in terms of increased quality of her future spouse.

We assume that women typically attach a stronger relative weight to community stigma than men and hence are more hesitant about delaying marriage. Below we show that, in our context, mothers have a stronger preference for complying with community norms of age-of-marriage, and also have lower beliefs about community members' actions when a girl is married young (see Section 4.2). Such differences in preferences for norm compliance have previously been confirmed in the literature on female genital mutilation (e.g. Gage and Van Rossem, 2006; Sagna, 2014; Bellemare et al., 2015), and are potentially rooted in the severity of community sanctions that women face when deviating from community norms, as also suggested by, e.g., Said et al. (2022) and Andrew et al. (2024).

2.1 Set-up

Consider a set J of households drawn from the same local community. In each household $j \in J$ there is a mother and a father who need to make a decision about when to make their daughter available for marriage. They can either opt for an "early marriage" or a "delayed marriage" and we denote their choice by $d_j \in \{0, 1\}$ where $d_j = 1$ indicates "delay".

Delaying marriage comes with a *potential* benefit, $r_j \in \{0, 1\}$. The realization of a benefit is, however, uncertain and all parents have incomplete information about how likely a benefit to delay is: the probability of a benefit, denoted $\pi_s \in (0, 1)$, depends on a "state of the world" s which is either "low" or "high."All parents hold a common prior over s.

Assumption 1. *(Return to delay, state of the world, and prior). There is a state of the world $s \in S \equiv \{L, H\}$ over which parents share a common prior belief, $\mu \equiv \Pr(s = H) \in (0, 1)$. Any household $j \in J$ may experience a benefit from delayed marriage, $r_j \in \{0, 1\}$, and the probability of a benefit occurring takes the form,*

$$\Pr(r_j = 1 | d_j, s) = d_j \pi_s, \tag{1}$$

where $0 < \pi_L < \pi_H < 1$.

For simplicity, we will use P to denote the prior. Consistent with this notation, let

$$\pi_P \equiv (1 - \mu) \pi_L + \mu \pi_H, \tag{2}$$

denote the perceived likelihood of a benefit to delayed marriage based on the common prior.

There is a pre-existing local social norm for the timing of marriage which we can assume reflects a commonly perceived frequency of delayed marriage in the community, $\widehat{d} \in (0, 1/2)$. That is, early marriages are relatively common in the community, defining expected behavior. Household j may experience stigma $z_j \in \{0,1\}$, and the risk of stigma is larger the more the household's decision is at odds with the norm.

Assumption 2. *(Social norm and probability of stigma). Any household $j \in J$ may experience stigma, $z_j \in \{0,1\}$, and the probability of stigma occurring takes the form,*

$$\Pr\left(z_j = 1|d_j, \widehat{d}\right) = \rho\left(d_j - \widehat{d}\right)^2, \tag{3}$$

where $\rho > 0$ and where the pre-existing norm satisfies $\widehat{d} \in (0, 1/2)$.

As the parents face a binary decision, we assume simple additive preferences over the potential delay benefit r_j and over stigma z_j, and we normalize the utility from benefit. Hence let the preferences of spouse $i \in \{1,2\}$ in household $j \in J$ be given by

$$u_{ij}\left(r_j, z_j\right) = r_j - \sigma_{ij} z_j. \tag{4}$$

Parents' preferences are assumed to vary both *across* and *within* households. This variation is captured by the individual stigma aversions $\sigma_{ij} \geq 0$. Hence $\boldsymbol{\sigma}_j \equiv (\sigma_{1j}, \sigma_{2j})$ characterizes the preferences of the two spouses in household j.

Within-household preference heterogeneity implies that, in every household, one spouse will be no more stigma-averse than their partner. Without loss of generality, we can label the least stigma-averse spouse in each household as spouse 1, whereby $\sigma_{1j} \leq \sigma_{2j}$ for all $j \in J$. In line with general patterns of the data (see Section 4.2 below), we will refer to the less stigma-averse parent 1 as the *father* and the more stigma-averse parent 2 as the *mother*. This of course is *not* without loss of generality. For this reason, when we outline model predictions below, we will pay close attention to this being a potential misclassification in some households and focus only on *robust* predictions.

Specifically, let the stigma aversions in household j be made up of a household component γ_j and a spouse 2 specific component λ_j, both of which are positive, random and independent.

Assumption 3. *(Stigma aversion) The stigma aversions $\boldsymbol{\sigma}_j$ of the parents in household $j \in J$ take the form $\sigma_{1j} = \gamma_j$ and $\sigma_{2j} = \gamma_j + \lambda_j$ where γ_j and λ_j are independent random variables with cumulative distribution function Γ and Λ respectively, each with support $[0, \infty)$.*

Assumption 3 implies that σ_{1j} and σ_{2j} are positively correlated via the common household component.

Whilst all parents hold the common prior belief μ over the state s, individual beliefs may change in light of information provided to them, either directly or via their spouse. To this end, let μ_{ij} denote the belief held by spouse i in household j that $s = H$. Given μ_{ij} and σ_{ij}, spouse i in household j will want to delay marriage if and only if their expected benefit to delay exceeds any associated increase in expected disutility from stigma,

$$E[r_j | d_j = 1, \mu_{ij}] \geq \sigma_{ij} \{E[z_j | d_j = 1] - E[z_j | d_j = 0]\}. \tag{5}$$

Using (1) and taking expectation also over the state to rewrite the left hand side using μ_{ij}, and using (3) and (4) to rewrite the right hand side, equation (5) can be written as

$$(1 - \mu_{ij}) \pi_L + \mu_{ij} \pi_H \geq \sigma_{ij} \rho \left(1 - 2\widehat{d}\right), \tag{6}$$

where we note that, by Assumption 2, $\rho \left(1 - 2\widehat{d}\right) > 0$. Since early marriage is perceived to be the more common choice in the community, any parent will perceive that delaying marriage increases the risk of stigma.

The parents in any given household may disagree on the marriage timing decision. But even then, a decision has to be made. The following assumption captures the notion of "decision power" in the simplest possible way.

Assumption 4. *(Decision power) The marriage timing decision, $d_j \in \{0, 1\}$, implemented in household $j \in J$ is the option preferred by spouse 1 with probability α and the option preferred by spouse 2 with probability $1 - \alpha$, where $\alpha \in (0, 1)$.*

This simple formulation allows for the possibility that fathers, for instance, have a larger "final say". But even then, they will want their spouse to agree with them as the mother has a positive say.

2.2 Household preferences

Consider the parents' preferred choices based on the prior belief P or based on full knowledge of the state s being either L or H. Specifically, define the following indicator for whether spouse i in household j prefers delay or not,

$$d_{ij}(k) \equiv \begin{cases} 1 & \text{if} \quad \sigma_{ij} \leq \underline{\sigma}(k) \\ 0 & \text{if} \quad \sigma_{ij} > \underline{\sigma}(k) \end{cases}, \quad i = 1, 2, \; j \in J \text{ and } k = L, P, H, \tag{7}$$

where, using (6), the threshold stigma aversions are defined by

$$\underline{\sigma}(k) \equiv \frac{\pi_k}{\rho\left(1 - 2\widehat{d}\right)} > 0 \text{ for } k = L, P, H. \tag{8}$$

Note that, for any household $j \in J$, the following monotonicities apply,

$$d_{ij}(L) \leq d_{ij}(P) \leq d_{ij}(H) \text{ for } i = 1, 2 \quad \text{and} \quad d_{1j}(k) \geq d_{2j}(k) \text{ for } k \in L, P, H. \tag{9}$$

The first simply says that, if a parent prefers to delay at P they also prefer to delay at H, and if they prefer to delay at L they also prefer to do so at P and H, and vice versa. This follows from the fact that, by Assumption 1, $\underline{\sigma}(L) < \underline{\sigma}(P) < \underline{\sigma}(H)$. The second says that, if there is disagreement between the spouses then spouse 1 prefers delay and spouse 2 prefers early marriage. This follows since, by Assumption 3, $\sigma_{1j} \leq \sigma_{2j}$ for all $j \in J$.[3]

2.3 Communication between spouses

Consider now the case where, in each household $j \in J$, one spouse learns the true state s. After learning s, the informed spouse i can communicate with their partner, denoted $-i$, by sending a signal $\widetilde{s}_{ij} \in S$. A *communication strategy* for spouse i is a mapping from the set of (true) states S to the probability of sending the signal $\widetilde{s}_{ij} = H$. This can be represented as a vector $\boldsymbol{\phi}_{ij} \equiv \left(\phi_{ij}^L, \phi_{ij}^H\right)$ where $\phi_{ij}^s \equiv \Pr(\widetilde{s}_{ij} = H|s)$. A natural interpretation of the signal $\widetilde{s}_{ij} = s$ is as spouse i claiming that the state is s, which may be truthful or not. The set of possible communication strategies is $\Phi \equiv [0,1] \times [0,1]$.

Upon receiving the realized signal $\widetilde{s}_{ij} \in S$ from spouse i the partner, $-i$, updates their belief using Bayes' rule and in line with $\boldsymbol{\phi}_{ij}$. Hence the posterior beliefs held by $-i$ that the true state is H will satisfy

$$\Pr\left(s = H|\widetilde{s}_{ij} = H; \boldsymbol{\phi}_{ij}\right) = \frac{\mu\phi_{ij}^H}{\mu\phi_{ij}^H + (1-\mu)\,\phi_{ij}^L}, \tag{10}$$

[3] One interpretation of the perceived delay frequency $\widehat{d}$ defining the local social norm is as the equilibrium frequency based on the prior. If so, $\widehat{d}$ would satisfy $\alpha \Pr(\sigma_{1j} \leq \underline{\sigma}(P)) + (1-\alpha)\Pr(\sigma_{2j} \leq \underline{\sigma}(P)) = \widehat{d}$. Given the assumed preferences for conforming with the social norm, this equation will generally have multiple solutions. For instance, all households delaying marriage is always an equilibrium. But an equilibrium with $\widehat{d} < 1/2$ is also possible and a community may find itself in such a low delay frequency equilibrium for reasons of path dependency. For instance, if in the past, parents did not perceive any direct benefit from delaying marriage.

$$\Pr\left(s = H|\widetilde{s}_{ij} = L; \boldsymbol{\phi}_{ij}\right) = \frac{\mu\left(1-\phi_{ij}^{H}\right)}{\mu\left(1-\phi_{ij}^{H}\right) + (1-\mu)\left(1-\phi_{ij}^{L}\right)}. \tag{11}$$

The order of events is as follows. Spouse i first chooses a communication strategy $\boldsymbol{\phi}_{ij} \in \Phi$. The true state of the world s is then revealed to i who sends a signal $\widetilde{s}_{ij}$ to $-i$ based on s and in accordance with $\boldsymbol{\phi}_{ij}$. $-i$ then updates their beliefs as in (10) and (11). Finally, the spouse who gets to have the final say (Assumption 4) implements their preferred option as the household decision d_j.

We can now consider what communication strategy will be privately optimal for the informed spouse, maximizing their own expected utility, knowing that their partner will update their belief based on it.[4] The following Claim describes the optimal communication strategies for each spouse. It states that spouse i, when privately informed, will report non-truthfully – that is, engage in persuasion – when they themselves prefer one option irrespective of the state of the world, but their non-informed partner's preferred choice depends on their belief, making them "persuadable".[5]

Claim 1. *(Privately optimal communication).*
(i) ***Informed Spouse 1 (Father):*** *If* $\sigma_{1j} < \underline{\sigma}(L)$*, but* $\underline{\sigma}(L) < \sigma_{2j} \leq \underline{\sigma}(H)$*, then the privately optimal communication strategy for spouse* 1 *is* $\boldsymbol{\phi}_{1j}^{*} = \left(\phi_{1j}^{*}, 1\right)$ *where,*

$$\phi_{1j}^{*} = \min\left\{\frac{\mu}{(1-\mu)}\frac{\left(\pi_H - \sigma_{2j}\rho\left(1-2\widehat{d}\right)\right)}{\left(\sigma_{2j}\rho\left(1-2\widehat{d}\right) - \pi_L\right)}, 1\right\}. \tag{12}$$

For all other $\boldsymbol{\sigma}_j$*, the truthful strategy,* $\boldsymbol{\phi}_{1j}^{*} = (0, 1)$*, is privately optimal for spouse* 1*.*
(ii) ***Informed Spouse 2 (Mother):*** *If* $\sigma_{2j} > \underline{\sigma}(H)$*, but* $\underline{\sigma}(L) \leq \sigma_{1j} < \underline{\sigma}(H)$*, then the privately optimal communication strategy for spouse* 2 *is* $\boldsymbol{\phi}_{2j}^{*} = \left(0, \phi_{2j}^{*}\right)$ *where,*

$$\phi_{2j}^{*} = \max\left\{1 - \frac{(1-\mu)}{\mu}\frac{\left(\sigma_{1j}\rho\left(1-2\widehat{d}\right) - \pi_L\right)}{\left(\pi_H - \sigma_{1j}\rho\left(1-2\widehat{d}\right)\right)}, 0\right\}. \tag{13}$$

For all other $\boldsymbol{\sigma}_j$*, the truthful strategy,* $\boldsymbol{\phi}_{2j}^{*} = (0, 1)$*, is privately optimal for spouse* 2*.*

The less stigma-averse parent (spouse 1) will – if anything – persuade their partner to agree to

[4] It is worth noting that the informed spouse's choice of communication strategy will not depend on the distribution of decision-power within the household. Irrespective of the value of α, an informed spouse will always have an incentive to choose a communication strategy that will make their partner agree with them as often as possible, even if, in the end, the informed spouse themself has the final say.

[5] Further model details and proofs are presented in Appendix A.

delay marriage. Claim 1 states that spouse 1 will use persuasion when they themself prefer to delay marriage irrespective of the state, but their partner would only want to delay at state H, not at state L. If the partner would prefer to delay marriage based on the prior, then spouse 1 will optimally always claim that the state is H, that is $\phi_{1j}^* = 1$. Doing so conveys no information and ensures that the partner does not update their beliefs and hence continues to support delaying marriage. If, on the other hand, the partner's stigma aversion is stronger – to the point that they would prefer early marriage based on the prior – then spouse 1 cannot make their partner always agree to delay. In this case, spouse 1 reveals state L with the lowest probability, $\phi_{1j}^* \in (0,1)$, that makes the partner prefer to delay upon receiving the signal H.

By corresponding argument, the more stigma-averse parent (spouse 2) will – if anything – persuade their partner to agree to early marriage. Claim 1 states that spouse 2 will use persuasion when they themself prefer early marriage irrespective of the state, but their partner would only want an early marriage at state L, not at state H. If the partner prefers early marriage on the prior, then spouse 2 would always claim L. If not, they would falsely claim L with the highest probability (and hence reveal H with the lowest probability) that makes the partner prefer early marriage upon receiving the signal L.[6]

2.4 Disagreements and IPV

Disagreement between spouses on a high-stake emotive decision can potentially lead to conflict and, ultimately, an elevated risk of IPV. Here we consider how information will affect the likelihood of disagreement. Let $\delta_j \in \{0,1\}$ indicate whether the spouses in household $j \in J$ disagree. Let

$$\overline{\delta}\left(s, \{i\}, \boldsymbol{\sigma}_j\right) \equiv E\left[\delta_j | s, \{i\}, \boldsymbol{\sigma}_j\right], \tag{14}$$

be the probability of disagreement in a household with preferences $\boldsymbol{\sigma}_j$ after spouse $\{i\}$ receives information s, with the expectation taken over potential signals sent by i. Of course, we do not observe households' preferences $\boldsymbol{\sigma}_j$ and will focus on the aggregate effect across the population. Hence let $\overline{\delta}\left(s, \{i\}\right) \equiv E\left[\overline{\delta}\left(s, \{i\}, \boldsymbol{\sigma}_j\right)\right]$, denote aggregate disagreement frequency where the expectation is taken over $\boldsymbol{\sigma}_j$.

The following Claim notes that disagreements are always at least as frequent when both spouses

[6] The scope for persuasion naturally depends on the particular value of their partner's stigma aversion. Specifically, ϕ_{1j}^*, is decreasing in σ_{2j}: the *larger* is spouse 2's stigma aversion, the *less* spouse 1 can persuade their partner to delay marriage. Conversely, $1 - \phi_{2j}^*$, is increasing in σ_{1j}: the *larger* is spouse 1's stigma aversion, the *more* spouse 2 can persuade their partner to opt for an early marriage.

are directly informed as compared to when only one of them is. Intuitively, when only one spouse is informed, they are provided with an informational advantage that they will – at some preference profiles – use to persuade their partner to agree with their preferred option. In contrast, when both spouses are directly informed, no persuasion is possible.

Claim 2. *(Probability of disagreement) The average probability of disagreement when:*
(i) There is a high probability of a benefit to delayed marriage, $s = H$, satisfies

$$\overline{\delta}\,(H, \{1, 2\}) = \overline{\delta}\,(H, \{1\}) > \overline{\delta}\,(H, \{2\})\,; \tag{15}$$

(ii) There is a low probability of a benefit to delayed marriage, $s = L$, satisfies

$$\overline{\delta}\,(L, \{1, 2\}) = \overline{\delta}\,(L, \{2\}) > \overline{\delta}\,(L, \{1\})\,. \tag{16}$$

So far we have duly considered both possible states, L and H. Given that the edutainment intervention provided information on the benefits of delaying marriage in order to reduce child marriages, we will focus on predictions at H. When applying the framework to the intervention, our starting point is thus that (i) the information conveyed was H and (ii) that the father is relatively less stigma-averse. That is, (15) applies with spouse 1 being the father. This indicates that disagreements should be least frequent when mothers only are directly informed, but should be equally frequent when the fathers only or both are directly informed.

However, the equality between the case where the father alone is informed and the case where both are informed is generally not a robust prediction. To see this, consider the possibility that, in some households, the father is the more stigma-averse parent: that is, the assumption that fathers are always spouse 1 may involves some degree of misclassification.[7] There would then be some households where fathers use persuasion (towards early marriage) upon receiving positive information. But persuasion by either spouse, in any direction, will involve the forging of agreement and will therefore make disagreements less likely relative to the case where both are informed.

Using the notation F, M, and $F + M$, to denote the three treatment arms in the intervention – female, male, both – the robust prediction is then that $\overline{\delta}\,(F + M)$ should be larger than both $\overline{\delta}\,(M)$ and $\overline{\delta}\,(F)$. The intuition is that any spouse, when privately informed, can seek to use this advantage to persuade their partner to agree with them, a mechanism that applies irrespective of

[7] To formalize the notion of misclassification, suppose that once the stigma aversions, $\boldsymbol{\sigma}_j \equiv (\sigma_{1j}, \sigma_{2j})$, have been drawn according to Assumption 3, σ_{1j} and σ_{2j} are then allocated to the father and the mother respectively with probability $1 - \epsilon$, but with probability ϵ the roles are reversed. We thus focus on predictions that are robust to some small fraction $\epsilon > 0$ of misclassifications.

who is persuading whom and in what direction.

Claim 2 makes no comparisons to the prior. This reflects the simple insight that information will generally *resolve* disagreements in some households and *induce* disagreements in others. As a result, without knowing the distribution of preferences, no unambiguous prediction can be made for the aggregate effect of information relative to the no-information prior.[8]

2.5 Effects of information on marriage timing

We now consider what effect information has on marriage timing decisions. By the "effect of information" we mean the change in the probability of a given household delaying marriage compared to when basing their decision on the prior. This depends on what state s is revealed, which spouse receives this information, and on the household's preferences. Formally, the effect of information s, received by spouse $\{i\}$ (possibly both), on household j with stigma aversions $\boldsymbol{\sigma}_j$, is given by,

$$\Delta d\left(s,\{i\},\boldsymbol{\sigma}_j\right) \equiv E\left[d_j|s,\{i\},\boldsymbol{\sigma}_j\right] - E\left[d_j|P,\boldsymbol{\sigma}_j\right], \tag{17}$$

where the expectations are over potential signals sent by the informed spouse and over the final say. As before, we are interested in the population aggregate. Hence, let $\Delta d\left(s,\{i\}\right) \equiv E\left[\Delta d\left(s,\{i\},\boldsymbol{\sigma}_j\right)\right]$ denote the aggregate effect where the expectation is taken over $\boldsymbol{\sigma}_j$.

From Claim 1 we know that, in some households, spouse 2, when privately informed, will persuade their partner not to delay marriage when the state is H. As a result, the aggregate effect of information H is more positive when received by spouse 1 only than when received by spouse 2 only, that is $\Delta d\left(H,\{1\}\right) > \Delta d\left(H,\{2\}\right)$. Indeed, information H, when received by spouse 1 only, will only ever increase the probability of any given household delaying marriage (weakly for all and strictly for some). If the same information is received by spouse 2 only, persuasion efforts by some make the aggregate effect ambiguous. As a consequence, $\Delta d\left(H,\{1\}\right) > 0$ but $\Delta d\left(H,\{2\}\right)$ is ambiguous. Conversely, from Claim 1 we know that, in some households, spouse 1, when privately informed, will persuade their partner to delay marriage when the state is L, leading to $\Delta d\left(L,\{2\}\right) < \Delta d\left(L,\{1\}\right)$. Also, by a parallel argument, $\Delta d\left(L,\{2\}\right) < 0$ whilst $\Delta d\left(L,\{1\}\right)$ is ambiguous.

What if *both* spouses learn the true state? When both are informed about s, each would, if they

[8] For either state $s \in S$, $\overline{\delta}\left(s,\{1,2\}\right)$ can be either smaller or larger than $\overline{\delta}\left(P\right) \equiv E\left[\delta_j|P\right]$, directly reflecting that the information s will resolve prior disagreements at some $\boldsymbol{\sigma}_j$, but will also induce disagreements at some $\boldsymbol{\sigma}_j$ where there was agreement based on the prior. Persuasion could potentially reduce disagreement relative to the prior. Specifically, $\overline{\delta}\left(H,\{2\}\right) < \overline{\delta}\left(P\right)$. However, this is not robust to misclassification as $\overline{\delta}\left(H,\{1\}\right) \lesseqgtr \overline{\delta}\left(P\right)$.

have the final say, implement their preferred option at that state. As spouse 1 – the less stigma-averse parent – only engages in persuasion at state L, the effect of both learning that the state is H is the same as when spouse 1 only receives this information. Correspondingly, the effect of both learning that the state is L is the same as when spouse 2 only receives this information.

The following claim summarizes the above effects.

Claim 3. *(Effect of information.) The effect of information on marriage delay when:*
(i) There is a high probability of a benefit to delayed married, $s = H$, satisfies

$$\Delta d(H, \{1\}) = \Delta d(H, \{1, 2\}) > \Delta d(H, \{2\}), \tag{18}$$

where $\Delta d(H, \{1\}) = \Delta d(H, \{1, 2\}) > 0$ but $\Delta d(H, \{2\})$ is ambiguous.
(ii) There is a low probability of a benefit to delayed marriage, $s = L$, satisfies

$$\Delta d(L, \{2\}) = \Delta d(L, \{1, 2\}) < \Delta d(L, \{1\}), \tag{19}$$

where $\Delta d(L, \{2\}) = \Delta d(L, \{1, 2\}) < 0$ but $\Delta d(L, \{1\})$ is ambiguous.

As above, when applying the framework to the intervention, our starting point is, as above, that the information conveyed was H and that the father is relatively less stigma-averse: that is, (18) applies with spouse 1 being the father. However, the equality between the case where the father alone is informed and the case where both are informed is generally not a robust prediction. To see this, consider as above the possibility that, in some households, the father is the more stigma-averse parent. If some fathers are actually spouse 2, there would be some fathers who, when privately informed, would persuade their partners towards early marriage. This would imply that the effect of positive information should be no larger when the father alone is informed compared to when both are informed. That too, however, can also be argued not to be a robust prediction. In particular, the imposed binary state structure downplays the scope of persuasion. In a more general setting, fathers would be able to "exaggerate" positive information when privately informed, making the effect of positive information potentially larger when the father alone is informed compared to when they both are. The predictions that are robust are thus that $\Delta d(M)$ and $\Delta d(F + M)$ are *both strictly positive* and *larger* than $\Delta d(F)$ where the latter can have an ambiguous sign.

2.6 Summary of model predictions

The parents' initially incomplete information provides a natural channel through which an information intervention can affect decisions and disagreements, in our case about the timing of marriage. The model makes predictions in three domains: beliefs, decisions, and disagreements/IPV. As the edutainment intervention was designed to emphasize the benefits to delaying marriage, we have taken as starting point that the information was "positive" (H) and that fathers are relatively less stigma-averse. But we have also been careful to focus on predictions that are robust.

Beliefs: With the edutainment providing positive information, beliefs about the benefit to delaying marriage should be improved by the intervention. Moveover, parents should update their beliefs the same whenever they themselves are directly informed, either alone or jointly with their spouse. In contrast, belief updating can rationally be lower by parents who are only indirectly informed via their partner – as both spouses will, at some preference profiles, strategically misreport information.

Disagreements and IPV: The key and robust prediction is that these should be more frequent when spouses are jointly targeted compared to when either one is targeted alone, $\overline{\delta}(F+M) > \overline{\delta}(M)$ and $\overline{\delta}(F+M) > \overline{\delta}(F)$. This reflects that when only one spouse is informed, they can use this advantage and seek to persuade their partner, thus leading to less disagreements and IPV. In contrast, there are no robust predictions relative to the control group, as information will generally resolve disagreements in some households but induce disagreements in others. As noted in the Introduction, we view disagreement as an IPV trigger by acting as an emotional cue leading to a loss of control. For this reason, our main focus will be on physical violence as outcome of interest (Card and Dahl, 2011).

Marriage decisions: The robust predictions are that marriage delays increase when fathers are targeted alone, $\Delta d(M) > 0$, and also when both are targeted, $\Delta d(F+M) > 0$. These positive effects should both be larger than when mothers are targeted alone, where $\Delta d(F)$ is ambiguous.

3 Experimental design

We leverage an existing cluster-randomized controlled trial (RCT) in 177 villages in Sindh and Punjab Provinces in Pakistan, where an educational entertainment ("edutainment") intervention addressing child marriage was implemented in treatment villages and where, crucially, the gender of the targeted household members was randomly varied. The results of the RCT on the likelihood of household and village-level child marriages are reported in detail in (Cassidy et al., 2024). The villages were randomly assigned into four treatment groups:

1. The *Female* intervention (F): Targeting women only;
2. The *Male* intervention (M): Targeting men only;
3. The *Female+Male* intervention ($F + M$): Targeting the intervention at both genders simultaneously; or
4. The control group (C): No intervention.

3.1 Intervention

The intervention, which took place during the first six months of 2019, consisted of a mobile cinema screening of an educational and entertaining (edutainment) street-theater performance, written and directed by local NGOs and performed by local actors.[9] The content of the play was developed by combining evidence about household's decisions about the timing of daughters' marriage[10] with knowledge from local partner organizations and focus group discussions that were held separately with men, adolescent boys, women, and adolescent girls in pilot communities. For our context, health and spousal quality benefits and costs in terms of deviation from community age-of-marriage norms were selected as relevant. The script was then written by the local NGO to reflect these costs and benefits. The script stressed the rights of women and girls; the costs of early marriage in terms of health and education for both the young married couple and their children and the perceived costs of deviating from prevailing age-of-marriage norms. This content was conveyed through characters embodying various positions on early marriage enacting everyday situations identified by the local NGOs and the participants in the focus group discussions in these communities.

[9] Street theater is a popular art form in South Asia, and uses emotion, immersion, and perspective-taking to address sensitive social and political themes and raise awareness among the public in an entertaining way. To ensure standardization of the content across communities, the play was pre-recorded and screened to target households as a mobile cinema. The movie of the street theater lasts approximately 10 minutes.

[10] E.g., household income, such as dowry and bride price (Jensen and Thornton, 2003; Chari et al., 2017; Corno et al., 2020; Corno and Voena, 2023), health of children and grandchildren (Jensen and Thornton, 2003; Chari et al., 2017), spousal and match quality (Adams and Andrew, 2024), as well as social norms governing the age of marriage (Anderson, 2007; Buchmann et al., 2023).

A first example of a scene in the play that highlights the *potential benefit of marriage delay* for the girl and her future household is a scene where a highly educated boy arrives back to the village. He is seen arguing with his parents that he wants to marry a girl that is at least 18, because he has had a realization, during his time away from the village, that marrying a young girl might lead to marriage failure and she might not be mature enough to take care of herself, their children or their household. A second example of a scene about potential benefits of marriage delay shows an old man reminiscing on the tragic memory of his deceased first wife. He tells a community member that she was only 15 when she succumbed to complications during childbirth. He further explains that he remarried when he and his wife were both 19, and he has had a good marriage with many offspring. A scene that highlights *potential costs of marriage delay resulting from community norms about the age-of-marriage* shows a marriage ceremony, where the bride is only 12 years old. Community members attending the ceremony are deliberating whether this is an appropriate age of marriage for the girl. In this scene, the adult women and men claim that marrying at this age is what they have always done in this community. A woman then speaks up and says that they want to stick to traditions because they are concerned about the opinions of the community if they delay a girl's marriage. A young nephew then tries to convince them that delaying marriage for girls reduces health risks, and that traditions need to be reconsidered when they are harmful to young brides.

The movie screening was followed by a 30-minute group discussion that followed a standardized format, facilitated by a gender specialist from the local NGOs.[11] In the second visit to each village approximately three months later, the local NGOs again conducted structured group discussions based around the content of the movie with the same participants. These discussions were led by the same gender specialist and lasted 50 minutes.

The screening of the theater performance and the group discussions were held in communal areas in the village: typically a compound or a room of a community building. In most villages men and women were not allowed to attend jointly in the *Female+Male* intervention arm. Therefore, in this arm men and women attended separately but simultaneously. Care was taken to inform both groups that the other group would be watching the same screening and would be discussing the same topics at the same time.

Target households were mobilized to participate in the intervention a few days prior to the theater

[11] Community discussion, sometimes with facilitation, is common after a street theater performance. The facilitator followed a carefully scripted list of questions about the experience of participants with the movie, the positions of the various characters, and the consequences of early marriage. The discussion lasted for 30 minutes, immediately after the screening, and facilitators encouraged active participation from all attendees.

performance screening, by a designated focal person from the village. The gender of the invited individual from target households was according to their village's treatment status — men, women, or both. The intervention was mainly held indoors, and spaces were limited to twenty participants, and only individuals from target households were invited. Other households in study villages did not participate, and we estimate that, on average, 15% of the households with children on the marriage market are treated.[12]

3.2 Sampling and randomization

Details of the village and household sampling frame are provided in Appendix B.1. From the census of eligible households, ten households per village were randomly selected to participate in the study: five households with an adolescent boy ("boy households") and five households with an adolescent girl ("girl households"). As a result, the planned sample size was 1,770 households (10 households in each of the 177 villages – with three respondents per household: father, mother, and either an unmarried adolescent boy or an unmarried adolescent girl). Some villages did not have a sufficient number of households meeting the selection criteria due to their small size, leading to a final sample size of 1,687 households (5,061 respondents): 756 households (2,268 respondents) in Sindh province, and 931 households (2,793 respondents) in Punjab province. Given the focus of our framework on decisions about marriage delay for daughters, in this paper we will only report the analysis on the half of the sample, namely households with an adolescent girl.

After the baseline survey, villages were randomly assigned to one of the four treatment arms, after stratification first by district and second by Mahalanobis distance matching on village-level characteristics.[13] 44 villages were assigned to receive the *Male* intervention; 45 villages were assigned to receive the *Female* intervention and 44 villages the *Female+Male* intervention. The remaining 44 villages were assigned to the control group.

[12] In the 177 villages 1,383 marriages are observed over 26 months, and thus 3.6 marriages per village per year. Over that same period of time, 188 marriages are observed in targeted households, so that is roughly 0.53 marriages in a year. So 15% of the "village market" is treated.

[13] The study area covered two districts in Sindh, and two in Punjab. Within each district, the Mahalanobis distance score was computed for each of our sample villages based on the following list of village-level baseline variables: boys only primary school; girls only primary school; mixed gender primary school; girls only secondary school; distance to nearest primary girls' school (in minutes); distance to nearest girls' secondary school (in minutes); are girls allowed to leave the compound; distance to the nearest town (in minutes); presence of teashop; whether the village is a main village or sub-village; total number of households; availability of female teachers in girls' school; and presence of a primary health care center. If in a district, the variable had less than or equal to two observations or a correlation ≥ 0.6 with other variables it was not included in its score computation. Villages were grouped into groups of eight villages based on the Mahalanobis distance score, and these eight villages were subsequently randomly assigned to either one of the treatment arms or the control arm.

4 Data

The data collection for the RCT is described in full in Cassidy et al. (2024). In particular, baseline data were collected in Sindh Province in July and August 2018, before the intervention was introduced in the treatment villages. In Punjab Province, baseline village-level data was collected and the household listing exercise was conducted (including adolescent's gender, age and marital status) and sample households were selected, but it was not possible to conduct a full baseline survey due to the security situation at the time of the baseline. Randomization of villages into treatment arms was conducted after the baseline survey, and before the start of the interventions. The security situation in Punjab subsequently eased, and allowed the intervention to go ahead in Punjab according to the assigned treatment arms. The midline survey was conducted from November 2019 until March 2020, i.e. six months after the intervention had ended in treatment villages, and just before the start of the COVID-19 pandemic. When target households in Punjab were visited for the midline survey, retrospective baseline questions on some outcomes of interest were included in the survey. An endline survey was conducted between September 2020 and March 2021, i.e. 18 months after the intervention and during the later stages of the COVID-19 pandemic. The RCT and the analysis of the midline and endline data are pre-registered.[14]

4.1 Household survey data

Household survey data were collected with three respondents per household: the father, the mother, and the adolescent child.[15]

Only women received the survey module about experiences of IPV, based on the Demographic and Health Survey (DHS) IPV module (e.g., Demographic and Health Survey (2016)). Women were asked to indicate, from a list of fifteen different acts of violence potentially committed against them, if their husband had performed these acts in the last three months, and ever prior to the last three months. Out of these violent acts, eight can be classified as "emotional violence," for example if her husband acted angry or jealous when she spoke to another man, if he insisted on knowing where she was at all times, or if he insulted or threatened to harm her or someone she cares about. The remaining seven acts of violence are classified as "physical violence" and include, for example, if the husband pushed, kicked, punched or slapped her, pulled her hair, or tried to

[14] AEA RCT Registry number AEARCTR-0006098: `https://doi.org/10.1257/rct.6098-1.0`

[15] In rare cases the primary male and female caregiver of the adolescent girl were other family members, such as grandparents.

choke or burn her or attack her with a weapon.[16] Women were also asked to report physical injuries such as cuts, wounds, bruises, burns or broken bones that they incurred as a result of the above mentioned acts of violence perpetrated by their husband. Questions related to sexual violence were not asked, because these were considered too sensitive in this sample. WHO ethical guidelines on data collection in domestic violence research (WHO, 2001, 2016) were followed carefully, in order to preserve women's safety when asking them to report IPV experiences. In accordance with these guidelines, only women were asked to report IPV experiences to prevent their husband from knowing that they have been asked about this, women were surveyed by female enumerators in a private and secured location, and careful referral procedures were in place.

The module about attitudes towards IPV was administered to all respondents, based on the DHS IPV attitudes module (e.g., Demographic and Health Survey, 2016). Respondents were asked if they find it justified if a husband hits or beats his wife in seven situations, for example if she goes out without telling him, if she burns the food, or argues with him. For the same seven situations, all respondents were asked to indicate on a 5-point scale how common it is for a husband from their community to hit or beat his wife in this situation. Moreover, respondents were asked what they think community members would do if they found out a husband is hitting or beating his wife. Lastly, all respondents were asked to indicate if they have personally experienced or heard of any incidents of gossiping, shaming, neglect, decision pressure, verbal attack and physical attack in the community.

Furthermore, fathers reported household demographic information, on education, employment, and marriage status of all members of the household, as well as household financial and wealth indicators, and household decision-making information. Data on preferences, attitudes, expectations, and beliefs about (early) marriage were collected from all respondents. All three household members were also asked about the adolescent child's education, marital status, and (conditional on being married) the age at the time of marriage and spousal characteristics.

4.2 Descriptives, balance and attrition

Table 1 reports summary statistics of IPV outcomes, attitudes and household decision-making variables in the control group at midline and endline, for the households with an adolescent girl, which is the focus of all analyses in this paper. Approximately 2.5% of women report to have had at least one experience of physical IPV in the three months prior to the midline and endline survey, with a total of 10% of women experiencing either physical or emotional IPV.

[16] A complete list of questions can be found in Appendix B.2.

Community norms are also such that IPV is perceived as widely justified in many situations. At both midline and endline, all respondents report to consider it justified for a man to beat his wife in at least one of the seven situations asked, with a mean of approximately four situations.

At midline, 94% of women are reported to have some involvement in decisions about their adolescent daughter, with 21% of women making the final decision. At endline, 98% of women are reported to have some involvement in decisions, while 12.5% make the final decision. On average, women's involvement in decisions about daughters, on a scale of one to ten, is around four.

Table 1: Summary statistics IPV & household decision-making

	(1) Midline	(2) Obs.	(3) Endline	(4) Obs.
Mother experienced any physical IPV in last 3 months	0.024 (0.154)	207	0.025 (0.157)	198
Mother experienced any physical or emotional IPV in last 3 months	0.106 (0.309)	207	0.096 (0.295)	198
Number of situations (out of 7) mother finds IPV justified	4.034 (2.174)	208	4.020 (2.060)	199
Number of situations (out of 7) father finds IPV justified	3.477 (1.976)	197	3.921 (2.087)	151
Mother has any involvement in decisions about daughter	0.937 (0.244)	206	0.975 (0.157)	199
Mothers' involvement (scale of 1-10) in decisions about daughter	3.808 (2.017)	206	4.133 (1.556)	199
Mother makes final decisions about daughter	0.209 (0.407)	206	0.125 (0.332)	200

Notes: Columns 1 and 3 show the means and standard deviations (in parentheses) of the variables for the control group in the midline and endline survey respectively. The variables are: binary variables that are equal to one if the mother reports physical IPV (Row 1) or any experience of IPV (Row 2) in the three months prior to the respective survey, and zero otherwise; count variables indicating the number of situations (out of seven) in which the mother (Row 3) or father (Row 4) finds that it is justified for a man to beat his wife. Rows 5, 6, and 7 are measured by asking the father to report on the involvement of household members in decisions about the daughter by dividing 10 tokens among household members, where the token allocation represents the extent of involvement in the decision. Based on this measure the variables are: binary variables that are equal to one if the father allocates a non-zero number of tokens to the mother, and zero otherwise (Row 5); count variables of the number of tokens allocated to the mother (Row 6); a binary variable equal to one if the father reports that the mother makes the final decision about the daughter, when asked who from all household members involved makes the final decision, and zero if he indicates any other household member (Row 7). Columns 2 and 4 report the number of observations for each variable.

Table 2 reports gender differences in girl adolescents' parents' preferences for compliance with community age-of-marriage norms and expected community responses to early marriage for girls. Mothers have a stronger preference for complying with community age-of-marriage norms: significantly more mothers than fathers report considering traditions, community opinions and family customs when deciding on the marriage age of their daughter and agreeing that marriages should not happen if the community disapproves. Mothers also expect community members to be more accepting of early marriage than fathers. Mothers are more likely than fathers to expect community members to do nothing, and also believe that fewer community members would expect the community to tell the police or pressure the families when a girl is married at a young age.

Table 2: Gender differences in parents' preferred norm compliance

	(1) Female	(2) Male	(3) Difference	(4) Observations
Consider tradition, community opinion, or family custom when deciding about daughters' marriage age	0.152 (0.360)	0.084 (0.278)	0.068 (0.005)***	736
Agree that marriage should not happen if the community disapproves	0.576 (0.495)	0.416 (0.494)	0.160 (0.000)***	736
Expect that no one in community would support daughter if she wants to delay marriage	0.611 (0.488)	0.582 (0.494)	0.030 (0.532)	736
Expect that community would do nothing if they found out a girl is married young	0.804 (0.397)	0.538 (0.499)	0.266 (0.000)***	736
Community members out of 10 that believe the community will tell the police if a girl is married young	2.067 (2.102)	4.045 (2.522)	-1.978 (0.000)***	736
Community members out of 10 that believe the community will pressure the families if a girl is married young	2.488 (2.322)	4.304 (2.398)	-1.817 (0.000)***	736

Notes: The table shows baseline variables answered by mothers and fathers of adolescent girls from Sindh Province only. Column 1 and 2 present the means and standard deviations (in parentheses) of the variables for mothers and fathers respectively. Column 3 presents differences in means for fathers and mothers, with in parentheses p-values from robust standard errors clustered at the village level (unit of randomisation) from bivariate regressions of the variable of interest on gender. Column 4 shows the total number of observations for mothers and fathers combined. The upper panel shows variables for which a higher value is associated with a higher preference for norm compliance, where a positive difference between mothers and fathers indicate mothers to be more conservative than fathers. Respondents were asked for the most important thing they take into account when deciding when to marry off their daughter. The first row presents a binary variable that is equal to one if the respondent indicated either tradition, community opinion, or family custom to be most important, and zero otherwise. The second row presents a binary variable that is equal to one if the respondent agrees or strongly agrees with the statement "If the community disapproves of a marriage, then the marriage should not go ahead even if the parents want it to," and zero otherwise. The third row presents a binary variable that is equal to one if the respondent answered "nobody" to the question "who from the community would support her if your daughter would want to delay a suggested marriage?" The fourth row presents a binary variable that is equal to one if the respondent answered "nothing" to the question "what would the community do if they found out that a girl was about to be married before the legal marriage age?" The lower panel shows variables for which a higher value is associated with a lower preference for norm compliance, where a negative difference between mothers and fathers indicate mothers to be more conservative than fathers. The fifth row presents the respondents' beliefs about how many community members out of 10, averaging over men and women, think that the community would tell the police if they found out that a very young girl was about to be married. The sixth row presents the respondents' beliefs about how many community members out of 10, averaging over men and women, think that the community would speak to or pressure the families if they found out that a very young girl was about to be married. The number of observations refers to the total number of 368 females and 368 males in all households with adolescent daughters in Sindh at baseline. Stars indicate: * 1 percent ** 5 percent * 10 percent level of significance.

Further details of pre-determined respondent characteristics for the sample of households with adolescent girls are provided in Table C1 inthe Appendix. Fathers are on average 47 years old, and have around 5 years of education. Mothers have an average age of 42, and 1.5 years of education. Cassidy et al. (2024) report balance checks and attrition rates. Pre-specified village- and household-level variables are shown to be well-balanced across treatment arms and the control group. The average attrition rates in the control group are low: 5.3% for fathers, 1.2% for mothers, and 0.7% for households at midline; 13% for fathers, 6% for mothers, and 4.6% for households at endline – with no evidence for differential attrition between experimental arms.

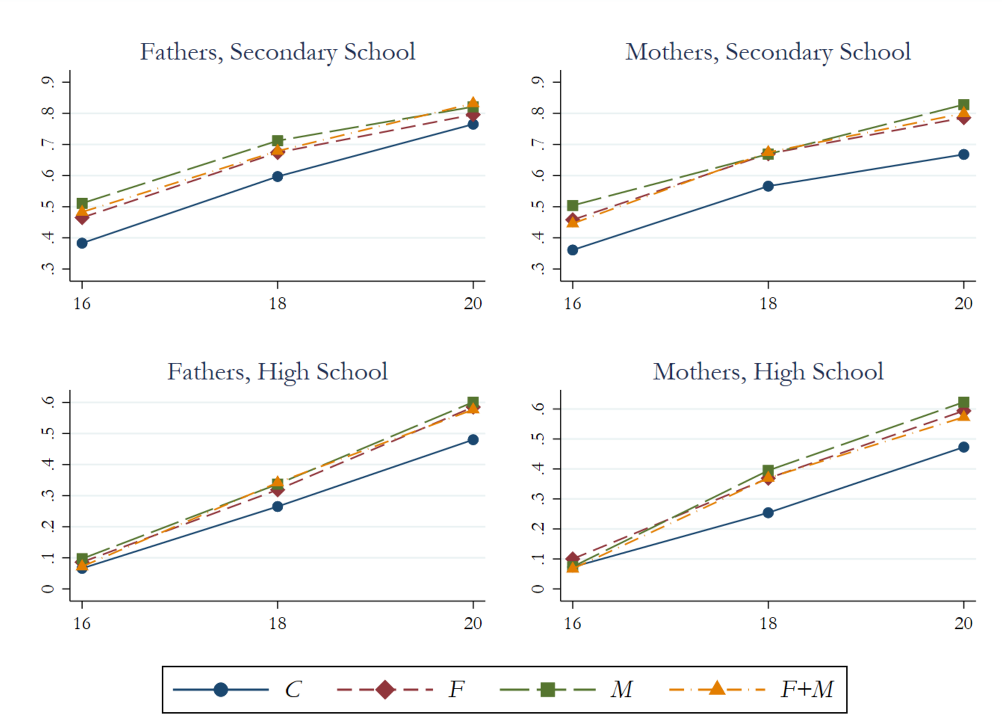
5 Results: Belief updating

In this section we test the model's predictions on parents' belief updating in response to the intervention. The Bayesian persuasion framework asserts that parents have incomplete information about a key factor relevant to their decision, but may then receive information about this factor. The framework predicts that parents should then update their beliefs in the same way whenever they are directly informed, regardless of whether their spouse is also informed, but should update their beliefs the same or less when indirectly informed via their spouse.

In our setting, the incomplete information concerns the potential benefit to marriage delay. The intervention stressed such benefits, notably in terms of the educational attainment of the daughter's prospective spouse. Empirically, we measure beliefs in terms of the expectation that the future spouse will have completed secondary (grade 9 or 10) or high school education (grade 11 or 12), conditional on the adolescent girl marrying at age 16, 18, or 20. We test that the intervention generally improved beliefs. More specifically, we test that (i) fathers update their beliefs the same in the *Male* arm as in the *Female+Male* arm, and weakly less in the *Female* arm, and (ii) mothers update their beliefs the same in the *Female* arm as in the *Female+Male* arm, and weakly less in the *Male* arm.

Figure 1 shows the expectations of fathers and mothers, at midline, that their daughter's future spouse will have completed secondary- or high-school education, if marrying at age 16, 18 or 20 respectively, by treatment group. The figure highlights a set of key features. First, beliefs – for both fathers and mothers and for both educational attainment levels – are monotonically increasing in age of marriage. This highlights that, in line with our framework, there is a perceived benefit to delaying marriage in term of the quality of the spouse. In particular, there is no evidence to suggest that parents perceive that delaying marriage until age 20 would worsen the educational attainment of the daughter's future spouse. The monotonicity in age of marriage is present also in the control group, highlighting that the intervention reinforces parents' beliefs about the benefits of delaying marriage rather than inducing such beliefs. Second, parents naturally have low expectations that the daughter's future spouse will have completed high-school education if she marries at age 16 and the intervention has little to no impact on this particular belief. All other beliefs are – based on the cell means – consistently positively affected by each treatment arm.[17] Third, whilst our regression analysis below will formally test the model's predictions that parents should update their beliefs no more when only indirectly informed, the figure indicates that both fathers and mothers do update their beliefs when only their partners are targeted. For instance, there is no indication that fathers do not update their belief in the *Female* arm and vice versa.

Figure 1: Parental beliefs about spouse educational attainment by age of marriage.



Notes: The figure shows the estimated proportion of parents who state, at midline, that they expect that the future spouse of their daughter will have at least completed secondary school (upper panels) – Grade 10 and above – or high school (lower panels) – Grade 12 and above, conditional on marrying at age 16, 18 or 20, and by treatment arm. The solid blue line in each panel represents the mean expectation in the control group (C) by the potential marriage age and the potential education level of the future spouse, and for fathers (left panels) and mothers (right panels). For the three treatment arms (F, M and $F + M$), the figure adds the estimated marginal treatment effects by treatment arm to the control group means. The control group means and estimated marginal treatment effects are presented, by potential age of marriage, in Tables 3, C3 and C5. For further details of the estimation of the marginal treatment effects, see the notes to these tables.

[17] To preserve visibility, Figure 1 does not include any confidence intervals. The regression analysis below provides the formal statistical tests for the treatment effects.

For the formal statistical testing, our preferred empirical specification, as pre-specified, is

$$Y_{ivs} = \alpha + \eta T_v + \rho T_v G_{ivs} + \theta G_{ivs} + \delta_s + \varepsilon_{ivs}, \tag{20}$$

where Y_{ivs} is the outcome variable of interest for individual i in village v and randomization strata s at midline or at endline.[18] T_v is a vector of indicators for the assignment of the village to each of the three treatment arms: the *Female*, *Male* and *Female+Male* intervention arms. G_i is a dummy that is equal to one if the gender of the adolescent child in the household is a girl. The vector of estimated coefficients η, therefore, represent the intent-to-treat (ITT) effects on households with an adolescent boy, and $\eta + \rho$ represents the ITT effects on households with an adolescent girl.[19] Given the focus of our framework on decisions about marriage delay for daughters, in this paper we will only report marginal treatment effects on households with an adolescent girl, $\eta + \rho$. Dummies δ_s for randomization strata based on Mahalanobis distance matching on baseline village-level characteristics per province are included when possible. Standard errors are clustered at the village level, which is the level of randomization.[20]

Table 3 reports ITT effects at midline on the beliefs of fathers and mothers of girl adolescents if their daughter's marriage is delayed until she is 18.[21] We report point estimates, two-sided p-values, and one-sided p-values for all tested predictions. The reported one-sided tests in the upper panel tests for positive effects on beliefs whilst the one-sided tests in the lower panel test for larger updating by spouses when directly informed compared to when only indirectly informed via the partner.

In the control group, 60% of fathers and 57% of mothers expect their daughter to marry a future spouse with secondary education if they delay her marriage age to 18. Around 27% of fathers and 25% of mothers in the control group expect their daughter's spouse to have a high school education if their daughters' marriage is delayed to the age of 18.

[18] We continue to use specification (20) throughout this paper, unless stated otherwise. We estimate equation (20) as logit regressions for binary outcome variables (e.g., experience of any type of IPV) and as OLS regressions for continuous variables (e.g., the number of situations where the respondent finds it justified if a husband hits or beats his wife).

[19] Estimated effects are ITT effects, since not all targeted individuals and households in treatment villages were always able to attend the intervention.

[20] We have also pre-registered an ANCOVA specification with baseline values of the dependent variable included as a control variable. We omit this in this paper due to unavailability of baseline data or lack of variation in baseline data of our variables of interest.

[21] We report treatment effects conditional on marriage at 16, and 20 in Tables C3, and C5 in the Appendix.

Table 3: Belief updating on spousal quality benefits to marriage delay to 18

	Secondary School		High School	
	Father	Mother	Father	Mother
	(1)	(2)	(3)	(4)
Female vs. Control	0.077	0.104	0.054	0.115
p-val $F \neq C$	(0.111)	(0.063) *	(0.284)	(0.034) **
	[0.130]	[0.092] *	[0.289]	[0.049] **
p-val $F > C$	(0.056) *	(0.032) **	(0.142)	(0.017) **
	[0.066] *	[0.048] **	[0.137]	[0.023] **
Male vs. Control	0.115	0.103	0.072	0.141
p-val $M \neq C$	(0.019) **	(0.068) *	(0.152)	(0.010) ***
	[0.030] **	[0.073] *	[0.220]	[0.021] **
p-val $M > C$	(0.010) **	(0.034) **	(0.076) *	(0.005) ***
	[0.021] **	[0.029] **	[0.116]	[0.009] ***
Female+Male vs. Control	0.082	0.109	0.077	0.116
p-val $F{+}M \neq C$	(0.082) *	(0.053) *	(0.124)	(0.031) **
	[0.089] *	[0.063] *	[0.163]	[0.043] **
p-val $F{+}M > C$	(0.041) **	(0.027) **	(0.062) *	(0.015) **
	[0.043] **	[0.025] **	[0.086] *	[0.020] **
Female vs. Male	-0.037	0.001	-0.019	-0.025
p-val $F \neq M$	(0.447)	(0.978)	(0.717)	(0.646)
	[0.466]	[0.984]	[0.738]	[0.679]
p-val $M > F$	(0.223)		(0.359)	
	[0.224]		[0.387]	
p-val $F > M$		(0.489)		(0.677)
		[0.484]		[0.624]
Female+Male vs. Male	-0.033	0.006	0.005	-0.024
p-val $F{+}M \neq M$	(0.481)	(0.907)	(0.923)	(0.658)
	[0.522]	[0.927]	[0.935]	[0.700]
p-val $F{+}M > M$		(0.454)		(0.671)
		[0.453]		[0.627]
Female+Male vs. Female	0.004	0.005	0.024	0.001
p-val $F{+}M \neq F$	(0.931)	(0.928)	(0.641)	(0.984)
	[0.951]	[0.935]	[0.656]	[0.993]
p-val $F{+}M > F$	(0.466)		(0.321)	
	[0.515]		[0.334]	
Observations	769	814	769	814
Control Mean	0.597	0.566	0.265	0.254

Notes: The table reports post-estimated marginal treatment effects for fathers and mothers of girl adolescents ($\eta + \rho$) from the pre-specified logit regression in Equation (20). The dependent variable takes on value one if the respondent - father (Column 1 and 3) or mother (Column 2 and 4) - states that they expect that the future spouse of their daughter will have at least completed secondary (Column 1-2) – Grade 10 and above – or high school (Column 3-4) – Grade 12 and above – if she is married at 18 at midline. Regressions include fixed effects for randomization strata. In parentheses, p-values from standard errors clustered at the village level (unit of randomization) and one-sided p-values in accordance with the model predictions are reported. Corresponding p-values from randomization inference following Young (2019) with 1,000 permutations are reported in square brackets. Stars indicate: *** 1 percent ** 5 percent * 10 percent level of significance. The row "observations" indicates the number of households with an adolescent girl that the marginal effects are estimated for using post-estimation. The row "control mean" indicates the percentage in the control group stating the above expectation.

As presented in the upper panel of Table 3, we find that the beliefs of both fathers and mothers about the spousal educational attainment benefits to marriage delay are revised upwards, as compared to the control group, regardless of the targeted gender. Indeed, all one-sided tests for improved beliefs relative to the control group are statistically significant (at 10% or higher), except for fathers' beliefs in relation to high-school in the *Female* arm.

In the lower panel of Table 3, we compare effects across treatment arms and find no significant differences in belief updating. In line with the predictions, we find no difference in the belief updating by fathers in the *Male* arm compared the *Female+Male* arm and, similarly, we find no difference in the belief updating by mothers in the *Female* arm compared to the *Female+Male* arm. In our test for larger updating when directly informed compared to when only indirectly informed via the spouse, we observe that the estimated effects on fathers' updating in the *Female* arm are slightly lower at point estimate, but we cannot reject equality to the effects in the *Male* and *Female+Male* arms. In Table C2 in the Appendix, we also include sharpened q-values correcting for false discovery rate using the Benjamini-Hochberg procedure (Benjamini and Hochberg, 1995; Anderson, 2008) and show that the results are robust.[22]

6 Results: IPV impacts

In this section we test the predictions from the persuasion framework with respect to IPV incidence following the arrival of information relevant to the parents' decision. In doing so we exploit that the edutainment was randomly targeted at men, women, or both in the sample households with adolescent girls.

The main prediction to be tested is that, when comparing across treatment arms, the highest likelihood of IPV should occur when spouses are jointly targeted in the *Female+Male* arm, where persuasion is not possible, as compared to when spouses are individually targeted in the *Male* arm or the *Female* arm, where persuasion by the informed parent should forge relatively more agreement. The relevance of comparing across multiple treatment arms that vary *who* receives information should be clear from the observation that information *per se* will generally resolve disagreements in some households and induce disagreements in others. As a result, the intervention will have no robust unambiguous predicted effects on IPV compared to the control group, regardless of the targeted gender.

[22] Corresponding results with sharpened q-values for marriage at ages 16 and 20 are shown in Tables C4 and C6 in the Appendix.

Table 4 presents ITT effects for the treatment arms on the likelihood that mothers of adolescent girls experienced physical IPV in the three months prior to the midline or endline, obtained from estimating (20) as a logit. For comparison, we note that (as previously shown in Table 1), 2.4% and 2.5% of women in the control group experienced physical IPV in the three months prior to the midline and endline survey respectively.

Table 4: Treatment effects on incidence of physical IPV

	Midline (1)	Endline (2)
Female vs. Control	0.014	0.004
p-val $F \neq C$	(0.556)	(0.809)
	[0.595]	[0.861]
Male vs. Control	-0.008	-0.014
p-val $M \neq C$	(0.582)	(0.341)
	[0.735]	[0.382]
Female+Male vs. Control	0.028	0.021
p-val $F{+}M \neq C$	(0.219)	(0.297)
	[0.281]	[0.218]
Female vs. Male	0.022	0.019
p-val $F \neq M$	(0.318)	(0.224)
	[0.426]	[0.345]
Female+Male vs. Male	0.036	0.035
p-val $F{+}M \neq M$	(0.086) *	(0.042) **
	[0.119]	[0.050] *
p-val $F{+}M > M$	(0.043) **	(0.021) **
	[0.051]*	[0.033]**
Female+Male vs. Female	0.014	0.016
p-val $F{+}M \neq F$	(0.623)	(0.419)
	[0.661]	[0.361]
p-val $F{+}M > F$	(0.311)	(0.210)
	[0.359]	[0.211]
Observations	816	775
Control Mean	0.024	0.025

Notes: The table reports post-estimated marginal treatment effects for mothers of girl adolescents ($\eta + \rho$) from the pre-specified logit regression in Equation (20). The dependent variables takes on value one if the mother experienced any type of physical IPV in the three months prior to the midline survey (Column 1), or endline survey (Column 2), perpetrated by their husband. A detailed overview of the survey questions that ask women about IPV experiences can be found in Table B1 in the Appendix. Standard errors are clustered at the village level, which is our level of randomization. Two-sided p-values and one-sided p-values in accordance with the model predictions are reported in parentheses. Corresponding p-values from randomization inference following Young (2019) with 1,000 permutations are reported in square brackets. Dummies for randomization strata are excluded due to strata perfect prediction of the outcome variable. Stars indicate: *** 1 percent ** 5 percent * 10 percent level of significance. The row "observations" indicates the number of households with an adolescent girl that the marginal effects are estimated for using post-estimation. The row "control mean" indicates the percentage of women in the control group that report to have experienced physical IPV in the last 3 months.

The upper panel of Table 4 presents estimated ITT effects relative to the control group. As noted above, as these compare households where at least some spouse received information to households where no spouse received information, the persuasion framework does not make any robust predictions. p-values for two-sided tests of differences are shown in parentheses. We find no significant impact on IPV incidence from the intervention when compared to the control group, regardless of the targeted gender. Note however that the largest positive point estimates – both at midline and endline – are obtained for the *Female+Male* arm, which will be relevant when we next make comparisons across treatment arms. In square brackets, we also report corresponding randomization inference p-values (Young, 2019) for the estimated ITT effects on physical IPV and show that results are similar.

The lower panel of Table 4 presents comparisons across treatment arms, that is, across recipients of information, where the persuasion framework predicts that IPV incidence should be higher in the *Female+Male* arm than in both the *Male* arm and the *Female* arm. For tests of these specific predictions, one-sided p-values are also presented. In line with the predictions, we observe the highest likelihood of physical IPV when men and women are jointly targeted in the intervention. At midline, the observed IPV incidence rate in the *Female+Male* arm is 1.4 percentage points higher than in the *Female* arm, and 3.6 percentage points higher than in the *Male* arm. Indeed, the latter difference is statistically significant in the relevant one-sided test. The corresponding differences at endline are 1.6 and 3.5 percentage points respectively, where again the latter difference is statistically significant. Whilst the IPV incidence rate in the *Female+Male* arm is higher than in the *Female* arm – both at midline and at endline – we cannot reject the null hypothesis of equality.[23]

6.1 Reporting bias

An important concern with survey measures of IPV is under- or over-reporting of incidences, which may bias the results. This is a concern especially when an intervention is targeted directly at changing outcomes of IPV (Chan, 2011; Bourey et al., 2015). Our intervention does not specifically address IPV, which mitigates concerns for direct experimenter demand effects. However, the intervention may have indirectly changed women's perceptions of violence and community norms around it. Given that we find that physical IPV is particularly high in the *Female+Male* arm, we need to carefully consider potential bias stemming from women that attended the intervention in this treatment arm becoming more inclined to report an incidence of violence, without experiencing an actual increase in incidences. This would mean that the intervention increased reporting

[23] Table C7 in the Appendix reports corresponding ITT effects on the incidence of emotional IPV.

of violence, but not the true occurrence of violence. We perform several checks to consider such reporting biases below.

IPV attitudes

Firstly, there may be an upward bias on the observed treatment effects in the *Female+Male* arm if the intervention changed women's attitudes towards IPV in such a way that they perceive less social acceptability and taboo around IPV. Suitable proxies for this can be the extent to which women consider IPV to be justified or common in their community, and beliefs women have about the probability that the community undertakes some form of action if someone reports IPV. Hence, if we find that our intervention decreases women's reports of justifiability and commonness of IPV, or increases expected community action, this may indicate a perceived reduction of social acceptability of IPV – making it easier for women to come forward when they experience IPV, raising concerns for reporting bias. Marginal treatment effects on these outcome variables for mothers of an adolescent girl are reported in Column 1-6 of Table 5. We find no treatment effects on perceived justifiability, commonness, or expected community action, at any treatment arm, neither at midline nor at endline.

Understanding of violence

Secondly, the intervention may have increased women's understanding of what is meant by violence, making them more likely to report an event as violence. If this is the case, we would expect reports of other violence in the village to also increase for women who have attended the intervention. Columns 7 and 8 of Table 5 report treatment effects on women's reports of verbal and physical attack in the village, at midline and endline respectively. We observe no significant treatment effects on reports of either form of violence. There is a marginally significantly higher likelihood of women reporting verbal attack in the *Male* arm than in the *Female* and *Female+Male* arm, but this effect goes in the opposite direction than what we should be concerned about in light of our results.

Trust in enumerators

Lastly, women may be more likely to report an incidence of violence when they trust the enumerator and feel more comfortable during the survey. Because women who participated in the intervention had more contact moments with NGO staff than women who did not receive the intervention, they could be more inclined to report an incidence of IPV, which would be a concern for reporting bias in our results.

Table 5: Treatment effects on women's attitudes, beliefs and reporting of IPV

	IPV Justifiability		IPV Commonness		Community Action		Other violence		Non-response	
	Midline	Endline	Midline	Endline	Midline	Endline	Midline	Endline	Midline	Endline
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Female vs. Control	-0.117	0.077	0.048	0.114	0.029	-0.047	0.004	-0.018	-0.000	0.005
p-val $F \neq C$	(0.561)	(0.694)	(0.636)	(0.240)	(0.634)	(0.469)	(0.854)	(0.666)	(0.997)	(0.560)
	[0.868]	[0.868]	[0.868]	[0.868]	[0.868]	[0.868]	[0.949]	[0.868]	[0.998]	[0.868]
Male vs. Control	-0.074	-0.143	0.051	0.120	0.031	-0.031	0.052	0.051	0.005	0.005
p-val $M \neq C$	(0.672)	(0.541)	(0.619)	(0.265)	(0.588)	(0.644)	(0.059)*	(0.342)	(0.625)	(0.521)
	[0.672]	[0.672]	[0.672]	[0.672]	[0.672]	[0.672]	[0.588]	[0.672]	[0.672]	[0.672]
Female+Male vs. Control	-0.183	-0.235	0.050	0.074	0.022	-0.045	0.013	-0.031	-0.005	0.023
p-val $F{+}M \neq C$	(0.354)	(0.286)	(0.628)	(0.496)	(0.672)	(0.482)	(0.563)	(0.451)	(0.315)	(0.085)*
	[0.672]	[0.672]	[0.672]	[0.672]	[0.672]	[0.672]	[0.672]	[0.672]	[0.672]	[0.672]
Female vs. Male	-0.043	0.220	-0.003	-0.007	-0.002	-0.016	-0.048	-0.069	-0.006	-0.001
p-val $F \neq M$	(0.823)	(0.316)	(0.977)	(0.942)	(0.979)	(0.803)	(0.111)	(0.169)	(0.623)	(0.933)
	[0.980]	[0.980]	[0.980]	[0.980]	[0.980]	[0.980]	[0.846]	[0.846]	[0.980]	[0.980]
Female+Male vs. Male	-0.109	-0.092	-0.000	-0.047	-0.009	-0.014	-0.039	-0.082	-0.010	0.018
p-val $F{+}M \neq M$	(0.554)	(0.704)	(0.998)	(0.668)	(0.876)	(0.826)	(0.200)	(0.101)	(0.317)	(0.222)
	[0.974]	[0.974]	[0.998]	[0.974]	[0.974]	[0.974]	[0.740]	[0.740]	[0.793]	[0.740]
Female+Male vs. Female	-0.066	-0.312	0.003	-0.040	-0.007	0.002	0.009	-0.013	-0.005	0.019
p-val $F{+}M \neq F$	(0.756)	(0.129)	(0.980)	(0.682)	(0.907)	(0.972)	(0.724)	(0.714)	(0.315)	(0.192)
	[0.980]	[0.959]	[0.980]	[0.980]	[0.980]	[0.980]	[0.980]	[0.980]	[0.980]	[0.959]
Observations	820	785	820	785	820	785	820	785	836	836
Control Mean	4.034	4.020	1.890	1.799	0.462	0.518	0.058	0.126	0.005	0.005

Notes: Table reports post-estimated marginal treatment effects for girl adolescents ($\eta + \rho$) from the pre-specified regression in Equation (20) on variables relevant for reporting bias in our IPV data, at midline (Columns 1, 3, 5, 7 and 9) and endline (Columns 2, 4, 6, 8 and 10). Columns 1-4 report marginal treatment effects from OLS regressions. The dependent variable in Columns 1-2 is the number of situations (out of seven) in which women finds that it is justified for a man to beat his wife (see Table B2 in the Appendix). The dependent variable in Columns 3-4 is how common women perceive a man beating his wife to be in the community, as an average of all the seven situations asked (see Table B2 in the Appendix) on a 5-point scale running from very rare (1) to very common (5). Columns 5-8 report marginal effects from logit estimations. In Columns 5-6, the dependent variable is a binary variable that takes on the value one if a woman expects any action from the community when they find out about a man beating his wife, and zero if she expects no action to be taken. The dependent variable in Column 7-8 is a binary variable that takes on the value one if a woman reports any incidence of verbal or physical attack in the community. The dependent variable in Columns 9-10 is a binary variable that takes on value one if the woman did not answer the IPV module, while she did answer other parts of the survey. Columns 9-10 report marginal treatment effects from OLS regressions, as estimating a logit model is not possible due to a low rate of non-response to the IPV module and insufficient variation. Standard errors are reported in parentheses and clustered at the village level, which is our level of randomization. In square brackets, sharpened q-values correcting for false discovery rate using the Benjamini–Hochberg procedure are reported (Benjamini and Hochberg, 1995; Anderson, 2008). Dummies for randomization strata are included in Columns 1-4, and excluded in Columns 5-10 due to strata perfect prediction of the outcome variable. Stars indicate: *** 1 percent ** 5 percent * 10 percent level of significance. The row "observations" indicates the number of households with an adolescent girl that the marginal effects are estimated for using post-estimation.

If indeed women in the *Female* and *Female+Male* treatment arm have larger trust in enumerators, we would expect that those women would also be less likely to attrit, or refuse to answer the specific IPV questions in the survey. As noted in Section 4.2, attrition is not differential between experimental arms. Columns 9 and 10 in Table 5 further show that the non-response rate to the IPV module by women who have answered the rest of the survey is not different in any treatment arm relative to the control group.

To conclude, we find no evidence of the intervention having impacted women's attitudes or beliefs about IPV and other violence. Moreover, the intervention does not seem to have impacted women's trust in enumerators. Although our survey measures of IPV are likely prone to general under-reporting, we can confidently conclude, based on the checks above, that inaccuracies in reporting of IPV are not differential between experimental arms. This means that the observed treatment effects on IPV reflect a true increase in occurrences of IPV, and are not driven by reporting bias.

7 Results: Child marriage impacts

Section 2.6 noted the robust predictions that the intervention, when targeting fathers alone or when targeting fathers and mothers jointly, should increase the frequency of marriage delays ($\Delta(M) > 0$ and $\Delta(F + M) > 0$). These positive effects should both be larger than when mothers are targeted alone, where the sign of $\Delta(F)$ is ambiguous. In this section, we present results on child marriage impacts – first published in this paper's companion paper (Cassidy et al., 2024) – that confirm these predictions.

Using our marriage data we estimate the average annual hazard for entry into child marriage using a discrete approximation of a censored duration model as developed in Cassidy et al. (2024).[24] The data is converted into an adolescent-year panel, where each girl enters the sample at her baseline age and contributes one observation for each post-baseline year-at-risk between ages 13 and 17. A girl who either marries or passes the age 18 threshold exits the data at that point, whilst girls who are still unmarried and under the age of 18 at the time of the midline or endline survey are right-censored as they may still experience an unobserved child marriage.[25]

We estimate the probability of adolescent i, with baseline age k, in village v and strata s, entering

[24] Corno et al. (2020) use a similar estimation strategy for the annual hazard rate into child marriage.
[25] The midline survey was conducted six months after the intervention, which is more than a year after the baseline survey. This means that every adolescent girl contributes one or two observations by the time of the midline survey. The endline survey was conducted eighteen months after the intervention, which is more than two years after the baseline survey. This means that every adolescent girl contributes two or three observations by the time of the endline survey. We observe more complete marital histories at endline than at midline, implying less censoring in the endline analysis. We are, however, interested in short-term and long-term impacts of our intervention, and therefore conduct the analysis at both midline and endline.

child marriage at age t, using the following specification,

$$Y_{iktvs} = \beta T_v + \phi_t + \gamma_k + \delta_s + \epsilon_{iktvs}. \tag{21}$$

The binary dependent variable, Y_{iktvs}, indicates entry into child marriage. It is thus zero for any at-risk year where marriage does not occur. Specifically, adolescent i will have one of three possible paths for Y_{iktvs}. For an adolescent who is observed, at midline or endline, to have married between age 13 and 17, the dependent variable is zero for the ages prior to her marriage and as unity for the age at which she marries. She exits the data thereafter. For an adolescent observed to reach the age of 18 by the midline or endline while still being unmarried, the dependent variable is zero for all of her observations. Finally, for an adolescent still under the age of 18 and unmarried by the midline or endline survey, the dependent variable is zero prior to this censoring point and missing thereafter. T_v is a vector of dummies for village v being assigned to each of our three treatment arms – *Male*, *Female*, or *Female+Male*. The vector β is our coefficients of interest and represents the ITT effect of our interventions on the average annual hazard rate of child marriage. δ_s are fixed effects for randomization strata, ϕ_t is a vector of age fixed effects accounting for the different probability of marriage at at-risk ages $\{13, 14..., 17\}$, and γ_k are fixed effects for girls' baseline age to account for cohort effects. Thus, our identifying variation comes from within-at-risk-age and within-cohort variation in treatment arms and marriage outcomes. We estimate Equation (21) using OLS with standard errors robust to village-level heteroskedasticity, as this was the level of randomization.

Table 6 presents the test of the model predictions on the probability of child marriage for girl adolescents up to midline and endline. Columns (1) and (2) present estimations from Equation (21) where observations beyond the censoring point are coded as missing, our preferred specification. We also present results from an alternative specification in Columns (3) and (4), where censored observations that are still at risk of being child married are coded as the cohort-specific, age-specific, and treatment arm-specific probability of marriage between their current age and below the age 18 threshold. In Columns (5) and (6) we present estimated marginal effects on the probability of child marriage for adolescent girls from a logit model according to our pre-specified specification in Equation (20), where the outcome for each adolescent is a single indicator for child marriage. The main difference between the preferred specification in Equation (21) and the pre-specified logit is how censored data are accounted for. A limitation of the pre-specified logit is that it codes all adolescents who are under 18 and unmarried at the time of the survey as "not child married", thereby not accounting for the continued risk through to age 18. The complete report of the preferred and pre-specified analysis of the child marriage data as reported in Cassidy et al. (2024) can be found in Table C8 in the Appendix.

In the control group, the average annual hazard rate of child marriage for girls is 2.9 percent per year at midline and 4.2 percent per year at endline. Column 5-6 shows that 6 percent and 12 percent of girls are child married in the control group at midline and endline, respectively.

Table 6: Tests for predictions of treatment effects on probability of child marriage

	Annual Hazard Rate		Annual Hazard Rate		Logit Probability	
	Preferred		*Alternative*		*Pre-specified*	
	Midline	Endline	Midline	Endline	Midline	Endline
	(1)	(2)	(3)	(4)	(5)	(6)
Female vs. Control	0.004	-0.013	0.021	-0.011	0.013	-0.025
p-val $F \neq C$	(0.721)	(0.280)	(0.004)***	(0.238)	(0.671)	(0.493)
	[0.767]	[0.341]	[0.003]***	[0.294]	[0.705]	[0.550]
Male vs. Control	-0.018	-0.017	-0.030	-0.019	-0.041	-0.053
p-val $M < C$	(0.018)**	(0.054)*	(0.000)***	(0.012)**	(0.014)**	(0.042)**
	[0.020]**	[0.065]*	[0.000]***	[0.012]**	[0.012]**	[0.046]**
Female+Male vs. Control	-0.007	-0.017	-0.011	-0.024	-0.015	-0.052
p-val $F{+}M < C$	(0.220)	(0.052)*	(0.024)**	(0.002)***	(0.249)	(0.041)**
	[0.221]	[0.060]*	[0.031]**	[0.004]***	[0.241]	[0.045]**
Female vs. Male	0.022	0.004	0.051	0.008	0.054	0.028
p-val $F > M$	(0.016)**	(0.346)	(0.000)***	(0.157)	(0.028)**	(0.204)
	[0.029]**	[0.374]	[0.000]***	[0.191]	[0.045]**	[0.250]
Female+Male vs. Female	-0.012	-0.004	-0.032	-0.013	-0.028	-0.026
p-val $F{+}M < F$	(0.162)	(0.347)	(0.000)***	(0.048)**	(0.180)	(0.212)
	[0.180]	[0.377]	[0.000]***	[0.059]*	[0.194]	[0.258]
Observations	1,641	2,159	2,990	2,843	828	798
Control Mean	0.029	0.042	0.044	0.053	0.062	0.123

Notes: The table presents treatment effects on the probability of child marriage for girl adolescents from our sample households. Marriage outcomes are as reported by the adolescent themselves, as pre-specified. Reported are estimations for midline and endline. Column 1-2 reports estimated effects on the average hazard rate for entry into child marriage, using a discrete approximation of a censored duration model, estimated from Equation (21). Data is an adolescent-year panel, where each adolescent contributes one observation for each post-baseline at-risk year, that is, between 13 and 17. The dependent variable is a binary variable. For a girl who marries by the time of the survey (and under the age of 18), the dependent variable is coded as unity in the year of marriage, and she then exits the data. A girl who reaches the age of 18 unmarried by the time of the survey also exits the data. A girl who is unmarried by the time to survey but still under age 18 is right censored in the preferred specification. Column 3-4 reports an alternative specification where censored observations are coded as the cohort-specific, age-specific, and treatment arm-specific probability of marriage between their current age and below the 18-year threshold. Fixed effects for each age at-risk of marriage, baseline age and randomization strata are included. Column 5-6 reports post-estimated marginal treatment effects for girl adolescents ($\eta + \rho$) from the pre-specified logit regression in Equation (20), with "child-marriage" as outcome variable – i.e a dummy variable that takes on the value of one if the adolescent is observed to marry below the age of 18 – for midline and endline respectively. One-sided p-values for marginal treatment effects in accordance with the model predictions are based on standard errors clustered at village level (unit of randomization), and are indicated in parentheses. Corresponding p-values from randomization inference following Young (2019) with 1,000 permutations are reported in square brackets. Stars indicate: *** 1 percent ** 5 percent * 10 percent level of significance. The row "Control Mean" indicates the average annual probability of child marriage – over cohorts (Column 1-4) – in the control group.

The upper panel of Table 6 presents estimates of the impact of the intervention relative to the control group. The robust predictions from the persuasion framework that are tested are that the probability of child marriage should decrease in the *Male arm* and in the *Female+Male arm*. The prediction is confirmed for the *Male arm* in our preferred specification: at midline – six months after the intervention – there is a 1.8 percentage points reduction in the average annual probability of child marriage (p-value<0.05 in the one-sided test) while at endline – 18 months after the interventions – there is a 1.7 percentage points reduction (p-value<0.1 in the one-sided test). The point estimates for the *Female+Male arm* for the impact on the average annual probability of child marriage are also negative, but only significant at endline, indicating a 1.7 percentage points reduction (p-value<0.1 in the one-sided test). In contrast, and consistent with the predicted ambiguous effect in the *Female arm*, the estimates are not consistently negative and not statistically significantly different from zero.

The lower panel highlights the comparisons between the treatment arms where we specifically test the predictions of larger negative effects on the probability of child marriage in the *Male arm* and in the *Female+Male arm* compared to the *Female arm*. The prediction is confirmed for the *Male arm* at midline where we find that the average annual probability of child marriage is 2.2 percentage points higher in the *Female arm* than in the *Male arm* (p-value<0.05 in the one and two-sided tests). While the remaining three differences (*Male arm* versus *Female arm* at endline and *Female+Male arm* versus *Female arm* at both midline and endline) have the predicted signs, none is statistically significant. The results are robust to the alternative specification as reported in Columns 3-4.

Qualitatively, the results from the pre-specified logit model are similar, but less precisely estimated. Relative to the control group, we observe reductions in the probability of child marriage in the *Male arm* at midline (p-value<0.05 in the one and two-sided test) and endline (p-value<0.05 in the one-sided test) and in the *Female+Male arm* at midline (although insignificant) and endline (p-value<0.05 in the one-sided test). In contrast, we find no consistent or statistically significant effect in the *Female arm* relative to the control group. The implied differences between treatment arms also follow the same pattern as in our preferred specification.

8 Conclusion

We study the impact on IPV of targeting information relevant for a high-stakes household decision, at men, women or both. This is important because a wide range of interventions target information at households, or at men only or women only, which may lead to reconsideration of the household decision, spark disagreements, and increase the likelihood of IPV. We show theoretically and empirically that the extent to which disagreements and violence are triggered, may depend on whether the male, female, or both partners are targeted with the information, and the degree to which this information is shared between partners.

We formulate a model of Bayesian persuasion in which spouses decide whether or not to delay their daughter's marriage in a context of community age-of-marriage norms that condone child marriage. Due to systematic gender differences in the perceived costs of stigma resulting from deviations from the age-of-marriage norm, the model predicts that new information about the benefit to delaying marriage can cause an increase in disagreements and IPV particularly when both spouses receive the information. When one spouse receives the information privately, they gain an information advantage and will strategically share or conceal information to secure agreement around their own preferred marriage timing choice. Persuasion through strategic communication is not possible when spouses receive the information jointly. Consistent with this, we find the highest incidence rate of physical IPV when men and women are targeted jointly.

In terms of policy implications, our results indicate that providing information about household decisions to both spouses may limit each spouse's ability to strategically represent this information to avoid disagreements and IPV in the household. This urges for a careful consideration of whom to target when rolling out information interventions on high-stakes topics that are subject to joint household decision-making. Interventions targeting both partners in a household may want to enhance their program with a conflict-mitigating component. Our paper also contributes a novel perspective to decision-making in households where spouses are fully aware of each other's strategic motives to use information to their advantage, but with an objective to avoid conflict and forge agreement.

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A Model Appendix: Proofs

In this appendix we provide proofs of Claims 1 - 2. To do so it is helpful to classify household based on their preferences. Hence we will refer to the six-tuple of preferred options by spouse 1 and 2 at L, P and H, that is $\{d_{ij}(k)\}_{i=1,2}^{k=L,P,K}$, as household j's "preference profile". Given Assumptions 1 and 3 there are ten possible preference profiles, denoted $C^0, ..., C^9$. The preference profile of any given household $j \in J$, denoted C_j, depends on $\boldsymbol{\sigma}_j$. For instance, $C_j = C^0$ if $\sigma_{1j} > \underline{\sigma}(H)$ and $\sigma_{2j} > \underline{\sigma}(H)$ whereby both spouses prefer early marriage even at state H. The ten possible preference profiles are displayed in Table A1 where, in each panel, row i is for spouse i. The monotonicities in (9) are reflected in row- and column monotonicity respectively. How the ten preference profiles relate to the underlying pair of stigma aversions $\boldsymbol{\sigma}_j$ is illustrated in Figure A1.

Table A1: Possible preference profiles.

Profile C^0

L	P	H
0	0	0
0	0	0

Profile C^1

L	P	H
0	0	1
0	0	0

Profile C^2

L	P	H
0	1	1
0	0	0

Profile C^3

L	P	H
1	1	1
0	0	0

Profile C^4

L	P	H
0	0	1
0	0	1

Profile C^5

L	P	H
0	1	1
0	0	1

Profile C^6

L	P	H
1	1	1
0	0	1

Profile C^7

L	P	H
0	1	1
0	1	1

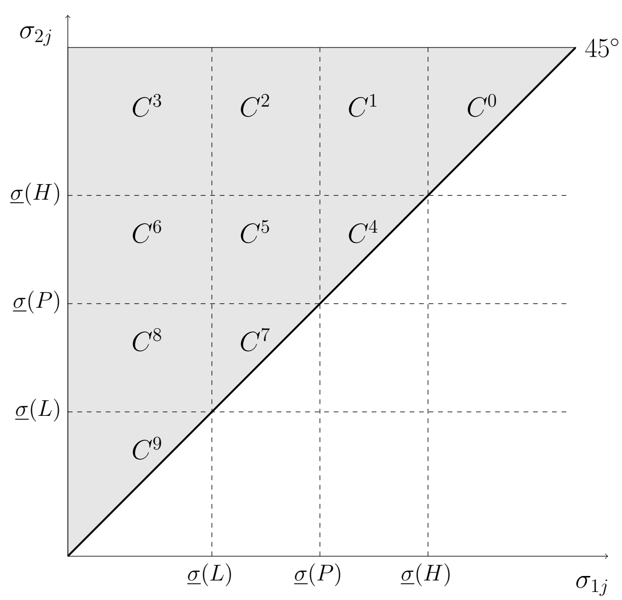
Profile C^8

L	P	H
1	1	1
0	1	1

Profile C^9

L	P	H
1	1	1
1	1	1

Figure A1: Preference profile by aversions toward stigma.



Proof of Claim 1. Truthful reporting of s is privately optimal for each spouse when they *agree* on the course of action at each of the two possible states $s \in S$. Truthful reporting is also privately optimal when they *disagree* at both states. Hence truthful reporting will be privately optimal for *both* spouses at preference profiles C^0, C^3, C^4, C^5, C^7, and C^9. Conversely, at the remaining four preference profiles, C^1, C^2, C^6 and C^8, *some* spouse will have an incentive to report non-truthfully.

Consider first the case where spouse 1 is the informed spouse. At profiles C^1 and C^2, the spouse 2 will prefer early marriage for *any* beliefs they may hold. Given this, it is optimal for spouse 1 to communicate truthfully at these profiles. At profiles C^6 and C^8 spouse 1 prefers to delay even if the state is L whereas spouse 2's preferred option depends on their beliefs. At profile C^8 the partner also prefers to delay on the prior. Spouse 1 then optimally adopts the uninformative strategy $\boldsymbol{\phi}^*_{1j} = (1, 1)$ which always reports $\widetilde{s}_{1j} = H$ as doing so ensures that partner retains their prior belief and continues to support delayed marriage. At profile C^6 the partner prefers early marriage on the prior. In this case the optimal strategy for spouse 1 is to reveal L with the lowest frequency compatible with the partner preferring to delay upon receiving the signal $\widetilde{s}_{1j} = H$. The uniquely implied probability is the first term in the bracketed expression in (12). To see this, note that from (10), spouse 2's posterior beliefs upon receiving the signal $\widetilde{s}_{1j} = H$ satisfies

$$\mu_{2j} = \Pr\left(s = H | \widetilde{s}_{1j} = H; \boldsymbol{\phi}_{1j}\right) = \frac{\mu}{\mu + (1-\mu)\,\phi^*_{1j}}, \tag{22}$$

where we used that spouse 1's communication strategy takes the form $\boldsymbol{\phi}_{1j} = \left(\phi^*_{1j}, 1\right)$. For the partner to prefer to delay marriage upon the signal $\widetilde{s}_{1j} = H$ it must be that $(1-\mu_{2j})\,\pi_L + \mu_{2j}\pi_H \geq \sigma_{2j}\rho\left(1 - 2\widehat{d}\right)$, or, substituting using (22) and rearranging,

$$\frac{\mu}{\mu + (1-\mu)\,\phi^*_{1j}} \geq \frac{\sigma_{2j}\rho\left(1 - 2\widehat{d}\right) - \pi_L}{\pi_H - \pi_L}. \tag{23}$$

Given that, at profile C^6, spouse 2 prefers early marriage on the prior and delayed marriage at H, this equation will hold with equality for a unique ϕ^*_{1j} in unit interval. To see this, consider the generic case where spouse 2's stigma aversion σ_{2j} is such that their preferences over marriage timing are strict both at P and at H, that is $\underline{\sigma}(P) < \sigma_{2j} < \underline{\sigma}(H)$. Then, (i) at $\phi_{1j} = 0$ equation (23) holds with strictly inequality as the partner prefers to delay at state H, $\pi_H > \sigma_{2j}\rho\left(1 - 2\widehat{d}\right)$, and (ii) at $\phi_{1j} = 1$ equation (23) is strictly violated as the partner prefers to early marriage on the prior P, $\pi_P < \sigma_{2j}\rho\left(1 - 2\widehat{d}\right)$. Since the left hand side of (23) is strictly decreasing in ϕ_{1j}, equality will hold for a unique ϕ^*_{1j} in unit interval. In the limiting cases where spouse 2 is indifferent between early and delayed marriage either at P or H, ϕ^*_{1j} will limit to 1 and 0 respectively. Solving (23) as equality for ϕ^*_{1j} gives the term in the bracket in (12).

A completely analogue set of arguments apply when spouse 2 is the informed spouse. At profiles C^6 and C^8, spouse 1 will prefer delayed marriage for *any* beliefs they may hold. Given this, it is optimal for spouse 2 to communicate truthfully at these profiles. At profiles C^1 and C^2 spouse 2 prefers early marriage even if the state is H whereas spouse 1's preferred option depends on their beliefs. At profile C^1 the partner also prefers early marriage on the prior. Spouse 2 then optimally adopts the uninformative strategy $\boldsymbol{\phi}^*_{1j} = (0, 0)$ which always reports $\widetilde{s}_{1j} = L$ as doing so ensures that the partner retains their prior belief and continues to support early marriage. At profile C^2 spouse 1 prefers early marriage on the prior. In this case spouse 2 will instead reveal the state to be H with positive probability, but will do so with the lowest frequency compatible with the partner preferring early marriage upon receiving the signal $\widetilde{s}_{1j} = L$. The uniquely implied probability is the first term in the bracketed expression in (13). #

Proof of Claim 2. Any potential disagreement will reflect the household's preference profile. Profiles C^0, C^4, C^7, and C^9 are in this respect uninteresting as, not only will any spouse communicate truthfully at these profiles (Claim 1), they will also *always agree* on a course of action. This is not surprising: at these profiles the spouses have similar preferences as indicated by closeness to the 45-degree line in Figure A1. Profile C^3 is also uninteresting as the spouses will in this case *always disagree* irrespective of what information is available to whom. Conversely, at profiles C^1, C^2, C^5, C^6, and C^8 whether a disagreement occurs or not will depend on what information is available and to whom.

Table A2: The probability of disagreement by state and information recipient

Prior, P					
	C^1	C^2	C^5	C^6	C^8
No Spouse Informed	0	1	1	1	0
High Probability of Benefit, $s = H$					
	C^1	C^2	C^5	C^6	C^8
Spouse 1 (Father)	1	1	0	0	0
Spouse 2 (Mother)	0	ϕ^*_{2j}	0	0	0
Both Spouses	1	1	0	0	0
Low Probability of Benefit, $s = L$					
	C^1	C^2	C^5	C^6	C^8
Spouse 1 (Father)	0	0	0	$1 - \phi^*_{1j}$	0
Spouse 2 (Mother)	0	0	0	1	1
Both Spouses	0	0	0	1	1

For the latter five preference profiles, Table A2 lists the equilibrium probabilities of disagreements,

$E[\delta_j|s, \{i\}, \boldsymbol{\sigma}_j]$, by state s and information recipient $\{i\}$ (which is the empty set in the case of the prior) where the expectation is taken over any potential signals sent by the informed spouse. For instance, spouse 1, in any household j, if they learn that $s = H$, will report this information truthfully (Claim 1), but whether a disagreement will occur depends of the household's preference profile. If $C_j = C^1$, the information will lead them to disagree. In contrast, if $C_j = C^5$, the information will lead them to agree to delay.

Claim 2 then follows directly from the entries in Table A2. For instance, the aggregation of the probabilities of disagreement – that is, taking the expectation over $\boldsymbol{\sigma}_j$ – will for *any* distribution of $\boldsymbol{\sigma}_j$ imply a higher aggregate frequency of disagreements when both spouses are informed that $s = H$ than when the same information is privately received by spouse 2. Specifically, in any household with $C_j = C^1$, a disagreement will occur if both spouses are informed that $s = H$, but will not occur if only spouse 2 is informed. Similarly, in any household with $C_j = C^2$, a disagreement will occur if both spouses are informed that $s = H$, but will only occur with a positive probability ϕ^*_{2j} if only spouse 2 is informed. The equalities and inequalities in (15) and (16) follow in this way directly from Table A2.

For completeness, the table also highlights the prior. Note however, the comparison of the aggregation under the prior to the aggregation where one or both spouses are informed about s is generally ambiguous. The only exceptions would be where spouse 2 (alt. 1) is informed that the state is H (alt. L). However, as noted in the text and can be seen from the table, these comparisons would not be robust to there being some positive fraction of misclassifications. #

Proof of Claim 3. The effect of information on households' decision can be determined by combining the privately optimal communication strategies described in Claim 1 with the preference profiles listed in Table A1. Table A3 outlines the effect of information by information recipient $\{i\}$, information s, and by preference profile C_j. Each panel only lists the preference profiles for which there is a non-zero effect for at least *some* information recipient. For instance, if $C_j = C^1$ and spouse 1 receives the information that $s = H$, the probability of household j delaying marriage increases from zero under the prior to α, thus increasing by α.

Table A3: Effect of information about the state on the probability of marriage delay – by state, information recipient and preference profile.

High Probability of Benefit, $s = H$					
	C^1	C^2	C^4	C^5	C^6
Spouse 1 (Father)	α	0	1	$1-\alpha$	$1-\alpha$
Spouse 2 (Mother)	0	$-\alpha(1-\phi^*_{2j})$	1	$1-\alpha$	$1-\alpha$
Both Spouses	α	0	1	$1-\alpha$	$1-\alpha$
Low Probability of Benefit, $s = L$					
	C^2	C^5	C^6	C^7	C^8
Spouse 1 (Father)	$-\alpha$	$-\alpha$	$(1-\alpha)\phi^*_{1j}$	-1	0
Spouse 2 (Mother)	$-\alpha$	$-\alpha$	0	-1	$\alpha-1$
Both Spouses	$-\alpha$	$-\alpha$	0	-1	$\alpha-1$

Consider first $s = H$. If spouse 1 learns that $s = H$, the probability of marriage delay increases at profiles C^1, C^4, C^5, C^6. If, in contrast, spouse 2 learns the same information, the same increase in the delay probability occurs at profiles C^4, C^5, and C^6, but no increase occurs at profile C^1 (as spouse 2 at this profiles sends an uninformative signal $\widetilde{s}_{2j} = L$). Moreover, at C^2 a decrease in the delay probability occurs when spouse 2 is informed that $s = H$, as they persuade their partner of an early marriage with positive probability $1 - \phi^*_{2j}$. If both spouses learn that $s = H$, implement their preferred option at that state if they have the final say (Assumption 4). It is easy to see that the effect of both spouses being informed that $s = H$ has the same effect in every household as spouse 1 only being informed. The effects of $s = L$ can be deduced in a corresponding way.

Claim 3 then follows directly from the entries in Table A3. For instance, the aggregation of the effects of information – that is, taking the expectation over $\boldsymbol{\sigma}_j$ – will for *any* distribution of $\boldsymbol{\sigma}_j$ imply a higher aggregate effect when only spouse 1 is informed that $s = H$ (and the same if both spouses were informed) compared when only spouse 2 receives this information. Moreover, the former aggregate effect is – for any distribution of preferences – strictly positive whereas the latter is ambiguous. The case of $s = L$ deduced in a corresponding way. #

B Data Appendix

B.1 Sample frame

Sampling and randomization was conducted in three stages. First, the local NGOs selected villages for inclusion in the study. To minimize the risk of contamination across villages, villages that had less than 1.6 kilometers between their outer boundaries were excluded, based on a mapping exercise conducted with the local NGOs and local government offices. This left 80 eligible villages from Sindh Province and 97 eligible villages from Punjab Province. Next, baseline village-level data were collected on key village characteristics including presence of and distance to primary and secondary boys/girls/mixed schools, presence of female teachers, distance to nearest town, presence of health center and tea shop, population size, and mobility of women in the village.

Next, a household listing exercise was conducted to obtain a census of households in each village that were eligible to participate in the study. The eligibility criteria were that households needed to have at least one unmarried adolescent son or daughter aged 13-17 years and needed to have at least one adult father or male caregiver and one adult mother or female caregiver in the household. Ages of adolescents were verified either through National Identity Card (NIC), or a Birth Registration Certificate (B-Form) where applicable.[26]

[26] In Pakistan, citizens who are age 18 years and older are eligible for a National Identity Card. It is possible, given that our villages are remote and rural, that not all households have applied for these cards. Birth Registration Certificates (B-Form) are issued by the local government at the time of birth. They contain the name and date of birth of the individual in question and the name and date of birth of their parents as well as siblings.

B.2 Survey questions

Table B1: Survey questions IPV experiences

Emotional Violence
In the last three months, was your husband jealous or angry if you talked to other men?
In the last three months, did your husband frequently accuse you of being unfaithful?
In the last three months, did your husband not permit you to meet your female friends?
In the last three months, did your husband try to limit your contact with your family?
In the last three months, did your husband insist on knowing where you were at all times?
In the last three months, did your husband say or do something to humiliate you in front of others?
In the last three months, did your husband threaten to hurt or harm you or someone you care about?
In the last three months, did your husband insult you or make you feel bad about yourself?
Physical Violence
In the last three months, did your husband push you, shook you, or threw something at you?
In the last three months, did your husband slap you?
In the last three months, did your husband twist your arm or pull your hair?
In the last three months, did your husband kick you, drag you, or beat you up?
In the last three months, did your husband punch you with his fist or something that could hurt you?
In the last three months, did your husband try to choke you, or burn you on purpose?
In the last three months, did your husband threaten or attack you with a knife, gun, or other weapon?

Table B2: Survey questions attitudes IPV justifiability

In your opinion, are husbands justified in hitting their wife if ..
.. she goes out without telling him?
.. she neglects the children?
.. she argues with him?
.. she burns the food?
.. she neglects the in-laws?
.. she refuses to come to him (for sex) ?
.. she spends money on things he does not approve of?

C Empirical Appendix

Table C1: Summary statistics mother and father's characteristics

	(1) Min	(2) Mean	(3) Max	(4) SD	(5) Obs.
Father's age in years	17	46.73	76	8.86	796
Mother's age in years	18	42.23	70	7.77	810
Father's years of education	0	4.81	16	4.89	793
Mother's years of education	0	1.57	16	3.54	809

Notes: The minimum, mean, maximum, standard deviation, and number of observations for all respondent characteristics in our sample of households with daughters are reported in Column 1, 2, 3, 4 and 5 respectively. We report age (Row 1 and 2) and education (Row 3 and 4) of both fathers (Row 1 and 3) and mothers (Row 2 and 4), as reported by the father.

Table C2: Belief updating on spousal quality benefits to marriage delay to 18 (FDR corrections)

	Secondary School		High School	
	Father	Mother	Father	Mother
	(1)	(2)	(3)	(4)
Female vs. Control	0.077	0.104	0.054	0.115
p-val $F \neq C$	(0.111)	(0.063) *	(0.284)	(0.034) **
	[0.395]	[0.127]	[0.395]	[0.127]
p-val $F > C$	(0.056) *	(0.032) **	(0.142)	(0.017) **
	[0.198]	[0.064] *	[0.198]	[0.064] *
Male vs. Control	0.115	0.103	0.072	0.141
p-val $M \neq C$	(0.019) **	(0.068) *	(0.152)	(0.010) ***
	[0.076] *	[0.091] *	[0.203]	[0.020] **
p-val $M > C$	(0.010) **	(0.034) **	(0.076) *	(0.005) ***
	[0.040] **	[0.046] **	[0.102]	[0.010] ***
Female+Male vs. Control	0.082	0.109	0.077	0.116
p-val $F{+}M \neq C$	(0.082) *	(0.053) *	(0.124)	(0.031) **
	[0.246]	[0.071] *	[0.246]	[0.062] *
p-val $F{+}M > C$	(0.041) **	(0.027) **	(0.062) *	(0.015) **
	[0.123]	[0.036] **	[0.123]	[0.030] **
Female vs. Male	-0.037	0.001	-0.019	-0.025
p-val $F \neq M$	(0.447)	(0.978)	(0.717)	(0.646)
	[0.865]	[0.978]	[0.865]	[0.862]
p-val $M > F$	(0.223)		(0.359)	
	[0.479]		[0.479]	
p-val $F > M$		(0.489)		(0.677)
		[0.972]		[0.972]
Female+Male vs. Male	-0.033	0.006	0.005	-0.024
p-val $F{+}M \neq M$	(0.481)	(0.907)	(0.923)	(0.658)
	[0.923]	[0.908]	[0.923]	[0.908]
p-val $F{+}M > M$		(0.454)		(0.671)
		[0.671]		[0.671]
Female+Male vs. Female	0.004	0.005	0.024	0.001
p-val $F{+}M \neq F$	(0.931)	(0.928)	(0.641)	(0.984)
	[0.966]	[0.984]	[0.966]	[0.984]
p-val $F{+}M > F$	(0.466)		(0.321)	
	[0.517]		[0.517]	
Observations	769	814	769	814
Control Mean	0.597	0.566	0.265	0.254

Notes: The table reports post-estimated marginal treatment effects for fathers and mothers of girl adolescents ($\eta + \rho$) from the pre-specified logit regression in Equation (20). The dependent variable takes on value one if the respondent - father (Column 1 and 3) or mother (Column 2 and 4) - states that they expect that the future spouse of their daughter will have at least completed secondary (Column 1-2) – Grade 10 and above – or high school (Column 3-4) – Grade 12 and above – if she is married at 18 at midline. Regressions include fixed effects for randomization strata. In parentheses, p-values from standard errors clustered at the village level (unit of randomization) and one-sided p-values in accordance with the model predictions are reported. Corresponding q-values correcting for false discovery rate within each family of schooling levels per respondent per treatment arm comparison test using the Benjamini-Hochberg procedure are reported in square brackets. Stars indicate: *** 1 percent ** 5 percent * 10 percent level of significance. The row "observations" indicates the number of households with an adolescent girl that the marginal effects are estimated for using post-estimation. The row "control mean" indicates the percentage in the control group stating the above expectation.

Table C3: Belief updating on spousal quality benefits to marriage delay to 16

	Secondary School		High School	
	Father	Mother	Father	Mother
	(1)	(2)	(3)	(4)
Female vs. Control	0.082	0.097	0.020	0.027
p-val $F \neq C$	(0.121)	(0.083) *	(0.468)	(0.392)
	[0.142]	[0.115]	[0.444]	[0.387]
p-val $F > C$	(0.061) *	(0.042) **	(0.234)	(0.196)
	[0.074] *	[0.055] *	[0.238]	[0.206]
Male vs. Control	0.128	0.143	0.031	0.001
p-val $M \neq C$	(0.019) **	(0.010) **	(0.312)	(0.986)
	[0.044] **	[0.017] **	[0.352]	[0.984]
p-val $M > C$	(0.009) ***	(0.005) ***	(0.156)	(0.493)
	[0.024] **	[0.007] ***	[0.176]	[0.404]
Female+Male vs. Control	0.100	0.085	0.006	-0.006
p-val $F{+}M \neq C$	(0.048) **	(0.146)	(0.827)	(0.846)
	[0.061] *	[0.135]	[0.829]	[0.808]
p-val $F{+}M > C$	(0.024) **	(0.073) *	(0.413)	(0.577)
	[0.038] **	[0.077] *	[0.436]	[0.621]
Female vs. Male	-0.046	-0.046	-0.011	0.026
p-val $F \neq M$	(0.406)	(0.420)	(0.723)	(0.397)
	[0.433]	[0.451]	[0.734]	[0.386]
p-val $M > F$	(0.203)		(0.361)	
	[0.189]		[0.653]	
p-val $F > M$		(0.790)		(0.199)
		[0.761]		[0.811]
Female+Male vs. Male	-0.028	-0.058	-0.025	-0.007
p-val $F{+}M \neq M$	(0.587)	(0.327)	(0.421)	(0.832)
	[0.585]	[0.336]	[0.442]	[0.868]
p-val $F{+}M > M$		(0.836)		(0.584)
		[0.832]		[0.533]
Female+Male vs. Female	0.017	-0.012	-0.014	-0.033
p-val $F{+}M \neq F$	(0.730)	(0.836)	(0.618)	(0.313)
	[0.748]	[0.867]	[0.631]	[0.323]
p-val $F{+}M > F$	(0.365)		(0.691)	
	[0.392]		[0.700]	
Observations	769	814	769	814
Control Mean	0.383	0.361	0.066	0.073

Notes: The table reports post-estimated marginal treatment effects for fathers and mothers of girl adolescents ($\eta + \rho$) from the pre-specified logit regression in Equation (20). The dependent variable takes on value one if the respondent - father (Column 1 and 3) or mother (Column 2 and 4) - states that they expect that the future spouse of their daughter will have at least completed secondary (Column 1-2) – Grade 10 and above – or high school (Column 3-4) – Grade 12 and above – if she is married at 16 at midline. Regressions in Column 1-2 include fixed effects for randomization strata. In parentheses, p-values from standard errors clustered at the village level (unit of randomization) and one-sided p-values in accordance with the model predictions are reported. Corresponding p-values from randomization inference following Young (2019) with 1,000 permutations are reported in square brackets. Stars indicate: *** 1 percent ** 5 percent * 10 percent level of significance. The row "observations" indicates the number of households with an adolescent girl that the marginal effects are estimated for using post-estimation. The row "control mean" indicates the percentage in the control group stating the above expectation.

Table C4: Belief updating on spousal quality benefits to marriage delay to 16 (FDR corrections)

	Secondary School		High School	
	Father	Mother	Father	Mother
	(1)	(2)	(3)	(4)
Female vs. Control	0.082	0.097	0.020	0.027
p-val $F \neq C$	(0.121)	(0.083) *	(0.468)	(0.392)
	[0.243]	[0.302]	[0.469]	[0.523]
p-val $F > C$	(0.061) *	(0.042) **	(0.234)	(0.196)
	[0.122]	[0.150]	[0.234]	[0.262]
Male vs. Control	0.128	0.143	0.031	0.001
p-val $M \neq C$	(0.019) **	(0.010) **	(0.312)	(0.986)
	[0.038] **	[0.042] **	[0.313]	[0.987]
p-val $M > C$	(0.009) ***	(0.005) ***	(0.156)	(0.493)
	[0.018] **	[0.020] **	[0.156]	[0.493]
Female+Male vs. Control	0.100	0.085	0.006	-0.006
p-val $F{+}M \neq C$	(0.048) **	(0.146)	(0.827)	(0.846)
	[0.096] *	[0.289]	[0.827]	[0.847]
p-val $F{+}M > C$	(0.024) **	(0.073) *	(0.413)	(0.577)
	[0.048] **	[0.144]	[0.413]	[0.577]
Female vs. Male	-0.046	-0.046	-0.011	0.026
p-val $F \neq M$	(0.406)	(0.420)	(0.723)	(0.397)
	[0.730]	[0.560]	[0.730]	[0.560]
p-val $M > F$	(0.203)		(0.361)	
	[0.365]		[0.365]	
p-val $F > M$		(0.790)		(0.199)
		[0.929]		[0.796]
Female+Male vs. Male	-0.028	-0.058	-0.025	-0.007
p-val $F{+}M \neq M$	(0.587)	(0.327)	(0.421)	(0.832)
	[0.702]	[0.726]	[0.702]	[0.833]
p-val $F{+}M > M$		(0.836)		(0.584)
		[0.836]		[0.836]
Female+Male vs. Female	0.017	-0.012	-0.014	-0.033
p-val $F{+}M \neq F$	(0.730)	(0.836)	(0.618)	(0.313)
	[0.944]	[0.836]	[0.944]	[0.658]
p-val $F{+}M > F$	(0.365)		(0.691)	
	[0.691]		[0.691]	
Observations	769	814	769	814
Control Mean	0.383	0.361	0.066	0.073

Notes: The table reports post-estimated marginal treatment effects for fathers and mothers of girl adolescents ($\eta + \rho$) from the pre-specified logit regression in Equation (20). The dependent variable takes on value one if the respondent - father (Column 1 and 3) or mother (Column 2 and 4) - states that they expect that the future spouse of their daughter will have at least completed secondary (Column 1-2) – Grade 10 and above – or high school (Column 3-4) – Grade 12 and above – if she is married at 16 at midline. Regressions in Column 1-2 include fixed effects for randomization strata. In parentheses, p-values from standard errors clustered at the village level (unit of randomization) and one-sided p-values in accordance with the model predictions are reported. Corresponding q-values correcting for false discovery rate within each family of schooling levels per respondent per treatment arm comparison test using the Benjamini-Hochberg procedure are reported in square brackets. Stars indicate: *** 1 percent ** 5 percent * 10 percent level of significance. The row "observations" indicates the number of households with an adolescent girl that the marginal effects are estimated for using post-estimation. The row "control mean" indicates the percentage in the control group stating the above expectation.

Table C5: Belief updating on spousal quality benefits to marriage delay to 20

	Secondary School		High School	
	Father	Mother	Father	Mother
	(1)	(2)	(3)	(4)
Female vs. Control	0.031	0.118	0.105	0.121
p-val $F \neq C$	(0.435)	(0.030) **	(0.059) *	(0.029) **
	[0.517]	[0.052] *	[0.098] *	[0.038] **
p-val $F > C$	(0.217)	(0.015) **	(0.029) **	(0.014) **
	[0.273]	[0.026] **	[0.051] *	[0.017] **
Male vs. Control	0.056	0.160	0.121	0.150
p-val $M \neq C$	(0.181)	(0.003) ***	(0.025) **	(0.009) ***
	[0.195]	[0.006] ***	[0.047] **	[0.020] **
p-val $M > C$	(0.091) *	(0.001) ***	(0.012) **	(0.005) ***
	[0.124]	[0.001] ***	[0.029] **	[0.007] ***
Female+Male vs. Control	0.067	0.132	0.097	0.100
p-val $F{+}M \neq C$	(0.075) *	(0.011) **	(0.065) *	(0.075) *
	[0.106]	[0.019] **	[0.066] *	[0.089] *
p-val $F{+}M > C$	(0.037) **	(0.006) ***	(0.032) **	(0.037) **
	[0.057] *	[0.008] ***	[0.034] **	[0.036] **
Female vs. Male	-0.025	-0.042	-0.017	-0.029
p-val $F \neq M$	(0.575)	(0.403)	(0.762)	(0.597)
	[0.604]	[0.442]	[0.746]	[0.660]
p-val $M > F$	(0.288)		(0.381)	
	[0.306]		[0.399]	
p-val $F > M$		(0.799)		(0.702)
		[0.790]		[0.654]
Female+Male vs. Male	0.011	-0.029	-0.024	-0.050
p-val $F{+}M \neq M$	(0.786)	(0.548)	(0.645)	(0.363)
	[0.814]	[0.573]	[0.669]	[0.387]
p-val $F{+}M > M$		(0.726)		(0.818)
		[0.695]		[0.789]
Female+Male vs. Female	0.036	0.013	-0.008	-0.021
p-val $F{+}M \neq F$	(0.373)	(0.786)	(0.886)	(0.682)
	[0.434]	[0.805]	[0.877]	[0.713]
p-val $F{+}M > F$	(0.187)		(0.557)	
	[0.242]		[0.615]	
Observations	769	815	769	815
Control Mean	0.765	0.668	0.480	0.473

Notes: The table reports post-estimated marginal treatment effects for fathers and mothers of girl adolescents ($\eta + \rho$) from the pre-specified logit regression in Equation (20). The dependent variable takes on value one if the respondent - father (Column 1 and 3) or mother (Column 2 and 4) - states that they expect that the future spouse of their daughter will have at least completed secondary (Column 1-2) – Grade 10 and above – or high school (Column 3-4) – Grade 12 and above – if she is married at 20 at midline. Regressions include fixed effects for randomization strata. In parentheses, p-values from standard errors clustered at the village level (unit of randomization) and one-sided p-values in accordance with the model predictions are reported. Corresponding p-values from randomization inference following Young (2019) with 1,000 permutations are reported in square brackets. Stars indicate: *** 1 percent ** 5 percent * 10 percent level of significance. The row "observations" indicates the number of households with an adolescent girl that the marginal effects are estimated for using post-estimation. The row "control mean" indicates the percentage in the control group stating the above expectation.

Table C6: Belief updating on spousal quality benefits to marriage delay to 20 (FDR corrections)

	Secondary School		High School	
	Father	Mother	Father	Mother
	(1)	(2)	(3)	(4)
Female vs. Control	0.031	0.118	0.105	0.121
p-val $F \neq C$	(0.435)	(0.030) **	(0.059) *	(0.029) **
	[0.580]	[0.061] *	[0.235]	[0.061] *
p-val $F > C$	(0.217)	(0.015) **	(0.029) **	(0.014) **
	[0.290]	[0.030] **	[0.116]	[0.030] **
Male vs. Control	0.056	0.160	0.121	0.150
p-val $M \neq C$	(0.181)	(0.003) ***	(0.025) **	(0.009) ***
	[0.363]	[0.012] **	[0.100]	[0.012] **
p-val $M > C$	(0.091) *	(0.001) ***	(0.012) **	(0.005) ***
	[0.182]	[0.004] ***	[0.048] **	[0.007] ***
Female+Male vs. Control	0.067	0.132	0.097	0.100
p-val $F{+}M \neq C$	(0.075) *	(0.011) **	(0.065) *	(0.075) *
	[0.100]	[0.036] **	[0.100]	[0.100]
p-val $F{+}M > C$	(0.037) **	(0.006) ***	(0.032) **	(0.037) **
	[0.050] *	[0.018] **	[0.050] *	[0.050] *
Female vs. Male	-0.025	-0.042	-0.017	-0.029
p-val $F \neq M$	(0.575)	(0.403)	(0.762)	(0.597)
	[0.978]	[0.538]	[0.978]	[0.597]
p-val $M > F$	(0.288)		(0.381)	
	[0.651]		[0.651]	
p-val $F > M$		(0.799)		(0.702)
		[0.873]		[0.873]
Female+Male vs. Male	0.011	-0.029	-0.024	-0.050
p-val $F{+}M \neq M$	(0.786)	(0.548)	(0.645)	(0.363)
	[0.946]	[0.821]	[0.946]	[0.821]
p-val $F{+}M > M$		(0.726)		(0.818)
		[0.818]		[0.818]
Female+Male vs. Female	0.036	0.013	-0.008	-0.021
p-val $F{+}M \neq F$	(0.373)	(0.786)	(0.886)	(0.682)
	[0.893]	[0.786]	[0.968]	[0.786]
p-val $F{+}M > F$	(0.187)		(0.557)	
	[0.446]		[0.557]	
Observations	769	815	769	815
Control Mean	0.765	0.668	0.480	0.473

Notes: The table reports post-estimated marginal treatment effects for fathers and mothers of girl adolescents ($\eta + \rho$) from the pre-specified logit regression in Equation (20). The dependent variable takes on value one if the respondent - father (Column 1 and 3) or mother (Column 2 and 4) - states that they expect that the future spouse of their daughter will have at least completed secondary (Column 1-2) – Grade 10 and above – or high school (Column 3-4) – Grade 12 and above – if she is married at 20 at midline. Regressions include fixed effects for randomization strata. In parentheses, p-values from standard errors clustered at the village level (unit of randomization) and one-sided p-values in accordance with the model predictions are reported. Corresponding q-values correcting for false discovery rate within each family of schooling levels per respondent per treatment arm comparison test using the Benjamini-Hochberg procedure are reported in square brackets. Stars indicate: *** 1 percent ** 5 percent * 10 percent level of significance. The row "observations" indicates the number of households with an adolescent girl that the marginal effects are estimated for using post-estimation. The row "control mean" indicates the percentage in the control group stating the above expectation.

Table C7: Treatment effects on incidence of emotional IPV

	Midline	Endline
	(1)	(2)
Female vs. Control	0.085	0.008
p-val $F \neq C$	(0.019) **	(0.836)
	[0.012] **	[0.809]
Male vs. Control	0.037	0.009
p-val $M \neq C$	(0.308)	(0.808)
	[0.297]	[0.762]
Female+Male vs. Control	0.098	0.017
p-val $F{+}M \neq C$	(0.013) **	(0.631)
	[0.015] **	[0.566]
Female vs. Male	0.049	-0.001
p-val $F \neq M$	(0.244)	(0.979)
	[0.235]	[0.984]
Female+Male vs. Male	0.061	0.008
p-val $F{+}M \neq M$	(0.169)	(0.821)
	[0.170]	[0.783]
p-val $F{+}M > M$	(0.085) *	(0.411)
	[0.098]*	[0.438]
Female+Male vs. Female	0.012	0.009
p-val $F{+}M \neq F$	(0.781)	(0.809)
	[0.758]	[0.795]
p-val $F{+}M > F$	(0.391)	(0.405)
	[0.415]	[0.402]
Observations	816	775
Control Mean	0.106	0.091

Notes: The table reports post-estimated marginal treatment effects for mothers of girl adolescents ($\eta + \rho$) from the pre-specified logit regression in Equation (20). The dependent variables takes on value one if the mother experienced any type of emotional IPV in the three months prior to the midline survey (Column 1), or endline survey (Column 2), perpetrated by their husband. A detailed overview of the survey questions that ask women about IPV experiences can be found in Table B1 in Appendix B.2. Standard errors are clustered at the village level, which is our level of randomization. Two-sided p-values and one-sided p-values in accordance with the model predictions are reported in parentheses. Corresponding p-values from randomization inference following Young (2019) with 1,000 permutations are reported in square brackets. Dummies for randomization strata are excluded due to strata perfect prediction of the outcome variable. Stars indicate: *** 1 percent ** 5 percent * 10 percent level of significance. The row "observations" indicates the number of households with an adolescent girl that the marginal effects are estimated for using post-estimation. The row "control mean" indicates the percentage of women in the control group that report to have experienced emotional IPV in the last 3 months.

Table C8: Target households: Child marriage outcomes for adolescent girls.

	Annual Hazard Rate		Pre-specified Logit	
	(1)	(2)	(3)	(4)
	Midline	Endline	Midline	Endline
Female vs. Control	0.004	-0.013	0.013	-0.025
p-val $F \neq C$	(0.721)	(0.280)	(0.671)	(0.493)
	[0.767]	[0.341]	[0.705]	[0.550]
Male vs. Control	-0.018	-0.017	-0.041	-0.053
p-val $M \neq C$	(0.036)**	(0.107)	(0.027)**	(0.083)*
	[0.048]**	[0.150]	[0.048]**	[0.131]
Female+Male vs. Control	-0.007	-0.017	-0.015	-0.052
p-val $F{+}M \neq C$	(0.440)	(0.105)	(0.498)	(0.081)*
	[0.461]	[0.119]	[0.488]	[0.092]*
Observations	1,641	2,159	828	798
Control Mean	0.029	0.042	0.062	0.123
p-val $M \neq F$	0.032	0.691	0.056	0.407
p-val $F{+}M \neq F$	0.323	0.695	0.361	0.424
p-val $F{+}M \neq M$	0.187	0.996	0.138	0.948
p-val $F < C$	0.982	0.140	0.665	0.247
p-val $M < C$	0.018	0.054	0.014	0.042
p-val $F{+}M < C$	0.220	0.052	0.249	0.041
p-val $M < F$	0.016	0.346	0.028	0.204
p-val $M < F{+}M$	0.094	0.498	0.069	0.474
p-val $F{+}M < F$	0.162	0.347	0.180	0.212

Note: The table presents treatment effects on the probability of child marriage for girl adolescents from our target households. Marriage outcomes are as reported by the adolescent themselves as pre-specified in the pre-analysis plan. Reported is the estimation for midline and endline. Columns 1-2 report the average hazard rate into child marriage, using a discrete approximation of a censored duration model, estimated from Equation (21). Data is an adolescent-year panel, where each adolescent contributes at most five observations to the sample, one observation for each post-baseline at-risk year between 13 and 17 until she is either married or passes the 18-year threshold after which she exits the data. The dependent variable is a binary variable that is coded as zero for the ages prior to her marriage, and as unity for the age at which she marries. Right censored observations – that is, observations between the current age at the corresponding survey-round and age 18 for girls who are aged less than 18 and still unmarried by midline or endline – are coded as missing. Fixed effects for each age at-risk of marriage, current age and randomisation strata are included. Columns 3-4 report marginal treatment effects for girl adolescents ($\eta + \rho$) from the pre-specified logit regression in Equation (20) on child marriage, i.e, a binary variable that takes on value one if the adolescent was less than 18 years old at the time of marriage, for midline and endline respectively. Fixed effects for randomisation strata are included at endline and not at midline due to perfect prediction. P-values for marginal treatment effects are based on standard errors clustered at village level (unit of randomisation), and are indicated in parentheses. Exact p-values for marginal treatment effects from randomization inference tests based on 1,000 permutations are provided in square brackets. Stars indicate: *** 1 percent ** 5 percent * 10 percent level of significance. The row "Control Mean" indicates the average annual probability of child marriage (Columns 1-2) and the probability of child marriage (Columns 3-4) in the control group. P-values for all comparisons of treatment effects between each experimental arm as well as one-sided tests are reported at the bottom of the table: Male arm (M), Female arm (F) and Female+Male arm ($F{+}M$).