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Examining the Determinants of Sexual Violence Among Young, Married Women in Southern India

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Abstract

The prevalence of sexual violence is increasingly being studied in India. Yet the determinants of sexual violence, irrespective of physical violence, remain largely unexplored. Here the authors identify the determinants of sexual violence, and additionally, explore how the presence of physical violence modifies these determinants. A cross-sectional analysis is conducted using baseline data from a longitudinal study involving young married women attending reproductive health clinics in Southern India. A multivariable logistic regression analysis is conducted to first identify determinants of sexual violence and then repeated after stratifying elements based on presence or absence of physical violence identified from participants' reports. 36% and 50% of the participants report experiencing sexual and physical violence, respectively. After adjusting for other covariates, women's partners' characteristics are found most significantly associated with their odds of experiencing sexual violence. These characteristics include husbands' primary education, employment as drivers, alcohol consumption, and having multiple sex partners. Women's contribution to household income also increases their odds of experiencing sexual violence by almost twofold; however, if they are solely responsible for "all" household income, the relationship is found to be protective. Physical violence modifies the determinants of sexual violence, and among women not experiencing physical violence, husbands' primary education and employment as drivers increase women's odds of experiencing sexual violence nearly threefold, and women who contribute "all" the household income ($n = 62$) do not experience sexual violence. These relationships are not significant among women experiencing physical violence. Study findings improve the understanding of the determinants of sexual violence. Future research is needed to examine the risk factors for different types of GBV independently and to tease apart the differences in risk factors depending on women's experiences. The significance of male partners' characteristics warrants in-depth research, and in order to promote gender-equitable norms, future interventions need to focus on male behaviors and men's day-to-day survival challenges, all of which likely influence conflicts in marital relationships.

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Karuna S. Chibber initiated and conducted the data analysis and led the writing of this manuscript. Karl Krupp provided input into the design, management, and data collection of this study and review of the manuscript. Nancy Padian contributed to the interpretation of study results. Purnima Madhivanan was the principal investigator on the study and provided input in the interpretation of study results.

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Keywords

gender-based violence; sexual violence; physical violence; India

Introduction

Gender-based violence (GBV) is recognized globally as a widely prevalent public health problem (Garcia-Moreno, Jansen, Ellsberg, Heise, & Watts, 2006). GBV includes a broad range of physical, sexual, and psychologically coercive acts arising from inequities in gender roles and relationships directed against women by their male partners (Ellsberg & Heise, 2005). Physical and sexual violence are the two forms of GBV considered in this article. As defined in the World Health Organization's multicountry study on women's health and domestic violence, physical violence includes being hit, kicked, choked, burnt, and other such actions that inflict physical pain, whereas sexual violence is operationalized via actions that entail men forcing women to have sex as, when, and how they desire, for example, by using verbal threats and/or physical violence to perpetuate forced sex, ignoring women's preferences and requests to use contraception (Garcia-Moreno et al., 2006).

Although early research in India focused primarily on physical violence, studies are increasingly measuring the prevalence of sexual violence irrespective of physical violence. According to the latest national survey among women of reproductive age (2005–2006), 7.7% reported experiencing sexual and physical violence (Silverman, Decker, Saggurti, Balaiah, & Raj, 2008), whereas a multisite study conducted in the 1990s found 15% reporting one or more incidents of forced sex (International Clinical Epidemiological Network, 2000). Prevalence estimates reported by other studies in India that used population-based data range from 12% to 32%, and 9% to 75%, in the case of studies that used community- or clinic-based data (Babu & Kar, 2009; Duvvury, Nayak, & Allendorf, 2002; Koenig, Stephenson, Ahmed, Jejeebhoy, & Campbell, 2006; Martin, Tsui, Maitra, & Marinshaw, 1999; Santhya, Haberland, Ram, Sinha, & Mohanty, 2007; Solomon et al., 2009).

The determinants of sexual violence, however, remain largely unexplored in India. Most recently, Babu and Kar (2009) conducted a population-based study in Eastern India among married women and men up to 50 years of age. They found urban residence and younger age to be positively associated with the occurrence of sexual violence among women whereas higher education was protective. Using secondary data from a representative sample of North Indian married men, Koenig et al. (2006) found childlessness, husband's extramarital relationships, intergenerational exposure to violence, household economic pressure, and residing in communities with a high crime rate to be positively associated with sexual violence. Husbands' higher education, however, was found to be negatively associated with physical violence but positively associated with sexual violence. The third study of relevance on this topic was conducted in 2004 among a random sample of married women from 40 low-income communities across Chennai, a major metropolitan in South India. Cross-sectional data analysis revealed that elementary or middle school education among husbands and women and household economic pressures were positively associated with women frequently experiencing forced sex (Solomon et al., 2009). Another cross-sectional study, conducted in 2002–2003, used mixed methods to identify the determinants of unwanted sex among a purposively selected sample of young, rural, married women who reported communicating their desire not to have sex to their husbands. Being pregnant or a new mother, women's higher education, their level of familiarity with husbands at the time of marriage, having a supportive husband, and having a higher standard of living were inversely associated with the risk of unwanted sex. Being employed and accepting violence

by husbands was positively associated with experiencing unwanted sex (Santhya et al., 2007). In summary, these studies found several individual, relationship, household, and contextual factors to be associated with sexual violence (or types of sexual violence) and some differences in the directions of the associations between select factors and sexual violence as compared to physical violence.

Furthermore, just as physical violence has been associated with women's adverse health outcomes, recent evidence shows that exposure to sexual violence may be independently associated with a range of women's reproductive health outcomes, including sexually transmitted infections (STIs) such as HIV/AIDS (Ghosh et al., 2011; Jain, John, & Keusch, 1994; Newmann et al., 2000; Stephenson, Koenig, & Ahmed, 2006; Sudha & Morrison, 2011; Swain, Saggurti, Battala, Verma, & Jain, 2011). The co-occurrence of sexual and physical violence is also common and may further heighten women's vulnerability to ill-health (Silverman et al., 2008). Instances of the occurrence of types of sexual violence without physical violence have also been documented (Garcia-Moreno et al., 2006; Santhya et al., 2007), even though women themselves may be less likely to identify certain actions as sexual violence (Ellsberg & Heise, 2005; Santhya et al., 2007).

Given the prevalence of sexual violence and its potentially negative impact on women's health, future research to understand sexual violence and its determinants, independent of other forms of GBV such as physical violence, is crucial. Programmatic and policy recommendations made without a comprehensive understanding of the determinants of sexual violence assume a substantial overlap in the determinants of different forms of GBV (physical, sexual, and psychological violence) and may recommend a common approach to address all types of GBV. This assumption may not necessarily be true, and thereby, insufficient to improve women's health and well-being.

In this article, we build on the current evidence to address the gap in the literature on the determinants of sexual violence. Our analysis was guided by Heise's conceptual framework for violence against women (Heise, 1998). Applying this framework, we recognized sexual violence to be a function of the complex interplay of factors operating at different levels of influence in an individual's environment (Heise, 1998; Kaplan, 1999; McMichael, 1999; Stokols, 1996). Guided by this framework, and on the basis of available data, we studied the association between sexual violence and factors operating at the individual, relationship, and household levels among a cohort of low-income, peri-urban, and rural married women in Southern India. In addition, we examined how the experience of physical violence modified the determinants of sexual violence.

Method

Study Setting and Design

Between November 2005 and April 2006, a consecutive sample of 918 low-income women were recruited from Mysore city in Karnataka state in Southern India. *Low-income* refers to participants who have a monthly household income less than INR 3,334 (US\$75) and who live in hutments, shacks or small, inferior construction dwellings (National Center for Macro Consumer Research, 2010). Potential participants were recruited from the obstetrics/gynecology outpatient clinic of a large hospital and through community out-reach programs. Detailed recruitment methods are described elsewhere (Krupp et al., 2007). Eligibility criteria included that the participants be in the age group of 15 to 30 years, sexually active, willing to undergo a pelvic examination, and willing to reside in the community for at least 6 months. Written informed consent was obtained from all eligible and interested participants, after explaining the study objectives. Study protocols were approved by the Committee for Protection of Human Subjects at the University of California, Berkeley, and the Asha Kirana

Institutional Review Board, Karnataka, India, in compliance with all federal regulations governing the protection of human subjects.

Enrolled women participated in face-to-face interviews conducted by trained interviewers, in private rooms in the outpatient clinic. Interviews were conducted in Kannada (the local language) at baseline and two follow-up sessions at 3-month intervals. The survey collected information on women's sociodemographics, socioeconomic, sexual and reproductive health status, health care-seeking practices, sexual history, substance abuse, experience of physical and sexual violence by an intimate partner, and data on various partner characteristics. Data used in these analyses are from the baseline visit for 898 observations where data on sexual and physical violence were available.

Measures

The outcome of experiencing sexual violence in the past year was derived from a scale of 12 survey items describing acts of sexual violence, as used in the World Health Organization's multicountry study on women's health and domestic violence (Garcia-Moreno et al., 2006). These included questions such as, "Have you had sex when you did not want to because you were afraid of what your husband might do if you refused?," and "Has your husband refused to use a condom/birth control method despite your request?" Each question had four response options: 0 (*never or 0 times*), 1 (*rarely or 1–2 times a year*), 2 (*sometimes or less than once a month*), and 3 (*frequently or at least once a month*). However, few respondents (between 0% and 5%) reported experiencing sexual violence *sometimes/2* or *frequently/3*. Given the paucity of research on this issue, the study objective was to capture and study any instance of a woman experiencing sexual violence. Therefore, in order to improve the efficiency of the analysis, the investigators decided to dichotomize responses by combining Options 1, 2, and 3 into a single category "1" describing having experienced any type of sexual violence. A composite variable was then created by aggregating the responses to these 12 dichotomous items, and Cronbach's alpha coefficient was .88, suggesting that the 12 items on the scale had relatively high internal consistency. Similar procedures were used to create a composite measure for the experience of physical violence in the past year, by combining 12 survey items pertaining to acts of physical violence; Cronbach's alpha was .89 (Garcia-Moreno et al., 2006).

The selection of independent measures was guided by existing literature and Heise's conceptual framework (Heise, 1998). *Age* and *age at first sex* were included as continuous variables at the individual level. In addition, at this level, we included whether or not women had children, their educational status (which was categorized as *no education*, *primary education*, and *more than primary education*), and their contributions to the household income. Categories for the latter (*none*, *some contribution*, and *all/contributing all the household income*) were developed based on the hypothesis that the amount of the contribution might influence women's risk of sexual violence. Factors selected at the relationship level included the following: husband's education (categorized in the same way as women's education), and a dichotomous variable for alcohol consumption and for having multiple sex partners. In addition, three occupational categories were created by combining occupations of similar skill and income level (unskilled occupations, skilled and higher-income occupations, and being a driver). The occupation of being a "driver" was retained as an independent category because this had the single largest frequency in the raw data. Furthermore, occupations involving mobility have been directly associated with increased risky behaviors for men, which in turn influence women's risk of GBV (Go et al., 2003; Jeyaseelan et al., 2007, 2004; Krishnan, 2005b; Martin, Kilgallen et al., 1999; Ramiro, Hassan, & Peedicayil, 2004; Saggurti, Schensul, & Verma, 2009; Sopheab, Fylkesnes, Vun, & O'Farrell, 2006), therefore rendering it important to study the independent effects of husbands' employment as drivers on women's risk of violence. At the household level, a

dichotomous measure of *monthly household income* was included (income less than INR 4,000 or INR 4,000 or more), and lower income was hypothesized to increase women's risk for sexual violence. Finally, evidence shows that extended family members can be influential in the perpetuation and prevention of GBV (Clark, Silverman, Shahrouri, Everson-Rose, & Groce, 2010; Hyder, Noor, & Tsui, 2007; Naved & Persson, 2008; Raj, Livramento, Santana, Gupta, & Silverman, 2006; Solomon et al., 2009). However, since we did not have data about extended family members a woman lived with, the number of people in the household was included as a proxy measure, under the assumption that when a family size exceeded 4 or 5, it most likely meant that women were living their in-laws.

Analysis

The relationships among related independent variables were assessed with contingency tables, chi-square analyses, and Student *t tests*, to ensure that two highly correlated (more than 50%) variables were not both included in the multivariable analyses. Univariable logistic regression analyses were conducted to assess the strength of the association of each independent covariate with the experience of sexual violence. A full multivariable logistic regression analysis was conducted subsequently to identify the significant determinants of experiencing sexual violence, after adjusting for other covariates. A test for statistical interaction between physical violence and each covariate was conducted, and three interaction terms were found to be significant. To simplify interpretation of results and to present all findings in this exploratory analysis, we repeated the full model, stratifying the sample by the experience of physical violence. Results were virtually identical, and the stratified model is presented here. Odds ratios and confidence intervals at the 95% level were calculated. All analyses were conducted using Stata 10 (StataCorp, 2009).

Results

The total number of participants for which data on sexual violence were available was 897. Average age of study participants was 26 years, their average age at first sex was 17 years, and the majority of participants reported having children. Furthermore, 36% and 50% reported experiencing sexual and physical violence, respectively, in the past year. More than a quarter of the participants and their husbands were uneducated, but approximately equal proportions of women and men reported more than primary education (43%). Few women worked outside their home, and therefore, about three fourths reported making no contribution to the household income. In contrast, all husbands were employed, with 43% employed in skilled and higher-income occupations and 11% employed as drivers. Approximately half of the husbands had ever consumed alcohol, but less than a quarter of them were reported as having multiple sex partners. The mean number of people in the household was 5.25, and more than three fourths had a monthly income of less than INR 4,000.

Table 1 summarizes the results of the unadjusted and adjusted logistic regression analyses. In the unadjusted model, relative to the reference group (no children), the odds of sexual violence were significantly higher among women who had children (Odds Ratio [OR] = 1.55, 95% Confidence Interval [95% CI] = 1.04–2.31). Making some contribution to the household income as compared to no contribution raised the odds of sexual violence (OR = 1.87, 95% CI = 1.30–2.68), whereas providing all the household income had the opposite effect (OR = 0.52, 95% CI = 0.32–0.85). The odds of sexual violence was significantly higher as well among women whose husbands had primary education (OR = 1.19, 95% CI = 1.32–2.71), were employed as drivers (OR = 1.87, 95% CI = 1.20–2.90), had ever consumed alcohol (OR = 2.13, 95% CI = 1.61–2.81), and had multiple sex partners (OR = 1.91, 95% CI = 1.35–2.71). In the adjusted model, all these associations, except for *having children*, remained significantly associated with sexual violence.

Table 2 presents results of the stratification by physical violence. Among women who experienced physical violence, the only covariate of significance for experiencing sexual violence was *husband having multiple sex partners* (OR = 1.70, 95% CI = 1.05–2.76). In contrast, there were several significant determinants of sexual violence among women who did not experience physical violence. Having a husband with primary education increased the odds of sexual violence threefold (OR = 3.11, 95% CI = 1.32–7.29), as did having a husband who was employed as a driver (OR = 2.90, 95% CI = 1.18–7.13). Husband's consumption of alcohol was also significant (OR = 1.96, 95% CI = 1.13–3.40). The relationship between women's contribution to the household income and their risk of sexual violence was even stronger after stratification. Among women who did not experience physical violence and who contributed the entire household income ($n = 62$), there was no variability in the outcome variable; that is, these 62 women did not experience sexual violence and were dropped from the analysis (see Table 2). We repeated the stratified models by excluding the contribution to household income variable to ensure that the loss of data on these 62 observations did not significantly alter the coefficients of other covariates. There was less than 10% difference in few covariates, but there was no difference in the significance levels.

Discussion

Adding to the growing literature, findings of this study make several important contributions to our understanding of the determinants of sexual violence for young married women in Southern India. This study found factors pertaining to the relationship level to be most significantly associated with women's risk of sexual violence. For instance, women whose husbands had primary education were at increased odds of experiencing sexual violence compared to those whose husbands were uneducated. This finding is consistent with two other studies on this topic (Koenig et al., 2006; Solomon et al., 2009). Interestingly, one of these two studies also found husband's higher education to be inversely associated with women's risk of physical violence (Koenig et al., 2006) as has been established in the past (Martin, Tsui et al., 1999). Applying Heise's conceptual framework provides one possible explanation for the difference in the direction of association between education and physical violence compared to education and sexual violence. Factors operating at the community and/or societal level—such as cultural norms and attitudes on how more educated men should behave in public in a more controlled manner—may condition such men against physically abusing their wives. However, entitlement over his wife's body likely remains a man's marital privilege (Go et al., 2003), and may be even more pronounced among educated men, being the only domain where they control their wives. Further research is needed with men to explore potential differences in norms and attitudes toward different forms of GBV by varying education levels, occupations, income levels, and other sociodemographic characteristics.

The second important risk factor at the relationship level was husbands' employment as "drivers." Evidence from India and other countries has demonstrated that male occupations with mobility (automobile drivers) are associated with risky behaviors, including having multiple sex partners, rape, crime, and substance abuse (Fawole, Ajuwon, Osungbade, & Faweya, 2002; Rao, Pilli, Rao, & Chalam, 1999; Saggurti et al., 2009; Sopheab et al., 2006). These behaviors, in turn, have been established as determinants of physical and sexual violence (Go et al., 2003; Jeyaseelan et al., 2007, 2004; Krishnan, 2005b; Martin, Kilgallen et al., 1999; Ramiro et al., 2004).

Another noteworthy finding was how physical violence modified the relationship between other determinants and sexual violence. There was substantial variation in the determinants of sexual violence, depending on the presence of physical violence. Among women who did

not experience physical violence, having a husband with primary education increased the likelihood of experiencing sexual violence threefold, as did having a husband who worked as a driver. These relationships were not significant among women who *did* experience physical violence. This finding suggests that women who experience both physical and sexual violence have different risk factors than those experiencing only sexual violence and perhaps those experiencing only physical violence. It further suggests potential differences between men who physically abuse their wives and those who don't, which in turn might influence the dynamics of marital relationships. Future research is needed to understand the overlap of different types of GBV that women experience and to tease apart the differences in risk factors depending on women's experiences. In-depth research with men is also critical to understand, for example, what makes some men both physically and sexually violent but others only sexually violent.

Finally, study findings add to the growing body of evidence on the association between women's employment and risk for GBV. Two previous studies, also conducted in Karnataka state with married women of reproductive age, one using a stratified multistage cluster sample of rural women (Krishnan, 2005a) and another using a convenience sample of urban women from low-income neighborhoods (Krishnan et al., 2010; Rocca, Rathod, Falle, Pande, & Krishnan, 2009), found a positive effect of women's employment (Krishnan, 2005b; Rocca et al., 2009) and changes in employment status over time (Krishnan et al., 2010) on their risk for GBV. Improving on these findings, our study establishes the importance of the amount of women's economic contribution; *some contribution to the household income* increased women's risk of sexual violence and *all contribution* was protective. Furthermore, stratifying the sample into those who did and did not experience physical violence revealed that the subset of participants who did not experience physical violence and contributed *all* of the household income did not experience sexual violence either. Examining data from our study against previous evidence helps to explain the differential experiences of violence among women making some contribution to the household income compared to women providing the entire household income. Possibly, when women begin to earn and contribute to the household income they acquire more independence and rights awareness and may, therefore, challenge traditional gender norms (Ahmed, 2005). Anxious to maintain their authority, husbands may respond with increased violence (Jeyaseelan et al., 2007; Schuler, Hashemi, & Badal, 1998). Over time, however, when women's contributions become substantial, men might begin to recognize the value of their wife's contribution, accept new gender roles, or feel less able to exercise physical or sexual control over their wives (Schuler et al., 1998). Applying Heise's conceptual framework suggests that as factors at the individual level change (women's economic contribution), how these interact with factors at other levels (husband-wife relationships and community norms about power and control in relationships) might also change, thereby changing women's risk of sexual violence (Heise, 1998). Since women's changing economic contribution is potentially a function of time and age, longitudinal research is needed to further explore the effects of the amount of economic contribution and time and increasing age on changing gender roles and the related risk of violence.

Limitations

Several limitations of this study should be noted. Similar to other studies on this topic, we conducted cross-sectional analysis to study the association between factors operating at different levels of the individual's environment and their risk for sexual violence. Hence, causal relationships between the independent covariates and sexual violence cannot be established. Reliance on a nonrandom sample restricts generalizability of findings to other populations. The study focus on individual behavior and practices limited the availability of data on household-, community-, and societal-level factors, such as norms around GBV and

women's status. To account for this limitation, however, we approximated for these factors by including overall household income and number of people in the household as measures of household-level economic and social pressure. A final limitation is the reliance on self-reported data that are subject to recall and social desirability biases. The potential for underreporting is also likely to be high for data of such a private nature. Several steps were taken to counter these limitations and to improve study validity. First, female interviewers were recruited from the local community and received extensive and ongoing training on ethics and methods to conduct research on sensitive topics. Second, prior to data collection, study investigators collaborated with support agencies and community-based networks to build community rapport and to ensure that study participants had access to the necessary support services.

Conclusion

These limitations aside, this study improves our understanding of sexual violence, emphasizing the importance of partner characteristics on women's risk for sexual violence and the complexity in identifying determinants for different types of GBV. The significance of factors pertaining to husbands' characteristics warrants the need for more in-depth research with all men to identify differences in norms and attitudes toward committing violence against woman by differing education levels, occupations, age, and other such sociodemographics. Furthermore, the consistent association between male alcohol consumption and risky behaviors in explaining the differential frequency with which women experience sexual violence and how differences in women's risk for sexual violence may be based on the amount of income they contribute to the household point to the need for interventions to directly address men's own day-to-day survival issues and to urgently engage with men and families to challenge the deeply rooted social norms that condone GBV and to promote gender equity. This study's findings also illustrate the differences in risk factors for different forms of GBV and the complexity of the relationships between a single risk factor and others operating at multiple levels of an individual's environment, including risk factors for other forms of GBV that may also be prevalent and changes that occur over time. This finding points to the need for longitudinal research and independently examining the risk factors for each form of GBV, teasing apart the differences based on women's individual experiences.

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Biographies

Karuna S. Chibber, DrPH, MHS, is a Fogarty International postdoctoral fellow in women's health & empowerment at the University of California San Francisco. She is a public health researcher conducting community-based research that examines the association between gender inequalities and women's reproductive and sexual health. For the past 10 years, she has worked in the fields of reproductive and maternal and child health, and poverty eradication in India and in the United States, with academic institutions, international NGOs, and community-based organizations. Her most recent research as a Fogarty International fellow focuses on the feasibility of health systems interventions for the prevention and management of gender-based violence among low-income women of reproductive age in Southern India. In addition, she is examining the feasibility of integrating educational programs that seek to enhance women's empowerment, rights consciousness, and awareness about gender-based violence and support services, with existing community-based programs, such as microcredit and other women's vocational training programs.

Karl Krupp, MPH, is a public health researcher and currently the program director of the Public Health Research Institute, a research organization focusing on basic and translational research in women's health issues in India. His research interests include bioethics in international settings; interactions between biological, behavioral, and social factors in the acquisition of HIV and sexually transmitted diseases in vulnerable populations; primary and secondary prevention of cervical cancer; human papillomavirus; and male circumcision for prevention of HIV/STIs. He has led several public health projects in the field, including capacity-building initiatives for traditional birth attendants in the prevention of vertical transmission of HIV and formative research to examine the barriers and facilitators for the acceptability of the HPV vaccine among health care providers and parents of adolescent girls. He has published extensively on a range of public health issues in leading peer-reviewed journals. His professional skills include coordinating the work of nongovernmental organizations in the United States in managing medical waste disposal in hospitals and successful grants writing. In addition to his own research, he consults with the Global Microbicides Campaign in Washington, DC, on grant writing.

Nancy Padian, PhD, MPH, is an internationally recognized leader in the epidemiology and prevention of STIs, including HIV. She is a senior technical advisor at the Office of the Global AIDS Coordinator (PEPFAR), a consultant for the Bill and Melinda Gates Foundation, and a faculty member at the University of California, Berkeley, in the Department of Epidemiology. She is an elected member of the Institute of Medicine, the American Epidemiology Society, and the International Society for Sexually Transmitted Disease Research. She frequently consults for UNAIDS and the WHO on programs related to care, treatment, and prevention of HIV. For more than two decades, she has developed and directed a range of research and intervention projects on HIV, sexually transmitted infections, and contraception in high-risk populations in the United States and internationally. Her portfolio includes a large Phase 3 randomized controlled trial (RCT) to evaluate the effectiveness of female-initiated HIV prevention methods in South Africa and an RCT of a combined vocational training and social support intervention designed to increase economic independence and reduce HIV risk among adolescent female orphans in Zimbabwe. She is the scientific advisor to numerous World Bank and UNAIDS impact evaluations as well as to an NIH-funded conditional cash transfer intervention for HIV prevention among adolescents in South Africa. In addition to HIV and other sexually transmitted diseases, her research also addresses the broader context of economic development, empowerment, and gender-based violence.

Purnima Madhivanan, PhD, MD, is an epidemiologist and clinician with extensive experience in reproductive and sexual health. She is the founder and executive director of Public Health Research Institute of India, a research organization striving to foster and promote excellence in basic and translational research in women's health issues in India. She is also the medical director of a community-based women's reproductive health project in Mysore, India. Formerly, she was an adjunct assistant professor at the University of California San Francisco and has also spent several years as a clinical epidemiologist at the San Francisco Public Health Department. Her research focuses broadly on reproductive and sexual health, including the prevention and management of sexually transmitted infections such as HIV/AIDS, among low-income populations. She is the lead investigator on several U.S. government- and international donor-supported projects. These range from studies that describe the various species of lactobacillus in bacterial vaginosis among Indian women, training of lower-level health care providers in the prevention of vertical transmission of HIV, examining the barriers and facilitators for the acceptability of the HPV vaccine among health care providers and parents of adolescent girls, and acceptability of male circumcision among VCT clinic attendees. She has published extensively; she has published more than 25 peer-reviewed articles in leading journals.

Table 1

Multivariable Logistic Regression of Sexual Violence: Unadjusted and Adjusted Models

Variable	Unadjusted Model		Adjusted Model	
	Odds Ratio	95% CI (Confidence Interval)	Odds Ratio	95% CI
Age	1.04	0.99–1.08	1.02	0.97–1.07
Age at first sex	0.99	0.94–1.04	1.00	0.94–1.06
Have children				
No		Ref.		Ref.
Yes	1.55	1.04–2.31	1.43	0.91–2.25
Education				
No education		Ref.		Ref.
Primary	1.10	0.77–1.58	1.11	0.75–1.65
More than primary	1.01	0.72–1.42	1.00	0.67–1.49
Contribution to household income				
None		Ref.		Ref.
Some contribution	1.87	1.30–2.68	1.71	1.18–2.49
All	0.52	0.32–0.85	0.48	0.29–0.80
Number of people living in the household	0.99	0.93–1.06	1.00	0.94–1.08
Husband's education				
No education		Ref.		Ref.
Primary	1.19	1.32–2.71	1.73	1.17–2.57
More than primary	1.07	0.77–1.48	1.04	0.70–1.55
Husband's occupation				
Unskilled		Ref.		Ref.
Skilled and higher income	1.21	0.90–1.62	1.24	0.88–1.74
Driver	1.87	1.20–2.90	1.59	1.00–2.56
Husband ever consumed alcohol				
No		Ref.		Ref.
Yes	2.13	1.61–2.81	2.03	1.52–2.72
Husband has multiple partners				
No		Ref.		Ref.
Yes	1.91	1.35–2.71	1.75	1.21–2.54
Household income (INR—Indian Rupees)				
<4,000		Ref.		Ref.
4,000 or more	1.04	0.73–1.48	1.25	0.82–1.90

Table 2

Multivariable Logistic Regression of Sexual Violence Stratified by Physical Violence

Variable	Adjusted Model Sexual Violence			
	Among Women Who Reported Physical Violence		Among Women Who Reported No Physical Violence	
	Odds Ratio	95% CI (Confidence Interval)	Odds Ratio	95% CI
Age	1.05	0.98–1.13	0.99	0.91–1.09
Age at first sex	1.01	0.93–1.10	1.04	0.95–1.16
Have children				
No		Ref.		Ref.
Yes	1.39	0.74–2.62	1.42	0.65–3.11
Education				
No education		Ref.		Ref.
Primary	0.94	0.57–1.55	1.10	0.47–2.58
More than primary	1.21	0.73–2.01	0.74	0.31–1.76
Contribution to household income				
None		Ref.		Ref.
Some contribution	1.35	0.84–2.15	1.46	0.69–3.12
All	1.02	0.52–2.01	<i>a</i>	<i>a</i>
Number of people living in the household	0.98	0.88–1.09	1.07	0.96–1.19
Husband's education				
No education		Ref.		Ref.
Primary	1.37	0.82–2.28	3.11	1.32–7.29
More than primary	0.92	0.55–1.52	1.51	0.63–3.63
Husband's occupation				
Unskilled		Ref.		Ref.
Skilled and higher income	0.95	0.62–1.47	1.92	0.96–3.82
Driver	0.99	0.54–1.83	2.90	1.18–7.13
Husband ever consumed alcohol				
No		Ref.		Ref.
Yes	1.43	0.97–2.12	1.96	1.13–3.40
Husband has multiple partners				
No		Ref.		Ref.
Yes	1.70	1.05–2.76	1.25	0.58–2.69
Household income (INR—Indian Rupees)				
<4,000		Ref.		Ref.
4,000 or more	1.27	0.67–2.42	1.60	0.83–3.08

^a Among women who did not experience physical violence and who contributed all the household income ($n = 62$), there was no variability in the outcome; that is, these women did not experience sexual violence. Hence, these observations were dropped from the multivariable logistic regression model during analysis.