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Associations between Contraceptive Decision-Making and Marital Contraceptive Communication and use in Rural Maharashtra, India

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

ETHICS APPROVAL STATEMENT AND PATIENT CONSENT STATEMENT

The study protocol was approved by the Institutional Review Boards at the National Institute for Research in Reproductive Health (ICMR-NIRRH; Mumbai, India), Population Council (New York, NY, USA), and the University of California, San Diego (San Diego, CA, USA). All participants provided written informed consent prior to participation, and procedures to maximize the safety of participants are detailed in our study protocol (Dixit et al. 2019).

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Abstract

*Women's contraceptive decision-making control is crucial for reproductive autonomy, but research largely relies on the Demographic and Health Survey (DHS) measure which asks who is involved with decision-making. In India, this typically assesses joint decision-making or male engagement. Newer measures emphasize female agency. We examined three measures of contraceptive decision-making, the DHS and two agency-focused measures, to assess their associations with marital contraceptive communication and use in rural Maharashtra, India. We analyzed follow-up survey data from women participating in the CHARM2 study (*n = *1088), collected in June–December 2020. The survey included the DHS (measure 1), Reproductive Decision-Making Agency (measure 2), and Contraceptive Final Decision-Maker measures (measure 3). Only Measure 1 was significantly associated with contraceptive communication (adjusted odds ratio [AOR]: 2.75, 95 percent confidence interval [CI]: 1.69–4.49) and use (AOR: 1.73, 95 percent CI: 1.14–2.63). However, each measure was associated with different types of contraceptive use: Measure 1 with condom (adjusted relative risk ratio [aRRR]: 1.99, 95 percent CI: 1.12–3.51) and intrauterine device (IUD) (aRRR: 4.76, 95 percent CI: 1.80–12.59), Measure 2 with IUD (aRRR: 1.64, 95 percent CI: 1.04–2.60), and Measure 3 with pill (aRRR: 2.00, 95 percent CI: 1.14—3.52). Among married women in Maharashtra, India, male engagement in decision-making may be a stronger predictor of contraceptive communication and use than women's agency, but agency may be predictive of types of contraceptives used.*

INTRODUCTION

Measurement of contraceptive decision-making is crucial to understanding and optimizing patterns of contraceptive uptake; however, existing measures fall short of capturing all aspects of couples' decision-making. Recent studies emphasize a need to focus on unmet need for contraception stratified by supply and demand for contraception, where demand, or lack thereof, may reflect women's reproductive choice (Senderowicz and Maloney 2022). Many existing family planning measures may not accurately capture women's contraceptive desires and needs, indicating a need for new approaches to measurement that focus on women's contraceptive autonomy (Speizer et al. 2022; Senderowicz and Maloney 2022).

The Demographic and Health Surveys (DHS) have provided the field of family planning with data on contraceptive decision-making and use via nationally representative samples across a number of low-to-middle-income countries (LMICs), and this work has been at the crux of much of the literature on the topic (Nazarbegian et al. 2021). This DHS measure identifies who is involved in the contraceptive decision-making process: women themselves, husbands, others, or both spouses jointly (ICF 2020). This measure shows that joint contraceptive decision-making inclusive of both partners is associated with contraceptive use, including uptake of effective long-acting reversible and permanent contraceptive methods, lower contraceptive discontinuation, and increased ability to achieve fertility desire

(Mutombo and Bakibinga 2014; Olakunde et al. 2020; Haque et al. 2021; Mekonnen and Wubneh 2020; Mahendra, Wilopo, and Putra 2019; Nazarbegian et al. 2021). In contrast, contraceptive decisions made alone by husbands or wives yield heterogeneous contraceptive outcomes, and typically lower likelihood of contraceptive use (Mutombo and Bakibinga 2014; Olakunde et al. 2020; Ahinkorah et al. 2020; Haque et al. 2021; Mekonnen and Wubneh 2020; Anita, Nzabona, and Tuyiragize 2020).

There are growing concerns regarding the ambiguity of this DHS measure and its classification, particularly regarding joint decision-making as indicative of agency, or the capacity to enact choice (Seymour and Peterman 2018; Nazarbegian et al. 2021; Bhan and Raj 2021). Rather than being indicative of reproductive agency for women, this measure when categorized with a focus on joint decision-making may better be more conservatively interpreted as indicative of male engagement rather than female agency (Bankole and Singh 1998). Two new contraceptive decision-making measures, the Reproductive Decision-Making Agency Measure validated in Nepal, (Hinson et al. 2019) and the Contraceptive Final Decision-Maker Measure validated in Niger (Silverman 2020), were designed to capture women's decision-making agency more directly. Both measures were developed by building upon qualitative evidence specifically focused on female agency in their respective contexts of focus (Silverman 2020; Hinson et al. 2019). The Reproductive Decision-Making Agency measure defines women with high decision-making agency as those who shared their opinion on contraception with their spouse, felt that this opinion was valued, had the final or joint say in the decision, and were satisfied with their influence on the decision. Women reporting higher agency were more likely to have feelings of reproductive control, and there was a trend toward increased contraceptive use (Hinson et al. 2019). The Contraceptive Final Decision-Maker measure assesses whether women feel they would have final decision-making authority, hypothetically, if disagreement exists on this topic between spouses; this measure also found an association with contraceptive use and covert contraceptive use[1] (Silverman 2020). These agency-focused measures are distinct from the DHS measure in their focus on women's *perception* of their control over or satisfaction with decision-making, where the DHS measure focuses solely on women's *behavior* regarding their independent or joint involvement in decision-making without confirming her satisfaction or ability to override her husband's decision.

India is an important context in which to understand female contraceptive decision-making, as female reproductive agency may be limited and male engagement in contraceptive decision-making has long been shown to be a fundamental predictor of family planning outcomes (Rimal et al. 2015; Bankole and Singh 1998). Prior research from India suggests that the vast majority of female-involved decision-making is in the form of joint decision-making, and this joint decision-making is associated with higher odds of contraceptive use, condom use in particular, even relative to sole female control over contraceptive decision-making (Dixit et al. 2021). These findings again suggest that male involvement in joint decision-making with women is predictive of contraceptive use and correspond with other studies from India and elsewhere showing associations of spousal contraceptive

[1]Unpublished data taken from the Reaching Married Adolescents Study in Niger. PI: Jay Silverman.

communication and decision-making in nationally representative samples (Kuete et al.; Mahendra, Wilopo, and Putra 2019; Dixit et al. 2021). However, some studies with smaller samples from Ethiopia and Nigeria did not yield similar findings (Abose, Adhena, and Dessie 2021; Iliyasu et al. 2020), suggesting that understanding these issues requires analysis within specific contexts. Nonetheless, research from the HIV literature across national contexts reinforces interpretation that for condom use, at least, male engagement and support is critical. This research shows that abusive and controlling male partners are less likely to use condoms and may even engage in condom refusal, and are more likely to engage in sexual infidelity without condoms (Jewkes et al. 2010; Pulerwitz et al. 2010; Mathur et al. 2020). Thus, there is value in male support in contraceptive decision-making, especially with respect to condoms, and while this is not necessarily indicative of women's equal control in decision-making; this male engagement with the female partner appears to be more likely in relationships without male violence against female partners. These findings suggest the importance of understanding women's contraceptive decision-making engagement and agency by type of contraceptive used.

In this study, we evaluate the (1) DHS Contraceptive Decision-Making, (2) Reproductive Decision-Making Agency, and (3) Contraceptive Final Decision-Maker measures, which encompass diverse aspects of the decision-making process, cross-validating the measures and assessing their associations with two outcomes of interest: contraceptive use (any and by type) and contraceptive communication with married couples in rural Maharashtra, India. Rural India, including rural Maharashtra, is characterized by more traditional gender norms and attitudes reinforcing lesser female agency and lesser male engagement in family planning, and characterized by high rates of unmet need for contraception (Ghule et al. 2015; IIPS 2017). *Based on our review, we hypothesized that* (1) these three measures will be correlated, as they all measure aspects of contraceptive decision-making while (2) the associations between the measures and our outcomes of interest may differ given their unique constructs of decision-making measurement, specifically with regard to measure design for indication of male engagement in decision-making versus female agency in decision-making. These analyses aim to elucidate the utility of female reproductive agency and the ways specific factors in the decision-making process predict specific contraceptive outcomes. This will guide application of contraceptive decision-making measures in future studies and programmatic evaluation projects, as well as optimization of contraceptive uptake in this population.

METHODS

Data Source

This study utilizes cross-sectional data collected at 18-month follow-up as part of the evaluation of the CHARM2 (Counseling Husbands and wives to Achieve Reproductive health and Marital equity) intervention. The CHARM2 intervention is a gender-transformative counseling intervention for young married couples, evaluated via a two-arm cluster randomized trial in Maharashtra, India from 2018 to 2020. We included nonsterilized married women aged 18–29 years, and their nonsterilized husbands; 1,201 total couples were recruited and randomized within geographic clusters to receive CHARM2 or standard

of care. Eligible couples were selected using systematic random sampling within the cluster. More detail on this study has been published elsewhere (Bhan et al. 2020; Dixit et al. 2019).

Data analyzed in this study were collected as part of the 18-month follow-up survey conducted from June to December 2020, though some demographic information included in analysis was collected as part of the baseline survey conducted October 2018–June 2019. Our analytic sample for this study was comprised of the 1,088 women who provided follow-up data. We excluded women pregnant at follow-up (n = 83) for the analyses of modern contraceptive use and contraceptive use by type; these two analyses thus included a sample of n = 1,005.

Measures

Measures of Contraceptive Decision-Making—Three measures of contraceptive decision-making were assessed. For the first measure, DHS Contraceptive Decision-Making (IIPS 2017), women were asked about involvement in contraceptive decision-making via a single item: “Would you say that using or not using contraception is mainly your decision, your husband’s, joint decision by both, your mother, mother-in-law, elderly head of household, your sibling, your husband’s sibling or someone else?” (ICF 2020). Responses were dichotomized to female involved (either female decision or joint decision by both wife and husband) or female not involved (all other answer choices).

For the second measure, Reproductive Decision-Making Agency (Hinson et al. 2019), women were asked a series of four items to assess agency in contraceptive decision-making (see online Appendix T1). Women were asked whether they shared their opinion about using contraceptives with their husband, whether their opinion was valued, who had the final say about using contraceptives, and whether they were satisfied with their level of influence in decision-making. Women were classified as having “high agency” if they (a) reported all four of the following characteristics: shared their opinion, their opinion was valued, they had the final say on whether to use contraceptives or the decision was joint, and they were satisfied or would have liked less influence in the decision-making process; or (b) did not share their opinion because they did not care about the issue or agreed already with their husband, were the final decision-maker or if the decision was made jointly, and were satisfied or would have liked less influence in the decision-making process. Women were classified as having “low agency” if they reported all three of the following characteristics: they did not share their opinion because they did not feel comfortable or did not think it would be valued OR shared their opinion and felt it was not valued, were not involved in the final decision, and wanted more influence in the decision-making process. All remaining women were considered “medium agency.” Due to a small number of low agency respondents (n = 5), we classified the analysis variable as high versus low/medium agency.

For the third measure, Contraceptive Final Decision-Maker (Silverman 2020), women were asked about final contraceptive decision-making via a single item “When there is disagreement about using contraception, who usually makes the final decision?” with answer choices: respondent, husband, respondent’s mother, mother-in-law, other head of household,

respondent's siblings, husband's siblings. Responses were dichotomized to female versus other.

Outcomes—We defined current modern contraceptive use as wife's report of use of a modern method (Hubacher and Trussell 2015) available locally (condoms, pills, intrauterine device [IUD], injectable, emergency contraceptive pill, or female sterilization) within the past three months, among nonpregnant women. If a woman reported multiple methods used, the most effective method was used for the categorical current method outcome. Due to small numbers (<5), women using exclusively injectable contraception or emergency contraceptive pill were excluded from the categorical outcome. This measure was adapted from the India DHS, known as the National Family Health Survey (NFHS) (IIPS 2017).

Contraceptive communication was assessed directly via the item "Did you have a discussion with your husband on contraceptive use in the past three months?" This was adapted from prior versions of the NFHS (IIPS 2017).

Covariates—Several demographics were included as covariates in adjusted models due to their associations with decision-making and/or contraceptive use and communication in our prior research with this sample (Dixit et al. 2021). The following covariates were assessed at baseline: wife's age, wife's education, wife's scheduled tribe, scheduled caste, or other backwards class designation, household below poverty line (BPL) card ownership [a proxy of low income], and years married. At the 18-month survey, a child roster was used to determine the number of living children and an indicator of a currently living son. Treatment status in the CHARM2 intervention was also included due to known association with both decision-making and our examined outcomes (Raj et al., under review).

Analysis

We first present descriptive statistics regarding decision-making items, outcomes, and covariates for the total sample. We then assessed correlation between the three decision-making items via Pearson's correlation coefficient. Next, we constructed unadjusted models of each decision-making item and the three outcomes of interest, by using logistic regression accounting only for study design via random effects on cluster (modern contraceptive use, contraceptive discussion) or multinomial logistic regression with cluster variance estimation specification (contraceptive type). Finally, we constructed fully adjusted models of each decision-making item and the three outcomes of interest, controlling for wife's age, wife's education, wife's caste designation, household BPL card ownership, years married, living son indicator, and treatment status for the CHARM2 intervention. The number of living children was also considered as a covariate but was removed from final adjusted models due to collinearity with the living son indicator.

Significance was set at $p < 0.05$ for all comparisons; odds ratios (ORs), adjusted odds ratios (AORs), or relative risk ratios (RRRs), along with 95 percent confidence intervals (CIs) are reported for regression results. All analyses were conducted using STATA 15.1.

RESULTS

Participants (n = 1,088) were on average 23.9 years of age (standard deviation [SD]: 3.0) and had been married on average 4.4 years (SD: 2.8). Half of these women (n = 547; 50.3 percent) had one living child and 44.4 percent (n = 483) had two or more, with 60.2 percent (n = 655) participants having one living son. In addition, 23.6 percent (n = 257) were BPL card-holders, 30.7 percent (n = 334) had SC/ST designation, and 57.4 percent (n = 625) had a higher secondary or postsecondary education (Table 1). More than half of the sample (n = 560; 55.7 percent) had used a modern contraceptive in the past three months. An additional 27.8 percent (n = 279) reported traditional methods in the form of withdrawal or rhythm method. The most common modern contraceptive method in use was condoms (n = 433; 39.8 percent); only 8.3 percent of women (n = 83) reported IUD use, and 3.1 percent (n = 31) reported pill use. Approximately, one-third of women (n = 433; 39.8 percent) had discussed contraceptive use with their husband in the past three months (Table 1).

Regarding contraceptive decision-making, according to the DHS Contraceptive Decision-Making measure, 89.0 percent of women in our sample (n = 968) reported being involved in the decision to use contraception. Breaking out male participation, 0.74 percent (n = 8) reported women-only decision-making and 88.24 percent (n = 960) reported joint decision-making with their husband. Using the Reproductive Decision-Making Agency measure, we found that 35.0 percent of women (n = 380) could be classified as having high reproductive agency, indicating both the opportunity to share opinions in decision-making and satisfaction with their influence on the decision. More specifically, using this measure we found that 67.3 percent of participants (n = 732) gave their opinion about contraceptive use,[2] and of those who gave an opinion, 98.9 percent (n = 723) felt that their opinion was valued. About half (n = 560; 51.5 percent) of participants were not satisfied with their level of involvement in contraceptive decision-making. Using the Contraceptive Final Decision-Maker measure, we found that only 16.2 percent (n = 176) believed that they would have the final say in the contraceptive decision if their spouse disagreed with them (Table 1). These decision-making measures were significantly but weakly correlated (all $r \leq \pm 0.20$, ps < 0.001) (Table 2). One participant did not respond to items for the Reproductive Decision-Making Agency measure but was included in analyses for the remaining measures.

Of these three measures of interest, only the DHS Contraceptive Decision-Making measure was significantly associated with use of any modern contraceptive in the past three months, such that women involved in contraceptive decision-making had 73 percent greater odds of any contraceptive use, even after adjusting for covariates (AOR: 1.73, 95 percent CI: 1.14–2.63, p = 0.01) (Table 3).

When contraceptive use was stratified by contraceptive type, we found that the DHS Contraceptive Decision-Making measure was significantly associated with higher likelihood of condom use (adjusted relative risk ratio [aRRR]: 1.99, 95 percent CI: 1.12–3.51, p = 0.02) and IUD use (aRRR: 4.76, 95 percent CI: 1.80–12.59, p = 0.002). The Reproductive

[2]Women could report that they did not share their opinion because they had the same opinion as husband or because the issue did not matter to them; if women indicated these reasons they were still considered to have high agency on this domain.

Decision-Making Agency measure was significantly associated with higher likelihood of IUD use (aRRR: 1.64, 95 percent CI: 1.04–2.60, $p = 0.03$), and the Contraceptive Final Decision-Maker measure was significantly associated with higher likelihood of pill use (aRRR: 2.00, 95 percent CI: 1.14–3.52, $p = 0.02$) (Table 4).

Of the three decision-making measures, only the DHS Contraceptive Decision-Making measure was significantly associated with having a discussion on contraceptive use with a spouse in the past three months, such that those reporting involvement in contraceptive decision-making had 2.75 times increased odds of talking to their partner about contraceptive use in the past three months (AOR: 2.75, 95 percent CI: 1.69–4.49, $p < 0.001$) (Table 5).

DISCUSSION

Our analysis of three existing measures of contraceptive decision-making in the context of rural India finds that only the DHS measure, which assesses joint decision-making, was associated with contraceptive communication and use. Findings are consistent with prior analyses documenting these associations across national contexts (Mutombo and Bakibinga 2014; Olakunde et al. 2020; Mekonnen and Wubneh 2020; Haque et al. 2021; Mahendra, Wilopo, and Putra 2019). Further analysis from our study, on type of contraceptive use, found that the DHS measure was associated specifically with condom and IUD use. Condom use obviously requires male involvement, but so too may IUDs in the rural Indian context, where time, funds, and freedom to seek medical care may require male permission, communication, support, or at least awareness. Prior studies from LMICs demonstrate that male partner support and engagement on contraceptive use significantly influence women's perceptions, intentions, and self-efficacy regarding contraceptive uptake, and in particular condom use (Lee et al. 2014; Ezeanolue et al. 2015; Prata et al. 2017; Truong et al. 2020). Increased communication and improved quality of communication on family planning between couples has also consistently been associated with increased contraceptive use across contexts, while lack of communication has been associated with decreased likelihood of joint contraceptive decision-making (Challa et al. 2020; Uddin, Pulok, and Sabah 2016; Underwood, Dayton, and Hendrickson 2020; Eshete and Adissu 2017). These findings reinforce prior calls from researchers to prioritize male engagement and couple-focused contraceptive counseling approaches to improve contraceptive communication and use (Dixit et al. 2019; Fleming et al. 2018; Shakya et al. 2018; Yore et al. 2016; Doyle et al. 2018; Lundgren et al. 2005). However, it is less clear from this association whether women's agency in contraceptive decision-making is meaningful for these outcomes, as the DHS measure does not assess whether women are satisfied with their decision-making involvement or have ultimate decision-making control. For this, the other two measures offer more insight.

While the two more agency-focused measures of contraceptive decision-making did not demonstrate the predictive value that the DHS measure offers, we found that these measures were associated with certain types of contraceptive use among married women in Maharashtra, India. The Reproductive Decision-Making Agency measure, which assesses women's communication of their opinions on contraceptive use, satisfaction with their

decision-making influence, as well as final or joint decision-making, was not associated with overall contraceptive use or communication, as was seen in prior analysis of this measure conducted in Nepal (Hinson et al. 2019). However, we did find its association with IUD use, as was also seen with the DHS measure. Hence, it may be that joint decision-making/male engagement facilitates IUD use but with greater female satisfaction with decision-making involvement. National data from India indicate greater female than male awareness of IUDs (IIPS 2017) and an association between informed choice and IUD use (Pradhan, Patel, and Saraf 2020). Therefore, joint decision-making with women's greater satisfaction with the decision may be indicative of her introduction and subsequent male agreement to IUD use. Similarly, in a recent study, women in India experiencing reproductive coercion by male partners or other family members were found to be more likely to use IUDs than pills, though they were less likely to use contraceptives in general (Tomar et al. 2020). These findings suggest the value of focus on women's agency approaches combined with male engagement to support IUD use in this population.

As with the prior discussed measure, the Contraceptive Final Decision-Maker measure was also not associated with overall contraceptive communication or use in our study population, again suggesting that this type of female agency is potentially not necessary or even useful for these outcomes. However, we did find its association with pill use, which, like IUDs, has been shown to be associated with more informed choice among women in India (Pradhan, Patel, and Saraf 2020). The similarities in outcomes of both agency-focused decision-making measures may in part be attributed to their overlapping inclusion of final decision-making involvement, though the Contraceptive Final Decision-Maker measure focuses specifically on final decision-making in the context of *disagreement*. Pill use may be indicative of situations where women hold final or even independent decision-making control, because the pill is more accessible, lower cost, and less reliant on male participation or even knowledge (Raj et al. 2015; IIPS 2017). Data from Zambia and Ethiopia (Mutombo and Bakibinga 2014; Stonehill, Bishu, and Taddese 2020) suggest that women's decision-making autonomy is particularly important when using female controlled methods. Research from Africa also indicates that covert use of contraceptives is often in the form of injectable use (Kibira et al. 2020; Baiden et al. 2016), though less is known about this issue in India and other contexts where availability of injectables is also limited. These findings suggest there may be value to supporting female agency, but women's final decision-making control over contraception does not appear to be so valuable to improve contraceptive uptake in rural India. Similar findings were observed in rural Ethiopia, where women who felt capable of using contraceptives without their spouse's consent were not more likely to use contraceptives (Tilahun et al. 2014). This highlights that although measuring women's involvement is necessary, it is insufficient to capture their agency and autonomy over decision-making, corresponding with prior research indicating that female-only decision-making is not associated with contraceptive use (Ahinkorah 2020; Mboane and Bhatta 2015; Olakunde et al. 2020).

Women's agency may therefore be less valuable to support contraceptive use specifically compared to male engagement in this sample. However, the value and insights provided by measures of contraceptive decision-making agency stem from their development rooted in qualitative evidence that targets women's level of control in decision-making. These

measures of agency contradict the widely held conception that bolstering women's agency predicts increased contraceptive use, while providing us with important information concerning the nature of the contraceptive decision-making process with regard to women's perception and role.

Each of the three measures of decision-making assessed here was designed to capture slightly different constructs: the DHS measure was not constructed to account for female perceptions of decision-making and the two measures of agency in decision-making address different scenarios (e.g., satisfaction with actual influence in decision-making vs. prediction of final decision-making power in the setting of a hypothetical conflict). It is therefore unsurprising that the correlation between each of the measures was quite weak, though significant. This offers additional insight into why each of the measures, including the two measures of agency, were not associated with the same specific contraceptive types, consistent with our second hypothesis. Meanwhile, despite differing frameworks, these measures were ultimately centered on contraceptive decision-making, thus accounting for the fact that the correlations were still significant, supporting our first hypothesis.

Despite our finding that male engagement more than female agency was associated with contraceptive use in our sample population, there is danger in relying solely on male engagement for family planning promotion. Certainly, in circumstances where good communication and engagement between partners occurs, contraceptive use is likely to increase regardless of women's autonomy in decision-making. Nonetheless, male control can be normative and female voice in reproductive decision-making may be quelled (Bhan and Raj 2021; Rimal et al. 2015; Fleming et al. 2018), yielding targeted outcomes that are not aligned with women's reproductive choice and agency (Bhan and Raj 2021). Such an approach can be viewed as comparable to coercive population control methods used to achieve desired public health goals, but conducted in ways that denied women and girls reproductive autonomy (Bhan and Raj 2021). At the same time, male engagement and support are clearly important, as findings consistent with prior research from this same region show limited utility of women's empowerment in the absence of male engagement in contraceptive decision-making (Dixit et al. 2019; Fleming et al. 2018; Shakya et al. 2018; Yore et al. 2016). Thus, although our findings suggest that male engagement will produce greater contraceptive use among married couples in Maharashtra, India, given our understanding of population control issues seen historically, we argue that continued measurement and incorporation of female engagement in contraceptive decision-making remains crucial.

Accordingly, progressive development of more expansive measures of male engagement and female agency hold potential for informing upon and improving family planning outcomes, as these factors carry weight beyond the realm of decision-making (Galle et al. 2021; Bhan and Raj 2021). A recent study recommends that more direct measures of male engagement should be developed to capture aspects of communication, practical involvement, physical involvement, and/or emotional involvement in family planning (Galle et al. 2021). Meanwhile, it has been suggested that measurement of female agency characterizes women's capacity to enact their fertility or contraceptive choices and may include informative indicators of self-efficacy with regard to initiation and nature of spousal

communication, as well as covert seeking of contraceptive counseling or use (Bhan and Raj 2021). The field also needs alternative indicators to measure the success of family planning interventions that focus on preference alignment. With better indicators, these measures of agency and decision-making may perform differently than they did in our study. Taken with our findings, this emphasizes the need for multidimensional understanding and intervention with regard to male engagement and female agency in family planning and calls for the dual emphasis of these factors along with better indicators of intervention success.

Some of these potentially meaningful factors related to agency were excluded from this paper in order to avoid overadjustment in our analyses, as our design specifically focused on understanding the nature of decision-making measures. Reproductive coercion by providers regarding contraception use and method type is an emerging concern and intervention target in the field (Senderowicz 2019), and further exploration of its relationship to our findings could be consequential. Some global public health efforts to address unmet need for contraception, which is heavily influenced by gender power dynamics, including male partner reproductive control (Hinson et al. 2019; Ndayizigiye et al. 2017), have employed potentially coercive approaches. Targets and incentivization schemes to increase contraceptive uptake can compromise women's reproductive agency (Bhan and Raj 2021). There are growing calls for outcome metrics that emphasize female reproductive agency. This agency is often measured solely by women's involvement in contraceptive and fertility decision-making vis-à-vis male partners rather than women's control over or satisfaction with their role in such decisions (Bhan and Raj 2021; Bhan et al. 2020). Thus, inclusive of reproductive coercion and covert contraceptive use, future research should consider the relative contributions of other measures of agency in addition to contraceptive decision-making. Furthermore, while this work aligns with issues of couples' communication, more work is needed with regard to linking couples' communication and female agency in this context. Additionally, in the context of India, women's social networks and in-laws' opinions have been shown to significantly impact family planning (Sinha 2020; Pradhan and Mondal 2022). This may also need to be measured in future studies to account for influences on decision-making external to couples' dynamics.

The study also relies on self-report and may thus be subject to social desirability and recall biases, and the study is cross-sectional and cannot assess causality. Additionally, the study relied on follow-up data from a larger family planning intervention study, and while we did adjust for intervention effects, the sample is both biased and, likely, better informed on family planning issues than the general population in our study site, limiting generalizability of study findings. While our analysis offers insight into cross-validation of these decision-making measures and their associations with contraceptive behaviors, this was not the original purpose of the parent study. Consequently, we were not powered for a comprehensive analysis of these measures. For example, only 0.46 percent of participants ($n = 5$) were classified as having low agency by the Reproductive Decision-Making Agency measure and therefore had to be combined with the medium agency category for analyses. Also, the questions at hand all emphasize the decision to use contraception, negating the reality that some women and couples may decide *not* to use contraception. Recent additions to the DHS include this decision-making *not* to use contraceptives, and future research should prioritize examination of this and assess how findings may differ across

questions based on whether the focus is on deciding to use versus not to use contraceptives. Accordingly, contraceptive use as an outcome may not be a good proxy for intervention success when the goal of contraceptive interventions is meeting the needs of women and families. Use of this outcome, which is standard in the field, is a potential limitation of this study.

A number of additional limitations are related to the decision-making measures themselves, which are to be expected given that analysis and development of two of these measures are new. Our measures of focus captured slightly different aspects of decision-making, and more measures for cross-validation would offer more insight into distinctions based on male engagement relative to female autonomy. Future research needs to support development of more comprehensive decision-making measures that assess these various elements, particularly given prior criticism that our existing measures of female agency in contraceptive use may only be sensitive to low agency (James-Hawkins et al. 2018). Additionally, as noted above, the DHS measure is not clearly indicative of agency. The Contraceptive Final Decision-Maker measure is based on a hypothetical, which is required for clarity on who would make a decision in a case of couple disagreement. However, a hypothetical alone may be inadequate to capture actual agency, again supporting the need for development of more comprehensive measures of contraceptive decision-making. We also acknowledge that we do not fully understand women's interpretation of these measures relative to each other. Furthermore, our discussion of the DHS contraceptive decision-making measure as an indicator of male engagement is based on our interpretation of the measure; future qualitative research can strengthen the understanding of how women interpreted this measure.

CONCLUSIONS

Joint contraceptive decision-making, as identified via the DHS Contraceptive Decision-Making measure, continues to be a predictor of contraceptive use outcomes among married couples in rural Maharashtra, India. However, female involvement in contraceptive decision-making cannot be conflated with decision-making agency. Although measures of decision-making agency were not strong predictors of overall contraceptive use or communication in the current study, it is important to continue supporting female agency in order to protect women's control over their reproductive health. The novel measures of agency were valuable in predicting use of specific types of contraceptive methods. Each measure of contraceptive decision-making may capture a unique aspect of agency in the decision-making process, and our findings emphasize the need for development of additional measures that inform on both male engagement and women's reproductive autonomy for use in family planning intervention programming and evaluation in this setting.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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TABLE 1

Demographic characteristics, outcome frequencies, and frequencies of contraceptive decision-making measures among married women living in rural Maharashtra (n = 1,088)

Measure	*N* (%) or Mean (SD)
Total	*1088 (100%)*
Demographics	
Wife age at baseline, mean (SD)	23.9 (3.0)
Household has a BPL card	
No	829 (76.2%)
Yes	257 (23.6%)
Missing	2 (0.2%)
Wife SC/ST designation	
None/other	754 (69.3%)
SC/ST/OBC	334 (30.7%)
Number of living children	
0	58 (5.3%)
1	547 (50.3%)
2+	483 (44.4%)
Has living son	
No	433 (39.8%)
Yes	655 (60.2%)
Years married at baseline, mean (SD)	4.4 (2.8)
Wife education	
None/secondary	463 (42.6%)
Higher secondary/Postsecondary	625 (57.4%)
Treatment status	
Control cluster	552 (50.7%)
Intervention cluster	536 (49.3%)
Outcomes	
Wife used modern contraceptive in past three months (nonpregnant only)	
No	445 (44.3%)
Yes	560 (55.7%)
Past three months FP method use by type (nonpregnant only)	
None	166 (16.5%)
Withdrawal or rhythm	279 (27.8%)
Condoms	323 (32.1%)
Pill	31 (3.1%)
IUD	83 (8.3%)
Female sterilization	117 (11.6%)
Other	6 (0.6%)
Past three months discussion about FP with husband	
No	655 (60.2%)

Measure	*N* (%) or Mean (SD)
Yes	433 (39.8%)
Measures of contraceptive decision-making	
DHS Contraceptive Decision-Making	
Female not involved	120 (11.0%)
Mainly husband	114 (10.5%)
Mother-in-law	5 (0.5%)
Other elderly head ofhousehold	1 (0.1%)
Female involved	968 (89.0%)
Mainly respondent	8 (0.7%)
Joint decision	960 (88.2%)
Reproductive Decision-Making Agency	
Low/medium agency	707 (65.0%)
High agency	380 (35.0%)
Missing	1 (0.1%)
Shared opinion about FP	
No	356 (32.7%)
Yes	732 (67.3%)
Opinion was valued (if shared opinion)	
No	8 (1.1%)
Yes	723 (98.9%)
Missing	1 (0.1%)
Who had final say on FP use	
Female not involved	178 (16.4%)
Husband	168 (15.4%)
Mother-in-law	7 (0.6%)
No decision made	3 (0.3%)
Female/joint	909 (83.6%)
Respondent	57 (5.2%)
Joint decision	852 (78.3%)
Missing	1 (0.1%)
Satisfied with level of influence, or prefer more or less	
More/unsure	560 (51.5%)
More influence	543 (49.9%)
Unsure	17 (1.6%)
Satisfied/less	528 (48.5%)
Less influence	74 (6.8%)
Satisfied	454 (41.7%)
Contraceptive Final Decision-Maker	
Husband or other family member	912 (83.8%)
Husband	886 (81.4%)
Respondent’s mother	16 (1.5%)
Mother-in-law	8 (0.7%)

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Measure	*N* (%) or Mean (SD)
Other elderly head of household	2 (0.2%)
Female	176 (16.2%)
Respondent	176 (16.2%)

TABLE 2

Pearson's correlation of three examined contraceptive decision-making items

	DHS Contraceptive Decision Making	Reproductive Decision Making Agency	Contraceptive Final Decision-Maker
DHS Contraceptive Decision Making	1.000	0.160 $p < 0.001$	0.147 $p < 0.001$
Reproductive Decision Making Autonomy	–	1.000	−0.202 $p < 0.001$
Contraceptive Final Decision-Maker	–	–	1.000

TABLE 3

Unadjusted and adjusted mixed-effects logistic regression analyses assessing association between contraceptive decision-making and modern contraceptive use in past three months, nonpregnant women only (n=1005)

	DHS Contraceptive Decision Making: Female not involved (Ref) vs. female involved				**Reproductive Decision Making Agency: Low/ medium (Ref) vs. high agency**				**Contraceptive Final Decision-Maker: Husband or other family member (Ref) vs. female**			
	OR	**95% CI**	**AOR**	**95% CI**	**OR**	**95% CI**	**AOR**	**95% CI**	**OR**	**95% CI**	**AOR**	**95% CI**
Female not involved/ low autonomy	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*
Female involved/ high autonomy	1.69*	[1.12,2.54]	1.73*	[1.14,2.63]	1.12	[0.86,1.48]	1.11	[0.84,1.46]	1.17	[0.83,1.65]	1.17	[0.82,1.65]
Wife age			1.01	[0.96,1.07]			1.02	[0.97,1.08]			1.02	[0.96,1.07]
Household BPL card												
No			*Ref*	*Ref*			*Ref*	*Ref*			*Ref*	*Ref*
Yes			1.15	[0.85,1.56]			1.17	[0.86,1.59]			1.16	[0.85,1.57]
SC/ST designation												
None/other			*Ref*	*Ref*			*Ref*	*Ref*			*Ref*	*Ref*
SC/ST/OBC			1.15	[0.86,1.53]			1.15	[0.87,1.53]			1.15	[0.87,1.53]
Has living son												
No			*Ref*	*Ref*			*Ref*	*Ref*			*Ref*	*Ref*
Yes			1.47**	[1.13,1.91]			1.47**	[1.13,1.91]			1.47**	[1.13,1.90]
Years married			1.00	[0.94,1.06]			1.00	[0.94,1.06]			1.00	[0.94,1.06]
Wife education												
None/secondary			*Ref*	*Ref*			*Ref*	*Ref*			*Ref*	*Ref*
Higher secondary/ postsecondary			1.02	[0.77,1.36]			1.08	[0.82,1.43]			1.07	[0.81,1.41]
Treatment												
Control cluster			*Ref*	*Ref*			*Ref*	*Ref*			*Ref*	*Ref*
Intervention cluster			0.79	[0.57,1.09]			0.80	[0.57,1.12]			0.80	[0.57,1.11]

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$.

TABLE 4

Unadjusted and adjusted[a] multinomial logistic regression analyses assessing association between contraceptive decision-making and type of contraception used in past three months, nonpregnant women only (n = 1,005). Reference category is no use of contraception

	DHS Contraceptive Decision Making: Female not involved (Ref) vs. female involved				Reproductive Decision Making Agency: Low/ medium (Ref) vs. high agency				Contraceptive Final Decision-Maker: Husband or other family member (Ref) vs. female			
	RRR	**95% CI**	**aRRR**	**95% CI**	**RRR**	**95% CI**	**aRRR**	**95% CI**	**RRR**	**95% CI**	**aRRR**	**95% CI**
Withdrawal or rhythm method												
Female not involved/Low autonomy	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*
Female involved/ High autonomy	1.34	[0.84,2.14]	1.30	[0.77,2.19]	1.36	[0.80,2.34]	1.37	[0.80,2.32]	0.86	[0.50,1.49]	0.85	[0.48,1.50]
Condoms												
Female not involved/Low autonomy	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*
Female involved/ High autonomy	2.12**	[1.29,3.48]	1.99*	[1.13,3.51]	1.22	[0.81,1.84]	1.23	[0.81,1.86]	0.81	[0.48,1.38]	0.78	[0.45,1.35]
Pill												
Female not involved/Low autonomy	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*
Female involved/ High autonomy	1.25	[0.38,4.12]	1.47	[0.49,4.47]	1.71	[0.66,4.44]	1.67	[0.63,4.43]	1.79*	[1.11,2.88]	2.00*	[1.14,3.52]
IUD												
Female not involved/Low autonomy	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*
Female involved/ High autonomy	4.95**	[1.86,13.20]	4.76**	[1.80,12.59]	1.64*	[1.07,2.52]	1.64*	[1.04,2.60]	1.74	[0.81,3.77]	1.71	[0.81,3.58]
Sterilization												
Female not involved/Low autonomy	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*
Female involved/ High autonomy	1.37	[0.66,2.83]	1.71	[0.71,4.11]	1.18	[0.66,2.12]	1.15	[0.58,2.25]	1.13	[0.51,2.51]	1.18	[0.47,2.97]

[a]For all adjusted analyses the following covariates were included: Wife age, BPL Cardholder status, SC/ST Designation, Has living son, Years married, Wife education, Treatment group.

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$.

TABLE 5

Unadjusted and adjusted mixed-effects logistic regression analyses assessing association between contraceptive decision-making and contraceptive communication with husband in past three months (n = 1088)

	DHS Contraceptive Decision Making: Female not involved (Ref) vs. female involved				Reproductive Decision Making Agency: Low/ medium (Ref) vs. high agency				Contraceptive Final Decision-Maker: Husband or other family member (Ref) vs. female			
	OR	**95% CI**	**AOR**	**95% CI**	**OR**	**95% CI**	**AOR**	**95% CI**	**OR**	**95% CI**	**AOR**	**95% CI**
Female not involved/Low autonomy	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*	*Ref*
Female involved/ High autonomy	3.16***	[1.95,5.11]	2.75***	[1.69,4.49]	1.00	[0.76,1.30]	1.01	[0.78,1.32]	0.98	[0.70,1.38]	0.93	[0.66,1.31]
Wife age			1.04	[0.99,1.10]			1.05	[0.99,1.11]			1.05	[0.99,1.11]
Household BPL card												
No			*Ref*	*Ref*			*Ref*	*Ref*			*Ref*	*Ref*
Yes			0.91	[0.67,1.24]			0.92	[0.68,1.24]			0.91	[0.68,1.23]
SC/ST designation												
None/other			*Ref*	*Ref*			*Ref*	*Ref*			*Ref*	*Ref*
SC/ST/OBC			1.12	[0.85,1.48]			1.13	[0.85,1.48]			1.13	[0.86,1.49]
Has living son												
No			*Ref*	*Ref*			*Ref*	*Ref*			*Ref*	*Ref*
Yes			1.16	[0.89,1.51]			1.17	[0.90,1.51]			1.17	[0.90,1.51]
Years married			0.92**	[0.86,0.98]			0.92**	[0.86,0.97]			0.92**	[0.86,0.97]
Wife education												
None/secondary			*Ref*	*Ref*			*Ref*	*Ref*			*Ref*	*Ref*
Higher secondary/ Postsecondary			1.20	[0.91,1.59]			1.31	[0.99,1.72]			1.32	[1.00,1.73]
Treatment												
Control cluster			*Ref*	*Ref*			*Ref*	*Ref*			*Ref*	*Ref*
Intervention cluster			2.22***	[1.70,2.91]			2.26***	[1.75,2.90]			2.26***	[1.76,2.91]

*$p < 0.05$

**$p < 0.01$

$^{***}p < 0.001$.