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RESEARCH ARTICLE

# Does Proximity to Conflict Zones Moderate Associations Between Girl Child Marriage, Intimate Partner Violence, and Contraception in Postconflict Sri Lanka?

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Women's primary contraceptive method type is impacted by the gender inequities of girl child marriage and intimate partner violence (IPV). Outside of South Asia, proximity to conflict zones has been found to impact contraceptive use, girl child marriage, and IPV, possibly moderating associations between these variables. We created multinomial regression models using the 2016 Demographic and Health Survey data from postconflict Sri Lanka to study associations between primary contraceptive method type (modern spacing methods, sterilization, and traditional methods compared to no method) and the gender inequities of girl child marriage and past year sexual, physical, and emotional IPV and to assess whether and how these associations were moderated by proximity to conflict. We found that proximity to conflict moderated the relationships between girl child marriage, past year physical and emotional IPV, and primary contraceptive method type. Girl child marriage was associated with increased relative risk (RR) of modern spacing methods (adjusted RR ratio/aRRR: 1.81–2.21) across all levels of proximity to conflict. In districts distal to conflict, past year physical IPV was associated with decreased RR of sterilization (aRRR: 0.67) and traditional methods (aRRR: 0.63), and past year emotional IPV was associated with decreased RR of traditional methods (aRRR: 0.71). In districts central to conflict, past year emotional IPV was associated with increased RR of modern spacing methods (aRRR: 1.50). Our findings suggest that policymakers and providers who seek to improve reproductive health in Sri Lanka must consider the moderating impact of proximity to conflict on the relationship between contraceptive use and the gender inequities of girl child marriage and IPV.

**Keywords:** Sri Lanka, intimate partner violence (IPV), postconflict setting, girl child marriage, South Asia, gender-based violence, contraceptive methods, reproductive health

## INTRODUCTION

### Background

The primary contraceptive method type used by an individual to prevent or delay pregnancy can have a major impact on their health and well-being. In Sri Lanka, women have free access to contraception [1], and sterilization is the most widely used contraceptive method, used

by 14% of women aged 15–49 [2]. Couples who rely on sterilization as their only contraceptive option cannot space or delay births, so widespread use of sterilization over other options can drive early childbearing with lack of healthy birth spacing [3]. Contraceptive methods vary in accessibility, detectability by a partner, whether they can be reversed (allowing for birth spacing), effectiveness (with modern methods being more effective than traditional), and acceptability to women and their partners. Sri Lankan women are more likely to use less-effective traditional methods than modern methods of contraception if they are Muslim, older than 35 years old, have a youngest child older than 6 years, and live with extended family members [4]. Sri Lankan women are also more likely to use traditional methods than modern methods if they live farther from a health clinic, have not had a public health midwife visit them, and have poor knowledge of modern contraceptives or a negative opinion of services at the nearest clinic [4]. In addition to demographic factors and

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issues of contraceptive access or knowledge, gender inequities such as girl child marriage (marrying or cohabiting before age 18 [5]) and intimate partner violence (IPV) can also impact women and girls' use of contraception.

The gender inequities of girl child marriage and IPV have been found in numerous settings to influence an individual's primary method of contraception, possibly through the mechanism of reproductive coercion [6]. Girl child marriage has been found in multiple South Asian contexts to be associated with increased use of modern contraceptive methods including female sterilization. In a study of India, Bangladesh, Nepal, and Pakistan, girl child marriage was significantly associated with current modern contraceptive use and female sterilization (vs. not being sterilized) [7]. In India, girl child marriage has been found to be associated with increased likelihood of female sterilization, even when controlling for duration of marriage [8]. There is no scientific consensus on the impact of IPV on women's primary contraceptive method type. A 2008 study found that in Bangladesh, women who experienced physical or sexual IPV were more likely to use current modern contraceptive methods than women who did not experience IPV [9]. In contrast, a 2015 multicountry study of Nepal, Bangladesh, and India found no associations between physical IPV and contraceptive methods as well as a positive association between sexual IPV and modern spacing methods and a negative association between sexual IPV and female sterilization [10]. Studies in the United States have found associations between physical and sexual IPV and increased likelihood of female sterilization [11, 12]. A 2015 systematic review and meta-analysis of longitudinal studies of IPV and contraception found that women's experience of IPV was associated with a significant reduction in their odds of using contraception [13]. The authors of the review suggested that researchers of IPV and contraceptive methods consider separately methods that are modern versus traditional and methods that do or do not require ongoing negotiations between a woman and her male partner [13]. Researchers have identified local lifetime IPV prevalence rates in Sri Lanka of around 30–40% in various single-setting studies across the country [14–17] and have found IPV to be more likely in Sri Lanka in the context of socioeconomic disadvantage [18]. While women's primary contraceptive method type may be influenced by inequitable and/or violent experiences in their relationships, community-level violence can also have an impact on contraception.

One factor that may moderate associations between primary contraceptive method type and the gender inequities of girl child marriage and IPV is proximity to conflict zones, both during and postconflict. Conflict and postconflict settings often suffer from underdevelopment of health systems, which can lead to lowered health access and negative outcomes for inhabitants [19]. Although demand for contraception is not lower in postconflict compared to non-conflict-affected settings [20, 21], underdeveloped health facilities can decrease women's access to and use of modern contraceptive methods [21]. Exposure to conflict has been linked to negative outcomes for adolescent girls including increased girl child marriage

and underage pregnancies [22–25]. Conflict has also been shown in many settings to result in increased IPV [26–29], possibly through the everyday normalization of military violence leading to acceptance of violence as a problem-solving measure within the home [30, 31]. Because of conflict's documented impact on girl child marriage, IPV, and contraception, it is possible that proximity to conflict could moderate any associations between these variables. Studies on the impact of conflict on women's sexual and reproductive health have largely been conducted in Sub-Saharan Africa and have not explored how conflict might affect contraception in South Asia.

Within South Asia, Sri Lanka presents a unique context in which to study whether conflict moderates associations between contraceptive use, girl child marriage, and IPV. During the 26-year civil war, which ended in 2009, residents of the Northern and Eastern provinces where the majority of armed conflict occurred were exposed to tremendous amounts of military violence by both separatist and government forces [32, 33]. Research on the conflict's impact on health outcomes has uncovered marked differences in health care utilization and outcomes between areas that were central to (within), proximal to (bordering), and distal to (furthest from) conflict zones, as well as an overall decrease in health systems development during the conflict [34], with rural and conflict-affected areas having far fewer doctors per inhabitants than urban areas far from conflict zones [35]. A 2016 Lancet report described how, 7 years after the end of the war, living standards in conflict zones were still poor, with limited access to toilets, water, and electricity [36]. During the war, families in the conflict zones practiced child marriage in order to remove their children from eligibility to be recruited by militant factions which were compelling youth to fight [37], and this practice may have persisted in the postconflict era [38]. IPV has also been found to be higher in the conflict zones many years after the end of the war [18, 39]. The enduring impact of the civil war on health systems, child marriage, and IPV in Sri Lanka suggests that the relationships between primary contraceptive method type, girl child marriage, and IPV may be moderated by individuals' proximity to conflict.

### **About This Study**

In postconflict Sri Lanka, the lasting impact of the conflict on IPV, girl child marriage, and contraception remains poorly understood. Using disaggregated data from the 2016 Sri Lankan Demographic and Health Survey, this study aims to understand how associations between girl child marriage, past year IPV, and primary contraceptive method type are moderated by proximity to conflict, a question that has not previously been considered in South Asia. Findings from this study will provide policymakers and health practitioners in Sri Lanka with much-needed information on how primary contraceptive method type is impacted by the gender inequities of girl child marriage and past year IPV and the ways in which these relationships are impacted by postconflict proximity to the conflict zone.

## METHODS

### Data Source

This study used data from the 2016 Sri Lankan Demographic and Survey (DHS), which collected individual-level data on child and maternal health outcomes, domestic violence experience, reproductive health, and information on economic engagement and agency of women in Sri Lanka ( $N = 27,210$  households, 18,510 women aged 15–49) [2]. The 2016 survey was the first DHS to collect data from a nationally representative sample of households in Sri Lanka—all previous DHS data collection occurred during the 30-year civil war and excluded portions of the Northern and Eastern provinces, which had been claimed as a separate state by the Liberation Tigers of Tamil Eelam organization [40]. Similar to other DHS data sets, the 2016 Sri Lankan DHS followed a multistage, clustered sample design that allowed for population-level estimates at both the national and district level [2, 41].

In addition to a general health survey administered to every eligible woman in each household, a domestic violence module was administered to one woman per household ( $n = 16,629$ ). The 2016 DHS was the first to ask questions on experience of past year IPV in Sri Lanka and, to date, no peer-reviewed studies have been published using these IPV data. Following the World Health Organization's (WHO) guidelines for the ethical collection of information on domestic violence, one eligible woman per household was randomly selected for this module, which was not implemented if privacy could not be obtained [42]. Each domestic violence module respondent was read an additional consent statement at the start of the module, informing her that the questions could be personal and reassuring her of the confidentiality of her responses. In the 2016 DHS, women taking part in the domestic violence module were asked nine questions about their experiences of IPV in the previous 12 months [2]. This study was restricted to women who were currently living with an intimate partner, answered the domestic violence module of the DHS, and were not pregnant nor trying to become pregnant, following a convention of counting women who wish to get pregnant in the 2 years post DHS as having no need for contraception [43]. This study was also restricted to women aged 18 and above, following a convention in girl child marriage research to censor participants under age 18 who might marry after the survey's completion [5]. The complete sample of women included in this study comprised of 11,426 participants. Ethical approval for this research was obtained from the University of California, San Diego Institutional Review Board (Project number #191418XX).

### Variables of Interest

#### Dependent Variable: Primary Contraceptive Method Type

As the dependent variable, we examined women's primary contraceptive method type and divided their responses into four categories based on whether a method type was modern or traditional and among modern methods whether it could be reversed and used for birth spacing

(separating out sterilization). The four categories are listed below:

1. No method (this was used as the reference category in multinomial analyses).
2. Modern spacing methods: pill, intrauterine device, implant, condom, injection, female condom, or emergency contraception.
3. Sterilization: male or female sterilization. Over 99% of this category comprised of female sterilization, but the respondents who listed male sterilization were included in order to retain a population-representative sample.
4. Traditional methods: lactational amenorrhea, rhythm method, or withdrawal (the same grouping used by the Sri Lankan Department of Census and Statistics in their descriptive report of DHS data) [2].

#### Independent Variables: Girl Child Marriage and IPV

We examined four variables as independent variables of interest to account for the separate and overlapping effects of different experiences. The four binary independent variables we considered are listed below:

1. Girl child marriage: having married or cohabited with a male partner before age 18, yes or no (conventional definition used by girl child marriage researchers [5]).
2. Past year sexual IPV: having been forced to have sex by a partner in the last 12 months, yes or no.
3. Past year physical IPV: having experienced at least one of six types of physical IPV: (1) slapping or beating with a hand, (2) pushing or shoving, (3) strangulation, (4) dragging or pulling, (5) beating with an object, or (6) burned, in the last 12 months, yes, or no.
4. Past year emotional IPV: having experienced at least one of two incidents, either being belittled/seriously offended or prevented from leaving home by a partner, in the last 12 months, yes or no.

We considered past year physical, sexual, and emotional IPV as separate independent variables to allow estimation of the independent effects of each form of IPV. We calculated Spearman's  $\rho$  correlation estimates across all three IPV variables. All IPV correlation estimates were below 0.5, justifying retaining them as independent variables.

#### Moderating Variable: Proximity to Conflict

We considered proximity to conflict as a potential moderator of the associations between girl child marriage, past year IPV, and primary contraceptive method type. This variable was defined as having three ordinal levels: central, proximal, and distal. Participants assigned to the "central" category reported residing in either the Northern or Eastern provinces of Sri Lanka, where the majority of the armed conflict occurred during the civil war. Central

districts were Ampara, Batticaloa, Jaffna, Kilinochchi, Mannar, Mullaitivu, Trincomalee, and Vavuniya. Participants assigned to the “proximal” category reported residing in one of the seven districts of Sri Lanka outside of the Northern and Eastern regions that shared a border with one or both of these regions. Proximal districts were Anuradhapura, Badulla, Hambantota, Matale, Monaragala, Polonnaruwa, and Puttalam. Finally, participants assigned to the “distal” category resided in districts that were neither in nor bordering the Northern and Eastern provinces of the country. Distal districts were Colombo, Gampaha, Galle, Kalutara, Kandy, Kegalle, Kurunegala, Matara, Nuwara Eliya, and Ratnapura.

### Covariates

We included as covariates variables known or hypothesized to be associated with girl child marriage, IPV, and contraception. These variables included each respondent’s age, education, household wealth, parity, the age difference between her and her partner, her participation in decisions about her health care, years married, household size, religion, and ethnicity. Beyond individual- and family-level characteristics, we also included as covariates whether the respondent lived in an urban setting or not and which district in Sri Lanka she lived in to control for unmeasured variation at the community level.

### Statistical Analysis

All statistical analyses were conducted using R software version 3.6.3 [44], and estimates were adjusted for complex survey design and participant-level weights using the “survey” package [45] in order to calculate population-representative measures. We first assessed the distributions of all considered covariates, girl child marriage, all three forms of past year IPV, proximity to conflict, and primary contraceptive method type in the sample. We used  $\chi^2$  tests for all comparisons across primary contraceptive method types after reducing all variables to categories (ordinal or nominal). In preparation for our multivariable model, we assessed all variables for multicollinearity by calculating their variance inflation factor (VIF). One of each pair of similarly distributed variables was excluded from the following multivariable models, resulting in a set of covariates in which all VIF values were less than 5. The following variables were excluded from multivariable models due to multicollinearity: age and ethnicity.

Next, we examined the role of proximity to conflict as a potential moderator of the relationships between child marriage, past year IPV, and primary contraceptive method type by first creating four separate interaction terms that combined proximity to conflict with child marriage and with each form of past year IPV [46]. We assessed the significance of these interaction terms in a multinomial logistic regression which estimated the adjusted change in relative risk of using modern spacing contraceptive methods, sterilization, or traditional methods (each compared to no method). The multinomial model was necessary in order to compare the multiple types of contraceptive methods within one parsimonious model. We included

in this multinomial model girl child marriage, all three past year IPV variables, proximity to conflict, and all non-collinear covariates that were significantly associated ( $p < .05$ ) with primary contraceptive method type. If an interaction term between proximity to conflict and an independent variable was statistically significant ( $p < .05$ ), it indicated that proximity to conflict moderated that variable’s impact on primary contraceptive method type (it partitioned that independent variable into domains of varying association with the dependent variable). To understand how relationships between the independent variables and primary contraceptive method type were impacted by differing levels of proximity to conflict, we examined how relationships between all independent variables and primary contraceptive method type in the multinomial models changed when stratified by the different levels of proximity to conflict. Finally, a sensitivity analysis was performed on the data set to assess whether removing respondents using male sterilization resulted in any changes in the direction or significance of any of the observed associations.

### RESULTS

Descriptive characteristics of the sample and their distributions across primary contraceptive method types are summarized with unweighted frequencies and weighted percentage values in table 1. Almost half (49%) of women reported using modern spacing methods of contraception. Nearly one in six (15%) of women had married before the age of 18. Women’s experiences of IPV in the past year varied, with 2% reporting having experienced past year sexual IPV and 14% having experienced past year emotional IPV. The majority of women (64%) lived in districts that were distal to conflict. Most women were older than 29, had attended secondary education, and had given birth two or more times. Over one third of women (34%) had partners who were 6 or more years older than them. Eighty-six percent of women reported that they made decisions about their health care individually or as an equal with their partner. Most women had been married 10 or more years and lived in households with four or more people. Finally, most women lived outside of urban settings, with Buddhism as the most practiced religion and Sinhala as the largest ethnic group represented.

Women’s primary contraceptive method type varied significantly by their demographic characteristics ( $\chi^2$  test of distribution,  $p < .05$ ). These distributions are shown in the nine rightmost columns in table 1. Women who were married as children were more likely to use sterilization (25%) and less likely to use traditional methods (8%) than women married as adults. Women who experienced each form of IPV were similarly more likely to use sterilization (20–23%) and less likely to use traditional methods (8–10%) than women who did not experience each IPV form, and they were also more likely to not use any method (24–26%). Over two in five (42%) women living in districts central to conflict were not using any method of contraception, which was much higher than the proportion of women not using any method in the distal (17%) and proximal (15%) districts. A majority of women under 40

**Table 1.** Demographic Details of Currently Partnered Women Aged 18–49 Who Are Not Pregnant or Trying to Become Pregnant and Participated in the 2016 Sri Lanka DHS Domestic Violence Module, by Type of Contraceptive Method. DOI: <https://doi.org/10.1525/agh.2022.1539582.t1>

| Characteristic                             | Primary Contraceptive Method Type |     |          |    |                |    |               |    |             |    |                |
|--|-----------------------------------|-----|----------|----|----------------|----|---------------|----|-------------|----|----------------|
|  | Total                             |     | None     |    | Modern Spacing |    | Sterilization |    | Traditional |    | $\chi^2$       |
|  | <i>n</i>                          | %   | <i>n</i> | %* | <i>n</i>       | %* | <i>n</i>      | %* | <i>n</i>    | %* | <i>p</i> Value |
| Total                                      | 11,426                            | 100 | 2,551    | 19 | 5,383          | 49 | 2,026         | 17 | 1,466       | 14 | –              |
| Girl child marriage                        |                                   |     |          |    |                |    |               |    |             |    |                |
| No   | 9,622                             | 85  | 2,199    | 20 | 4,499          | 49 | 1,577         | 16 | 1,347       | 15 | <.01           |
| Yes  | 1,804                             | 15  | 352      | 17 | 884            | 50 | 449           | 25 | 119         | 8  |                |
| Past year sexual IPV                       |                                   |     |          |    |                |    |               |    |             |    |                |
| No   | 11,104                            | 98  | 2,455    | 19 | 5,254          | 49 | 1,956         | 17 | 1,439       | 14 | <.01           |
| Yes  | 322                               | 2   | 96       | 26 | 129            | 41 | 70            | 23 | 27          | 10 |                |
| Past year physical IPV                     |                                   |     |          |    |                |    |               |    |             |    |                |
| No   | 10,288                            | 91  | 2,250    | 19 | 4,870          | 49 | 1,780         | 17 | 1,388       | 15 | <.01           |
| Yes  | 1,138                             | 9   | 301      | 24 | 513            | 47 | 246           | 21 | 78          | 8  |                |
| Past year emotional IPV                    |                                   |     |          |    |                |    |               |    |             |    |                |
| No   | 9,735                             | 87  | 2,098    | 19 | 4,633          | 50 | 1,682         | 17 | 1,322       | 15 | <.01           |
| Yes  | 1,691                             | 13  | 453      | 24 | 750            | 46 | 344           | 20 | 144         | 10 |                |
| Proximity to conflict                      |                                   |     |          |    |                |    |               |    |             |    |                |
| Distal                                     | 6,373                             | 64  | 1,078    | 17 | 3,120          | 50 | 1,100         | 17 | 1,075       | 17 | <.01           |
| Proximal                                   | 2,654                             | 23  | 408      | 15 | 1,402          | 54 | 557           | 21 | 287         | 11 |                |
| Central                                    | 2,399                             | 13  | 1,065    | 42 | 861            | 38 | 369           | 15 | 104         | 5  |                |
| Age**                                      |                                   |     |          |    |                |    |               |    |             |    |                |
| 18–29                                      | 2,111                             | 18  | 374      | 16 | 1,500          | 72 | 32            | 1  | 205         | 11 | <.01           |
| 30–39                                      | 4,834                             | 42  | 858      | 15 | 2,648          | 57 | 745           | 15 | 583         | 13 |                |
| 40–49                                      | 4,481                             | 39  | 1,319    | 26 | 1,235          | 30 | 1,249         | 28 | 678         | 17 |                |
| Education                                  |                                   |     |          |    |                |    |               |    |             |    |                |
| Primary (01–05) or less                    | 1,111                             | 8   | 334      | 26 | 318            | 30 | 378           | 35 | 81          | 9  | <.01           |
| Secondary (6–12)                           | 7,682                             | 67  | 1,651    | 18 | 3,799          | 51 | 1,366         | 18 | 866         | 13 |                |
| Higher than Secondary                      | 2,633                             | 24  | 566      | 19 | 1,266          | 49 | 282           | 11 | 519         | 21 |                |
| Household wealth quintile                  |                                   |     |          |    |                |    |               |    |             |    |                |
| Lowest                                     | 2,642                             | 18  | 746      | 22 | 1,156          | 48 | 593           | 22 | 147         | 7  | <.01           |
| Second                                     | 2,349                             | 20  | 514      | 19 | 1,130          | 50 | 423           | 18 | 282         | 13 |                |
| Middle                                     | 2,217                             | 21  | 431      | 18 | 1,154          | 53 | 346           | 15 | 286         | 14 |                |
| Fourth                                     | 2,180                             | 21  | 438      | 18 | 1,054          | 50 | 344           | 16 | 344         | 16 |                |
| Highest                                    | 2,038                             | 20  | 422      | 20 | 889            | 44 | 320           | 15 | 407         | 21 |                |
| Parity                                     |                                   |     |          |    |                |    |               |    |             |    |                |
| 0–1  | 2,390                             | 22  | 590      | 22 | 1,316          | 56 | 29            | 1  | 455         | 21 | <.01           |
| 2  | 4,832                             | 44  | 1,036    | 19 | 2,764          | 58 | 321           | 7  | 711         | 16 |                |
| 3 or more                                  | 4,204                             | 34  | 925      | 18 | 1,303          | 33 | 1,676         | 41 | 300         | 8  |                |
| Age difference between woman and partner** |                                   |     |          |    |                |    |               |    |             |    |                |
| Same or woman is older                     | 1,996                             | 17  | 481      | 21 | 941            | 50 | 317           | 15 | 257         | 14 | <.01           |
| 1–5 years                                  | 5,550                             | 49  | 1,218    | 19 | 2,657          | 50 | 940           | 16 | 735         | 15 |                |
| 6–10 years                                 | 3,075                             | 27  | 643      | 18 | 1,449          | 49 | 602           | 20 | 381         | 14 |                |
| Over 10 years                              | 805                               | 7   | 209      | 23 | 336            | 43 | 167           | 20 | 93          | 13 |                |

(continued)

**Table 1.** (continued)

| Characteristic                               | Primary Contraceptive Method Type |    |       |    |                |    |               |    |             |    | $\chi^2$<br>p Value |
|--|-----------------------------------|----|-------|----|----------------|----|---------------|----|-------------|----|---------------------|
|  | Total                             |    | None  |    | Modern Spacing |    | Sterilization |    | Traditional |    |                     |
|  | n                                 | %  | n     | %* | n              | %* | n             | %* | n           | %* |                     |
| Person who makes decisions about health care |                                   |    |       |    |                |    |               |    |             |    |                     |
| Woman or woman and partner                   | 9,725                             | 86 | 2,075 | 18 | 4,643          | 50 | 1,716         | 17 | 1,291       | 15 | <.01                |
| Partner or someone else                      | 1,701                             | 14 | 476   | 26 | 740            | 45 | 310           | 17 | 175         | 12 |                     |
| Years married**                              |                                   |    |       |    |                |    |               |    |             |    |                     |
| 0–9  | 3,197                             | 28 | 618   | 17 | 2,086          | 67 | 76            | 2  | 417         | 14 | <.01                |
| 10–19  | 5,033                             | 44 | 1,010 | 17 | 2,459          | 51 | 902           | 17 | 662         | 15 |                     |
| 20 or more                                   | 3,196                             | 28 | 923   | 26 | 838            | 28 | 1,048         | 33 | 387         | 14 |                     |
| Household size                               |                                   |    |       |    |                |    |               |    |             |    |                     |
| 1–3  | 1,713                             | 15 | 434   | 23 | 778            | 47 | 226           | 13 | 275         | 18 | <.01                |
| 4  | 3,748                             | 33 | 799   | 19 | 1,977          | 54 | 384           | 10 | 588         | 17 |                     |
| 5  | 3,129                             | 27 | 643   | 17 | 1,404          | 47 | 738           | 24 | 344         | 12 |                     |
| 6 or more                                    | 2,836                             | 24 | 675   | 20 | 1,224          | 46 | 678           | 23 | 259         | 10 |                     |
| Religion                                     |                                   |    |       |    |                |    |               |    |             |    |                     |
| Buddhism                                     | 7,480                             | 73 | 1,113 | 15 | 3,925          | 52 | 1,281         | 17 | 1,161       | 16 | <.01                |
| Hinduism                                     | 1,917                             | 11 | 735   | 38 | 664            | 34 | 432           | 23 | 86          | 5  |                     |
| Islam  | 992                               | 8  | 379   | 34 | 406            | 44 | 119           | 13 | 88          | 9  |                     |
| All other religions                          | 1,037                             | 8  | 324   | 22 | 388            | 43 | 194           | 19 | 131         | 16 |                     |
| Ethnicity                                    |                                   |    |       |    |                |    |               |    |             |    |                     |
| Sinhala                                      | 7,996                             | 79 | 1,205 | 15 | 4,158          | 52 | 1,371         | 17 | 1,262       | 16 | <.01                |
| Sri Lankan Tamil                             | 2,210                             | 12 | 927   | 39 | 744            | 35 | 443           | 21 | 96          | 5  |                     |
| Other ethnicities***                         | 1,220                             | 10 | 419   | 31 | 481            | 42 | 212           | 17 | 108         | 9  |                     |
| Urban setting                                |                                   |    |       |    |                |    |               |    |             |    |                     |
| No   | 9,634                             | 85 | 2,035 | 18 | 4,626          | 50 | 1,765         | 18 | 1,208       | 14 | <.01                |
| Yes  | 1,792                             | 15 | 516   | 26 | 757            | 44 | 261           | 14 | 258         | 15 |                     |
| District                                     |                                   |    |       |    |                |    |               |    |             |    |                     |
| Distal to conflict zone                      |                                   |    |       |    |                |    |               |    |             |    |                     |
| Colombo                                      | 881                               | 10 | 193   | 22 | 426            | 48 | 116           | 13 | 146         | 17 | <.01                |
| Galle  | 541                               | 5  | 78    | 15 | 254            | 47 | 96            | 18 | 113         | 20 |                     |
| Gampaha                                      | 916                               | 10 | 146   | 15 | 442            | 49 | 145           | 16 | 183         | 20 |                     |
| Kalutara                                     | 511                               | 6  | 60    | 12 | 251            | 49 | 81            | 16 | 119         | 23 |                     |
| Kandy  | 645                               | 6  | 130   | 20 | 316            | 50 | 128           | 18 | 71          | 12 |                     |
| Kegalle                                      | 412                               | 4  | 77    | 19 | 227            | 55 | 66            | 16 | 42          | 10 |                     |
| Kurunegala                                   | 881                               | 9  | 124   | 14 | 478            | 54 | 127           | 15 | 152         | 17 |                     |
| Matara                                       | 465                               | 4  | 88    | 19 | 242            | 53 | 61            | 12 | 74          | 16 |                     |
| Nuwara Eliya                                 | 422                               | 3  | 103   | 22 | 144            | 37 | 156           | 37 | 19          | 4  |                     |
| Ratnapura                                    | 699                               | 7  | 79    | 11 | 340            | 49 | 124           | 17 | 156         | 23 |                     |

(continued)



**Table 1.** (continued)

| Characteristic            | Primary Contraceptive Method Type |   |          |    |                |    |               |    |             |    |                |
|---------------------------|-----------------------------------|---|----------|----|----------------|----|---------------|----|-------------|----|----------------|
|                           | Total                             |   | None     |    | Modern Spacing |    | Sterilization |    | Traditional |    | $\chi^2$       |
|                           | <i>n</i>                          | % | <i>n</i> | %* | <i>n</i>       | %* | <i>n</i>      | %* | <i>n</i>    | %* | <i>p</i> Value |
| Proximal to conflict zone |                                   |   |          |    |                |    |               |    |             |    |                |
| Anuradhapura              | 494                               | 5 | 68       | 13 | 303            | 63 | 92            | 18 | 31          | 6  |                |
| Badulla                   | 431                               | 4 | 73       | 15 | 199            | 48 | 124           | 29 | 35          | 9  |                |
| Hambantota                | 375                               | 3 | 79       | 22 | 176            | 47 | 67            | 18 | 53          | 14 |                |
| Matale                    | 257                               | 2 | 28       | 10 | 144            | 56 | 55            | 21 | 30          | 13 |                |
| Monaragala                | 350                               | 3 | 45       | 12 | 186            | 54 | 79            | 22 | 40          | 12 |                |
| Polonnaruwa               | 294                               | 2 | 40       | 14 | 178            | 61 | 57            | 19 | 19          | 7  |                |
| Puttalam                  | 453                               | 4 | 75       | 16 | 216            | 49 | 83            | 17 | 79          | 17 |                |
| Central to conflict zone  |                                   |   |          |    |                |    |               |    |             |    |                |
| Ampara                    | 450                               | 4 | 160      | 34 | 197            | 45 | 58            | 13 | 35          | 8  |                |
| Batticaloa                | 337                               | 3 | 181      | 55 | 104            | 30 | 34            | 10 | 18          | 5  |                |
| Jaffna                    | 297                               | 2 | 120      | 39 | 88             | 30 | 73            | 25 | 16          | 5  |                |
| Kilinochchi               | 236                               | 1 | 64       | 27 | 105            | 45 | 61            | 25 | 6           | 3  |                |
| Mannar                    | 285                               | 0 | 219      | 76 | 34             | 13 | 32            | 11 | 0           | 0  |                |
| Mullaitivu                | 232                               | 0 | 49       | 20 | 129            | 58 | 42            | 18 | 12          | 4  |                |
| Trincomalee               | 274                               | 2 | 102      | 36 | 132            | 49 | 29            | 11 | 11          | 4  |                |
| Vavuniya                  | 288                               | 1 | 170      | 58 | 72             | 25 | 40            | 14 | 6           | 3  |                |

$N = 11,426$ . *n* values are unweighted, while percent and *p* values are weighted according to the survey's complex sampling design.

\*Cross-tabulated weighted percent values are calculated within rows. \*\*Age, age difference between woman and partner, and years married are presented in tables 1 and 2 as categorical but were included in regression models as continuous variables. \*\*\*Other ethnicities include Muslim, Malay, Indian Tamil, Burgher, and other.

were using modern spacing methods, while women aged 40–49 were most likely to be using no method of contraception (26%) or sterilization (28%). One in three women who had not attended secondary school reported using sterilization, while about half of women who had attended secondary school or higher were using modern spacing methods. Over one in five women (22%) from the lowest wealth quintile were using sterilization, which was a larger proportion than in wealthier groups. Women who had given birth three or more times were much more likely to use sterilization (41%) than women who had given birth two or fewer times (less than 10%). Over one in four women (26%) who did not participate in their own health care decisions were not using any form of contraception, compared to fewer than one in five women (18%) who participated in decisions about their health care. Women who had been married for 20 years or longer were most likely to use no method (26%) or sterilization (33%) than women married for shorter amounts of time, while a majority of women married for fewer than 20 years were using modern spacing methods.

We observed statistically significant ( $p < .05$ ) interaction effects between proximity to conflict and three of the four independent variables: girl child marriage, past year

physical IPV, and past year emotional IPV (see Table S1 for all interaction results). Additionally, there was an interaction effect trending toward significance ( $p = .10$ ) between proximity to conflict and past year sexual IPV. Results of the multivariable regression models stratified by proximity to conflict are shown in table 2. We found that women married as children had increased relative risk of modern spacing contraceptives compared to women who married as adults across all levels of proximity to conflict (distal adjusted relative risk ratio/aRRR: 1.81, 95% confidence interval [CI] = [1.43, 2.30]; proximal aRRR: 2.05, CI = [1.44, 2.91]; central aRRR: 2.21, CI = [2.54, 3.18]). Women who experienced past year physical IPV had decreased relative risk of both sterilization (aRRR: 0.67, CI = [0.46, 0.96]) and traditional methods (aRRR: 0.63, CI = [0.43, 0.91]) compared to women who did not experience past year physical IPV in districts distal to conflict. Women who experienced past year emotional IPV had decreased relative risk of traditional methods (aRRR: 0.71, CI = [0.51, 0.95]) in districts distal to conflict and increased relative risk of modern spacing methods (aRRR: 1.50, CI = [1.08, 2.10]) in districts central to conflict compared to women who had not experienced past year emotional IPV. Women who experienced past year sexual IPV did not have

**Table 2.** Stratified Multinomial Logistic Regression Models Across Proximity to Conflict Comparing Relative Risk of Different Primary Contraceptive Method Types to No Method Among Currently Partnered Women Aged 18–49 Who Are Not Pregnant or Trying to Become Pregnant and Participated in the 2016 Sri Lanka DHS Domestic Violence Module. DOI: <https://doi.org/10.1525/agh.2022.1539582.t2>

| Proximity to Conflict Variable | Primary Contraceptive Method Type (Compared to No Method) <sup>†</sup> |              |         |               |              |         |             |              |         |
|--------------------------------|--|--------------|---------|---------------|--------------|---------|-------------|--------------|---------|
|                                | Modern Spacing   |              |         | Sterilization |              |         | Traditional |              |         |
|                                | RRR  | CI           | p Value | RRR           | CI           | p Value | RRR         | CI           | p Value |
| Distal (n = 6,373)             |  |              |         |               |              |         |             |              |         |
| Girl child marriage            |  |              |         |               |              |         |             |              |         |
| No                             | Ref  | Ref          | Ref     | Ref           | Ref          | Ref     | Ref         | Ref          | Ref     |
| Yes                            | 1.81   | [1.43, 2.30] | <.01*   | 1.31          | [0.99, 1.72] | .06     | 1.00        | [0.75, 1.35] | >.9     |
| Past year sexual IPV           |  |              |         |               |              |         |             |              |         |
| No                             | Ref  | Ref          | Ref     | Ref           | Ref          | Ref     | Ref         | Ref          | Ref     |
| Yes                            | 1.28   | [0.70, 2.34] | .42     | 1.41          | [0.69, 2.88] | .34     | 1.76        | [0.85, 3.63] | .12     |
| Past year physical IPV         |  |              |         |               |              |         |             |              |         |
| No                             | Ref  | Ref          | Ref     | Ref           | Ref          | Ref     | Ref         | Ref          | Ref     |
| Yes                            | 0.81   | [0.61, 1.07] | .14     | 0.67          | [0.46, 0.96] | .03*    | 0.63        | [0.43, 0.91] | .01*    |
| Past year emotional IPV        |  |              |         |               |              |         |             |              |         |
| No                             | Ref  | Ref          | Ref     | Ref           | Ref          | Ref     | Ref         | Ref          | Ref     |
| Yes                            | 0.94   | [0.75, 1.19] | .63     | 1.03          | [0.77, 1.39] | .84     | 0.71        | [0.52, 0.95] | .02*    |
| Proximal (n = 2,654)           |  |              |         |               |              |         |             |              |         |
| Girl child marriage            |  |              |         |               |              |         |             |              |         |
| No                             | Ref  | Ref          | Ref     | Ref           | Ref          | Ref     | Ref         | Ref          | Ref     |
| Yes                            | 2.05   | [1.44, 2.91] | <.01*   | 1.41          | [0.95, 2.10] | .09     | 0.69        | [0.40, 1.19] | .18     |
| Past year sexual IPV           |  |              |         |               |              |         |             |              |         |
| No                             | Ref  | Ref          | Ref     | Ref           | Ref          | Ref     | Ref         | Ref          | Ref     |
| Yes                            | 1.87   | [0.63, 5.50] | .26     | 1.53          | [0.47, 4.99] | .48     | 1.56        | [0.31, 7.73] | .59     |
| Past year physical IPV         |  |              |         |               |              |         |             |              |         |
| No                             | Ref  | Ref          | Ref     | Ref           | Ref          | Ref     | Ref         | Ref          | Ref     |
| Yes                            | 1.05   | [0.59, 1.87] | .86     | 1.43          | [0.75, 2.75] | .28     | 0.78        | [0.34, 1.80] | .55     |
| Past year emotional IPV        |  |              |         |               |              |         |             |              |         |
| No                             | Ref  | Ref          | Ref     | Ref           | Ref          | Ref     | Ref         | Ref          | Ref     |
| Yes                            | 0.98   | [0.58, 1.71] | .94     | 0.79          | [0.42, 1.50] | .48     | 0.61        | [0.26, 1.39] | .24     |
| Central (n = 2,399)            |  |              |         |               |              |         |             |              |         |
| Girl child marriage            |  |              |         |               |              |         |             |              |         |
| No                             | Ref  | Ref          | Ref     | Ref           | Ref          | Ref     | Ref         | Ref          | Ref     |
| Yes                            | 2.21   | [1.54, 3.18] | <.01*   | 1.11          | [0.70, 1.74] | .66     | 0.31        | [0.10, 1.01] | .05     |
| Past year sexual IPV           |  |              |         |               |              |         |             |              |         |
| No                             | Ref  | Ref          | Ref     | Ref           | Ref          | Ref     | Ref         | Ref          | Ref     |
| Yes                            | 0.67   | [0.38, 1.16] | .15     | 0.86          | [0.45, 1.65] | .66     | 1.38        | [0.50, 3.83] | .53     |
| Past year physical IPV         |  |              |         |               |              |         |             |              |         |
| No                             | Ref  | Ref          | Ref     | Ref           | Ref          | Ref     | Ref         | Ref          | Ref     |
| Yes                            | 1.19   | [0.80, 1.76] | .38     | 1.37          | [0.83, 2.26] | .22     | 0.85        | [0.36, 2.01] | .72     |

(continued)

**Table 2.** (continued)

| Proximity to Conflict Variable | Primary Contraceptive Method Type (Compared to No Method) <sup>†</sup> |              |                |               |              |                |             |              |                |
|--------------------------------|--|--------------|----------------|---------------|--------------|----------------|-------------|--------------|----------------|
|                                | Modern Spacing   |              |                | Sterilization |              |                | Traditional |              |                |
|                                | RRR  | CI           | <i>p</i> Value | RRR           | CI           | <i>p</i> Value | RRR         | CI           | <i>p</i> Value |
| Past year emotional IPV        |  |              |                |               |              |                |             |              |                |
| No                             | Ref  | Ref          | Ref            | Ref           | Ref          | Ref            | Ref         | Ref          | Ref            |
| Yes                            | 1.50   | [1.08, 2.10] | .02*           | 1.09          | [0.69, 1.71] | .71            | 1.69        | [0.90, 3.15] | .10            |

*N* = 11,426. RRR = relative risk ratio; CI = 95% confidence interval.

\*Significant at  $\alpha = .05$ .

<sup>†</sup>Multivariate models included as covariates education, household wealth quintile, parity, age difference between woman and partner, person that makes decisions about health care, years married, household size, religion, urban setting, and district.

statistically significant changes in the relative risk of any primary contraceptive method type compared to women who did not experience past year sexual IPV, and no form of past year IPV was associated with variation in primary contraceptive method type compared to women who did not experience that form of past year IPV in districts proximal to conflict. Finally, a sensitivity analysis excluding all respondents who named male sterilization as their primary method ( $n = 8$ ) did not find any changes in the direction or significance of any of the measured associations calculated throughout our analyses.

## DISCUSSION

Our study adds depth to the research literature on contraceptive use in South Asia and in postconflict settings. We found that proximity to conflict moderates the associations of girl child marriage, past year physical IPV, and past year emotional IPV with primary contraceptive method type for women in Sri Lanka. Our findings imply that any interventions to influence Sri Lankan women's contraceptive method use need to not only consider the impact of girl child marriage and IPV on primary contraceptive method type but also take into account the varying ways that proximity to conflict may impact these relationships.

We found that girl child marriage was associated with increased likelihood of modern contraceptive methods across all levels of proximity to conflict and was not significantly associated with changes in any other type of contraceptive method. Our findings only partially aligned with the findings of other studies in South Asia, which have found girl child marriage to be associated with both increased modern spacing methods [7] and increased female sterilization [7, 8, 24]. The lack of significant associations between girl child marriage and sterilization may reflect an acceptance of birth spacing and greater use of reversible contraceptive methods in Sri Lanka among women married as children, different from women married as children in other South Asian countries. The finding could also be explained by the widespread use of sterilization among all women in Sri Lanka regardless of their age at marriage. Our study is the first to examine associations between girl child marriage and contraceptive

use in Sri Lanka and lays the groundwork for more in-depth explorations of the role of girl child marriage on the reproductive and sexual health of Sri Lankan women and girls.

Our study's findings on associations between past year IPV and primary contraceptive method type add complexity to the literature on this topic from other countries across South Asia. We did not find any significant associations between past year sexual IPV and primary contraceptive method type, contradicting results from other South Asian research on IPV and contraception which found sexual IPV to be associated with increased use of modern spacing methods and decreased use of sterilization [10]. One possible explanation of the lack of influence of sexual IPV on contraceptive use in Sri Lanka might be increased societal acceptance of birth spacing and small family sizes, thus separating sexual violence from the reproductive coercion that it is associated with in other South Asian countries. This possible difference in family size preference might be influenced by Sri Lanka's high rates of education for women compared to other South Asian countries, which may also explain Sri Lanka's differing rates and consequences of IPV [47]. Past year physical IPV was only associated with changes in primary contraceptive method type in districts that were distal to conflict, where it was associated with decreased relative risk of both sterilization and traditional methods. This finding diverged from other research in South Asia, which found physical IPV to be associated with increased likelihood of using contraceptive methods [9, 48, 49]. One possible explanation for the decrease in sterilization and traditional methods but not modern spacing methods with physical IPV may be that women who experience physical IPV are less able to use methods that are nonreversible (such as sterilization) or which require partner cooperation (such as traditional methods) [13]. The idea that use of traditional methods may be less possible for women experiencing physical IPV is supported by qualitative research on Sri Lankan women who prefer traditional contraceptive methods and list the support and cooperation of their partners as a crucial factor for the success of traditional methods [50]. Finally, we found diverging associations between emotional IPV and primary contraceptive

method type based on women's proximity to conflict: In distal districts, emotional IPV was associated with a decreased likelihood of using traditional methods, while in central districts, it was associated with an increased likelihood of using modern spacing methods. The differing associations between each form of past year IPV and primary contraceptive method type in Sri Lanka reveal the importance of considering each form as distinct, with unique causes and impacts. This idea is supported by research on men's perpetration of IPV in Sri Lanka, which found varying associations between adverse childhood experiences and the perpetration of sexual, physical, and emotional IPV [16].

The differing associations of physical and emotional IPV with primary contraceptive method type across proximity to conflict reveal the importance of considering these relationships across conflict exposure and postconflict place of residence. Past year physical IPV was not associated with any contraceptive method type in districts that were proximal or central to conflict despite being significantly associated with decreases in sterilization and traditional methods in districts distal to conflict. It is possible that prolonged exposure to armed conflict in districts that were central and proximal to conflict has in some way altered the perpetration and impact of physical IPV in these communities, where physical IPV may be more acceptable as a conflict resolution tactic [30, 31]. Past year emotional IPV was associated with decreased use of traditional methods in distal districts and increased use of modern spacing methods in central districts. Traditional methods such as withdrawal and the rhythm method require male partner communication and cooperation, which are less likely in association with emotional IPV [13, 50]. The increase in modern spacing methods among women experiencing emotional IPV in districts central to the conflict zone was the only IPV and contraceptive method association that was aligned with the literature from other contexts. It's possible that in the conflict zone in Sri Lanka, women who experience emotional IPV feel less stigma seeking help, including modern spacing methods to delay pregnancy, compared to women who have experienced physical or sexual IPV. It is also possible that in the conflict zone, perpetrators of emotional IPV are more likely to attempt to use reproductive coercion on their partners, triggering covert use of modern spacing contraceptives by women experiencing their abuse. Finally, the positive association between past year emotional IPV and modern spacing contraceptive methods could be temporally reversed, and women who used modern spacing contraceptives may face more emotional abuse by partners who don't approve of these methods in the conflict zone, possibly because of mismatched fertility desires and poor couple communication around contraception.

### **Limitations**

This study had multiple limitations. Because all variables were collected during a cross-sectional survey with a lack of clear temporal difference between our independent and dependent variables, we cannot infer causality from the findings. This is a challenge shared across many DHS

analyses [9]. It is also possible that women responding to the survey may have underreported IPV or girl child marriage due to social desirability bias or that women from districts with differing proximity to conflict recalled IPV experiences differently due to their varied contexts. The 2016 DHS only collected information on the most recent location that women had moved from; therefore, we did not have the complete data needed to analyze women's lived experience of the conflict and cannot make conclusions about the direct impact of the conflict on survey participants. For this reason, our proximity to conflict variable must be interpreted in a postconflict and cross-sectional context, 7 years after the end of the Sri Lankan civil war, and as a geographic rather than experiential variable.

Because the DHS was designed to be nationally representative, we were not able to focus our analyses on specific cultural groups in the country with known higher rates of IPV and child marriage. One example of this is the small proportion of participants from the group labeled "Indian Tamils," and defined as Tamils living in the up-country region of Sri Lanka and often working on tea "estates" (plantations) [2]. Although multiple studies focused on this population have highlighted high rates of IPV and sterilization compared to national averages [17, 39, 51–54], the proportions in this study sample were too small to separate upcountry Tamils from other minority ethnic groups or to separate women living in estate areas from other nonurban participants in our analyses. Muslim communities in Sri Lanka also differentially experience child marriage as the only group for which it is legal [55]; however, in the context of this study, we were only able to include religion as a covariate rather than study it as an independent variable. More research should be conducted on the experiences of minority groups in Sri Lanka to better understand differing patterns of girl child marriage, IPV, and contraception that exist within them. Finally, we were limited in our analyses by the lack of certain individual-level data, including access to reproductive health care, distance from the nearest health center, location over one's lifetime, and lifetime experience of IPV (rather than past year IPV). We suggest that future DHS implementations in Sri Lanka collect anonymized geolocation data and ask all participants about their locations over time, access to reproductive health care, and their lifetime experiences of IPV so that the impact of these variables can be examined in future analyses of contraceptive use.

### **Policy and Practice Implications**

Our findings can inform policy and practice in the field of public health and gender equity in postconflict Sri Lanka. We found that child marriage and IPV can influence women's primary contraceptive method type and that these relationships are moderated by proximity to conflict. These findings suggest that any interventions to increase women's access to effective contraception in Sri Lanka will need to take the postconflict context into account [19]. The WHO suggests that policymakers developing reproductive health programs in conflict-affected areas use regional policies to reflect the needs of regions that have been differentially affected by the conflict, rather than

a centralized approach, and programs need to be developed by or in collaboration with local community members, with special attention paid to ensure that the voices of marginalized groups are heard [29]. The WHO has also highlighted the additional need for reproductive health staff training and support in conflict-affected areas and to address gender-based violence [29]—this need has been shown to exist in Sri Lanka, where a large majority of nursing training programs include no instruction on IPV [56]. Finally, Sri Lankan researchers as well as the WHO recommend that contraceptive services be made available and accessible to all potential users, including those using traditional methods [4, 29]. Creating a welcoming environment for all who might need contraception will increase the likelihood that women across Sri Lanka will be able to access and use effective contraception.

## CONCLUSION

In order for all women across Sri Lanka to have access to effective contraception, health care policymakers need to consider the impact of the gender inequities of girl child marriage and IPV on contraceptive use as well as the moderating influence of proximity to conflict. Programs need to be developed that take into account the regional differences in contraceptive use based on differential conflict exposure and address the needs of minority groups with unique experiences of contraception, girl child marriage, and IPV. Contraceptive service providers in Sri Lanka need to be adequately trained to mitigate conflict-related factors affecting contraception, as well as to address IPV and provide care to women married as children or using traditional methods of contraception. Sri Lanka can move closer to eliminating its postconflict health disparities by making contraceptive services accessible and welcoming to all.

## AUTHOR CONTRIBUTIONS

RWF conceptualized the study, obtained data, performed analyses, and interpreted data for this work. JGS contributed to the study's conceptualization, acquisition of data, and interpretation of the work, and provided significant critical revisions. LM contributed to conceptualization, acquisition of data, and interpretation. AR, ER, LU, and RL contributed to the design of the work, interpretation of data, and critical interpretations of the findings.

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## DATA ACCESSIBILITY STATEMENT

Data from the 2016 Sri Lankan Demographic and Health Survey can be requested from the Sri Lankan Office of the Census. Information on requesting this data can be found at the Department of Census and Statistics website: <http://www.statistics.gov.lk>.

## COMPETING INTERESTS

The authors have no competing interests to declare.

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Table S1.

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