The Long Shadow of Witnessing Intimate Partner Violence as a Child: Evidence from Demographic Health Survey in India

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Competing interests

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Ethical compliance

The study used publicly available anonymized data collected by the International Institute of Population Sciences and Government of India complying with ethical norms. The present study did not require any ethical approval.

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Abstract

Spousal violence is a persistent challenge to gender equality in both developing and developed countries. Recent studies are now reporting that spousal violence has negative externalities, with its effects spilling over to other family members who become co-victims. Such effects may be long run in nature and persist even after the attainment of adulthood. The present study examines the long run impact of witnessing IPV as a child on the likelihood of facing IPV as an adult. The study is undertaken for currently married women aged 15-49 years using the fifth round of the National Family Health Survey data (2019-21) for India, a fast-growing South Asian country with poor gender indicators. Econometric methods combining matching and the control function approach address the possibility of confounding variables affecting both the child witnessing IPV and her revictimization as an adult. The study also allows for under-reporting in both witnessing and facing IPV. We find that witnessing IPV as a child significantly increases the risk of becoming a victim as an adult, which is explained in terms of the theory of learned helplessness. The results call for identifying co-victims of IPV and offering them counselling services to reduce the adverse consequences of exposure to IPV.

Keywords: Intimate partner violence, revictimization, learned helplessness, control function, India.

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1. Introduction

Spousal violence is a persistent challenge to gender equality in both developing and developed countries. It comprises of any acts of emotional, physical and sexual violence committed by the husband. A recent study reports that, globally, more than one in four ever-partnered women aged 15-49 years has experienced some form of violence in their lifetime; in India this figure is reported to be 35 per cent (Sardinha *et al.*, 2022). Spousal violence constitutes a violation of human rights. Studies of such violence have also observed the consequences of spousal violence for the psychological and physical health of the victim; it also has adverse effects on maternal health outcomes (García-Moreno *et al.*, 2005; Black *et al.*, 2011; Leatherman, 2011; Devries *et al.*, 2013; Ogland *et al.*, 2014; Atteraya, Gnawali and Song, 2015; Ismayilova, 2015). Recent studies are now reporting that spousal violence has negative externalities, with its effects spilling over on to other family members who become co-victims; further, such effects may be long run in nature and persist even after the attainment of adulthood (Felitti *et al.*, 1998). This study argues that merely witnessing spousal violence as a child may create learned helplessness (Seligman and Maier, 1967; Maier and Seligman, 1976; Shields *et al.*, 2020) and increase the chances of the child becoming a victim of spousal violence on attaining adulthood. It is an important problem given that studies report that the percent of children exposed to IPV in developed countries like US and Canada is 10-20 (Gilbert, Widom, *et al.*, 2009) and 34 percent (Wathen and Macmillan, 2013), respectively, and its impact on the development of brain and behaviour (Holt, Buckley and Whelan, 2008; Mueller and Tronick, 2019).

The present study examines the long run impact of witnessing IPV as a child on the likelihood of facing IPV as an adult. The study is undertaken for currently married women aged 15-49 years using the fifth round of the Demographic Health Survey data (2019-21) for India, a fast growing South Asian country with poor gender indicators. It contributes to literature in two ways. Firstly, it incorporates the possibility of confounding variables affecting both the child witnessing IPV and her revictimization as an adult by using econometric models that combine matching and the control function approach (Woolridge, 2010, 2014). Secondly, the study allows for under-reporting, due to the social stigma associated with being a victim of IPV, of

both witnessing and facing IPV. The results indicate that witnessing IPV is a risk factor for facing IPV as an adult.

The paper is structured as follows. Section 2 discusses the conceptual background, data used and methodology. Results are presented in Section 3, followed by a discussion (Section 4). The concluding section summarizes the implications of the analysis and identifies policy responses.

2. Materials and methods

2.1 Conceptual background

It has been long recognized that exposure to violence between parents significantly increases the risk of facing partner violence (Ehrensaft *et al.*, 2003). In their study, Renner & Slack (2006) found that women who witnessed parental violence were almost twice as likely to experience IPV victimization when they grow up. This has been confirmed in other studies undertaken in developed countries— women who witnessed parental violence during childhood were nearly 2 to 8 times more likely to become adult IPV victims (Bensley, Van Eenwyk and Wynkoop Simmons, 2003; Whitfield *et al.*, 2003; Renner and Slack, 2006; Ansara and Hindin, 2009; Fehringer and Hindin, 2009; Vung and Krantz, 2009; Chan *et al.*, 2011; Brassard *et al.*, 2020; Shields *et al.*, 2020). The literature on learned helplessness (Overmier and Seligman, 1967) has helped to identify the pathways between witnessing violence and becoming a victim as an adult.

The original formulation of the theory of learned helplessness hypothesized that repeated exposure to domestic violence can lead to a belief that spousal violence is independent of their current actions and any attempt to escape from such violence is futile (Seligman, 1975; Maier and Seligman, 1976). Subsequent studies have pointed out that learned helplessness is not the outcome but the cause underlying acceptance of the adverse outcome (Maier and Seligman, 2016). The victim of spousal violence may attribute their state of helplessness to a global factor (Abramson, Seligman and Teasdale, 1978; Salkind, 2008), viz. a social acceptance of the husband's right to practice violence. Witnessing violence in a male-dominated culture where the status of the woman is vulnerable due to lack of financial and social resources may also contribute to learned helplessness (Bargai, Ben-Shakhar and Shalev, 2007; Walker, 2008).

The neural origins of learned helplessness with respect to ACE in the form of exposure to spousal IPV has also been widely explored. If the shock (of witnessing violence)

> "were to produce a powerful activation of the dorsal raphe nucleus 5-HT neurons and lead to the release of 5-HT in structures such as the amygdala and dorsal periaqueductal gray, then this structure would hold the potential to be a crucial node in any learned helplessness circuit" (Maier and Seligman, 2016)

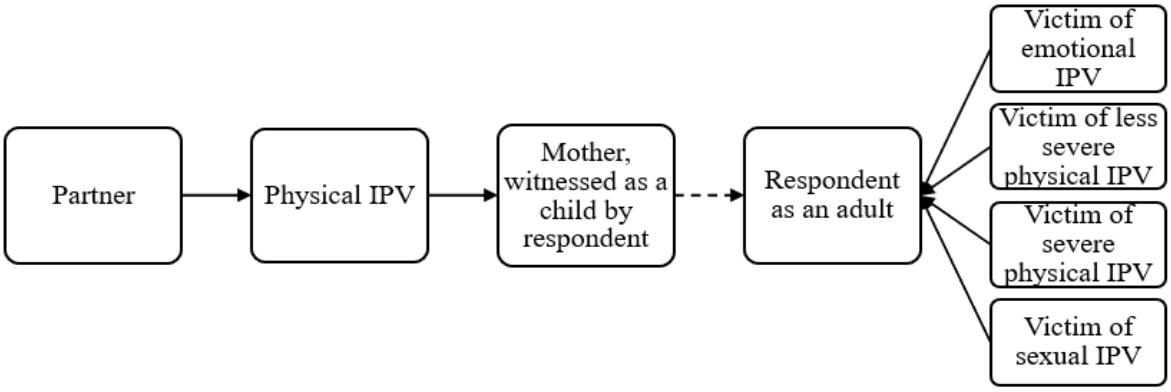
Witnessing violence, particularly in the first three to five years (Teicher and Samson, 2016), may elevate stress hormone levels of the child (Shonkoff, Boyce and McEwen, 2009; McLaughlin, Sheridan and Lambert, 2014; Teicher and Samson, 2016), affecting regions of the brain that are densely populated with glucocorticoid receptors (McEwen, 2007; Teicher and Samson, 2016). Although there is an evolutionary adaptation of the brain, enabling it to enhance survival (Masten *et al.*, 2008), such responses have consequences over the long run (McEwen, 2007). In particular, it makes affected persons vulnerable to stress levels and leads to the persistence of heightened negative emotional reactivity into adulthood (Franchek-Roa *et al.*, 2017). As a result, "witnessing IPV as a child increases the likelihood of IPV victimization as an adult" (Franchek-Roa *et al.*, 2017).

Studies of the impact of witnessing violence on the likelihood of victimhood as an adult has been mostly undertaken in the context of developed countries. Inter-generational transmission of IPV victimization in developing countries where child abuse is high (Ministry of Statistics and Programme Implementation, 2012) and which lack facilities for child counselling (Seth, 2015) remain an under-researched area. Under-reporting of parent-to-parent violence due to social stigma is another potential problem leading to biased estimates of the effect (Kruttschnitt and Dornfield, 1992). While it is possible to adjust for misclassification of the treatment status (Kothari, 2023), under-reporting of exposure to violence (i.e. errors in the outcome variable) due to a fear of being judged, endangered, or legally penalized (Blair, Coppock and Moor, 2020) is another methodological issue that needs to be taken care of (Joseph *et al.*, 2017; Seth, 2021). Finally, the presence of unobserved confounding variables that affect both treatment status and the outcome may result in endogeneity and result in biased and inconsistent treatment effects. The present study proposes to address these limitations.

2.2 Methodology

In this paper we will focus only on the impact of childhood exposure to the mother's physical IPV on the girl child's victimization of the four forms of IPV (emotional, less severe physical, severe physical, and sexual) as an adult (Figure 1). The reason is the absence of the required data (viz. type of violence witnessed) in the data set used in the study.

Figure 1: Impact of childhood exposure to physical IPV on adult victimization



The standard approach to examining the effect of witnessing violence as a child on subsequent victimhood is to regress a logit (or probit model):

$$AV = \beta_0 + \beta_1 WVC + \beta_2 X + e \qquad [1]$$

when AV is a binary variable taking the value of unity if the respondent has reported facing violence as an adult (and 0 otherwise), WVC is a binary variable taking the value of unity if the respondent reported witnessing violence as a child (and 0 otherwise) and X are a set of control variables. There are two problems with this model. Firstly, due to the social stigma associated with being a victim of violence, there is likely to be a significant level of under reporting of both witnessing violence and facing violence.[1] Further, it may plausibly be argued that women who are less likely to report witnessing violence are also less likely to report facing violence. Secondly, confounding variable(s) may influence both the probability of witnessing and facing violence. Both issues combine to create endogeneity, resulting in biased estimates of the impact of witnessing violence on facing violence.

The issue of under-reporting is tackled as follows. We estimate a logit model of the probability of witnessing violence as a child:

$$WVC = \alpha_0 + \alpha_1 X_1 + u \qquad [2]$$

and use this model to predict probabilities of witnessing violence as a child ($\widehat{WCV}$). We create a new variable AWCV (Adjusted Witnessing Violence as a Child) as follows:

$$\begin{aligned} AWCV &= 1 \text{ if } WCV = 1 \\ &= 1 \text{ if } \widehat{WCV} > [\text{mean}(\widehat{WCV}) + \theta_1 \times \text{sd}(\widehat{WCV})] \\ &= 0 \text{ otherwise} \end{aligned}$$

[1] For a discussion of the different types of stigma associated with being a victim of IPV see Crowe and Murray (2020).

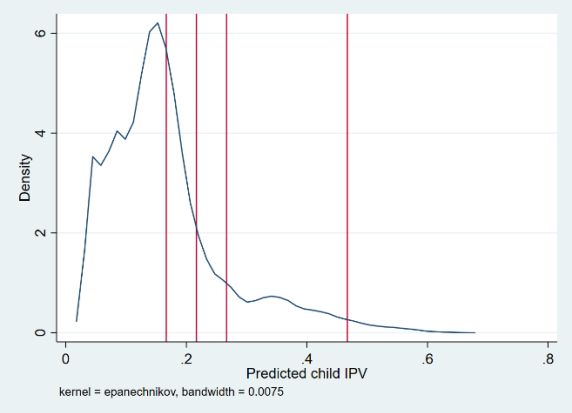
The values of θ_1 are 0, 0.5, 1 and 3. In other words, we are assuming that respondents with a probability of witnessing violence greater than a certain level, given by [mean($\widehat{WCV}$) + θ_1 × sd($\widehat{WCV}$)], have witnessed violence irrespective of their actual response. This binary treatment variable is then used in [1]:

$$AV = \beta_0 + \beta_1 AWVC + \beta_2 X_2 + e \qquad [1a]$$

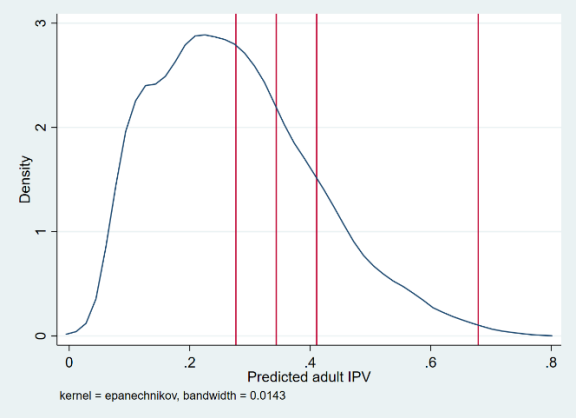
The same procedure is repeated for [1a] to obtain the predicted probabilities of facing violence as an adult ($\widehat{AV}$).

The cut-offs, superimposed upon the kernel densities of the predicted score for $\widehat{WCV}$ and $\widehat{AV}$ are shown in Figure 1.

Figure 1: Correcting responses of respondents



(a) Correcting responses for witnessing IPV as a child



(b) Correcting responses for facing IPV as an adult

As a result of this adjustment, the percentage of respondents reporting witnessing IPV as a child and facing IPV as an adult change. The extent of change is reported in Table 1. As expected, higher cut-off values result in re-classification of a smaller number of respondents, and the adjusted proportions tend towards the percentage obtained from the sample. The choice of cut-offs was based on an analysis of the changes in ATE for θ_2 = 0, 0.5, 1.0, 1.5, 2.0, 2.5 and 3.0 (see Figure 2). The results reveal that estimates are stable at initial values of θ_2, but starts to fall for $\theta_2 > 1$. In contrast, changes in the value of θ_1 does not seem to have any substantial impact. So, the range 0 to 1 indicate the stable section, while the cut-off of 3 represents the lower boundary. In this context, it should also be noted that, according to a recent

study, a reasonable estimate of the extent of under-reporting of IPV is about 35 percent (Cullen, 2023) , indicating that values of θ in the range of 0.5 to 1 may not be unjustified.

Table 1: Percentage of respondents reporting witnessing and facing IPV after correction

Cut-offs	Witnessed IPV		Faced IPV	
	Percentage after adjustment	Reclassification (%)	Percentage after adjustment	Reclassification (%)
As reported	18.04		30.44	
Cut-off:				
θ = 0	51.17	65	63.42	52
θ = 0.5	36.06	50	51.85	41
θ = 1.0	30.61	41	43.65	30
θ = 3.0	21.42	16	32.94	8

A control function approach (Woolridge, 2010) is then used to estimate the impact of witnessing violence on the probability of facing violence as an adult. After estimating the treatment model:

$$AWVC = \alpha_0 + \alpha_1 X_3 + w \qquad [3a]$$

The predicted probabilities are used to estimate two outcome models:

$$\widehat{AV} = \eta_0 + \gamma_0 X_4 + w_0 \quad \text{if } AWVC = 0 \qquad [3b]$$

$$\widehat{AV} = \eta_1 + \gamma_1 X_4 + w1 \quad \text{if } AWVC = 1 \qquad [3c]$$

when X_3 and X_4 represent two sets of control variables.

The predicted probabilities estimated from [3b] and [3c] are matched to estimate the Average Treatment Effect (ATE) of witnessing violence as a child on the likelihood of facing violence as an adult. Given that there are four values of θ_1 and θ_2, 16 models representing the different combinations of (θ_1, θ_2) are estimated.

Now, household level survey data often has complicated (including mixture type) distributions that are very difficult to model in a parsimonious parametric manner. The standard assumptions (like normality) may often fail to hold. In such situations, it is difficult to only rely on the inferences derived from the standard modelling exercise which may not be robust in such a scenario. For this reason, standard practice is to do a supporting non-parametric modelling

exercise on the data that is independent of the distributional assumptions. A common method for undertaking such analysis is bootstrapping. It employs repeated resampling from the original sample to generate an empirical distribution of estimates that is not subject to any parametric assumption. If the parametric model assumptions are reasonable, we will see a match between the derived parametric distribution and the bootstrap empirical distribution; otherwise, one needs to revisit model assumptions. In the last step of the analysis, in order to check the robustness of the estimated ATEs, we undertook bootstrapped sampling to generate 500 samples sized 60,000 each for each cell.

2.3 Database

The study uses data from the fifth round of the Demographic Health Survey (DHS-5) conducted in 2019-21, also referred to as National Family Health Survey. It is nationally representative survey undertaken using a stratified random sampling method; details of sampling strategy are given in the DHS report (International Institute for Population Sciences and ICF and International Institute for Population Sciences (IIPS) and ICF, 2021). The individual file consisting of information on all eligible women aged 18-49 years has been used. DHS-5 collected information from 7,24,115 women out of which 63,851 women have completed the domestic violence module. The complete information on exposure to violence as a child and adult IPV victimization is available for 61,946 women.

2.4 Model specification

Outcome variables: Ever-married respondents in the DHS were asked about their experience of any of the four forms of IPV—emotional violence (variable d104 in the data set), less severe physical violence (d106), severe physical violence (d107), and sexual violence (d108). The responses were coded in binary form as 1 (Yes) or 0 (No). Using the information on the four types of IPV, we create a variable (IPV) which takes a value of one if the woman reports having faced at least one of the four kinds of spousal violence (and zero otherwise).

Treatment variable: The treatment variable is the respondent's childhood exposure to IPV (variable d121 in the DHS questionnaire). Specifically, the respondent was asked, "As far as you know, did your father ever beat your mother?"

Control variables: The four set of control variables are as follows:

a) Control variables in [2]: Education, socio-religious identity, wealth index, attitude towards violence and residence (rural/urban and state)
b) Control variables in [1a]: Education, employment, socio-religious identity, wealth index, attitude towards violence, age at first marriage and residence
c) Control variables in [3a]: Education, socio-religious identity, wealth index, attitude towards violence and residence
d) Control variables in [3b and 3c]: Age, education, decision-making ability, mobility, control over money, population density, development of locality, mean temperature, and residence.

The details of the variables, selected based on existing literature and availability of information in the NFHS data, are given in Table 2. Ideally information on the respondent as a child should be used in equations 2 and 3a. However, NFHS does not provide such information. So, we chose variables that are unlikely to change over time (socio-religious identity, wealth index and residence[2]) or will affect reporting levels (attitude towards violence and education).

Table 2: Description of control variables used in study

Variable	Nature	Details
Education (V106)	Categorical	No education (reference), Primary, Secondary, Higher
Employment (V731)	Categorical	Whether the respondent worked in the past 12 months: No (reference), Yes
Age (V012)	Continuous	Information on respondent's current age
Age at first marriage (S308C and V011)	Continuous	Information on respondent's age at first marriage
Socio-religious identity (V130 & S116)	Categorical	Hindu-Scheduled Caste, Hindu-Scheduled Tribe, Hindu-Other Backward Classes, Hindu-General, Muslims, Other religious minorities
Wealth index (V191)	Continuous	Index formed using Principal Component Analysis based on the information selected assets, materials used for housing

[2] After inter-religion marriage, socio-religious identity will change, but such cases are—despite recent rightist propaganda—still not very common. Wealth status will change, but not substantially. Similarly, after marriage, women will move to a different location. Inter-state or even rural-urban migration, however, will be less common.

Variable	Nature	Details
		construction and types of water access and sanitation facilities of the household
Attitude towards violence (Appendix Table A)	Categorical	Information on attitude towards violence combined using polychoric principal component analysis to create scores that were normalised
Decision making ability (Appendix Table A)	Continuous	Information on decision making ability combined using polychoric principal component analysis to create scores that were normalized
Mobility (Appendix Table A)	Continuous	Information on mobility combined using polychoric principal component analysis to create scores that were subsequently normalised
Control over money (Appendix Table A)	Continuous	Information on respondent's control over financial issues combined using polychoric principal component analysis to create scores that were subsequently normalised
Population density	Continuous	Average UN-adjusted population density of the area at the DHS survey cluster location (Center for International Earth Science Information Network, 2016)
Development of locality	Continuous	Average night-time luminosity of the area at the DHS survey cluster location (Mills, Weiss and Liang, 2013; National Centers for Environmental Information, 2015)
Temperature	Continuous	Average temperature at the DHS survey cluster location for a given year (Harris *et al.*, 2020)
Residence (V025)	Categorical	=0 if urban, = 1 if rural
State (V024)	Categorical	State-level fixed effects

***Note**: Scheduled castes (SCs) are Hindus belonging by birth to the lowest of the four castes. Scheduled tribes (STs), on the other hand, are members of economically and socially depressed*

tribes. Articles 341 and 342 of the Constitution provide a list of all SCs and STs under the Constitution (Scheduled Castes) Order, 1950, and the Constitution (Scheduled Tribes) Order, 1950, respectively, to facilitate affirmative action targeting such social groups. Other Backward Class (OBC) is a collective term used by the Government of India to refer to other educationally or socially disadvantaged castes which do not fall into any of the above categories. The list of OBCs is maintained by the National Backward Commission (at the all-India level) and by state governments.

3. Results

3.1 Sample profile

The sample profile of women in sample used in the analysis is reported in Table 3. The majority of respondents reside in rural areas (69.26 per cent). It is observed that a third of all respondents reported experiencing any form of IPV (31.85 per cent); the proportion is lower in the urban (27.25 per cent) as compared to the rural areas (33.89 per cent). Only about one out of five respondents (18.04 per cent) reported witnessing father-to-mother IPV as a child. It is also reported that most of the respondents are middle aged and belong to the 30-49 years' age group, while a negligible proportion are aged below 20 years. Analysis of the educational profile indicates that the largest proportion have secondary level of education (corresponding to 10 years of schooling); it is followed by the group without education. Almost all women are married by the age of 25 years. The largest proportion of women belong to the Hindu Other Backward Class community, followed by Hindu Scheduled Caste and Muslims. Distribution of respondents across wealth index quantiles is predictably uniform. However, there is a rural-urban difference, with the urban population being relatively well compared to the rural sub-sample.

Table 3: Sample profile of the categorical variables used in the study (in percent)

Variable	Total	Urban (30.74)	Rural (69.26)
Respondent faced IPV			
No	68.15	72.75	66.11
Yes	31.85	27.25	33.89
Respondent witnessed father beating mother			
No	81.96	82.64	81.75
Yes	18.04	17.36	18.25

Respondent's age			
15-19 years	2.50	1.30	3.04
20-29 years	29.90	25.98	31.64
30-39 years	37.02	39.41	35.96
40-49 years	30.57	33.31	29.36
Respondent's education			
No education	28.52	15.76	34.18
Primary	13.93	10.25	15.56
Secondary	46.36	52.62	43.58
Higher	11.20	21.38	6.68
Age at first marriage			
Below 18 years	45.58	34.13	50.69
18-25 years	49.23	57.03	45.75
26-49 years	5.19	8.84	3.57
Socio-religious community			
Hindu SC	19.50	16.55	20.80
Hindu ST	7.67	3.35	9.57
Hindu OBC	35.92	34.13	36.71
Hindu General	15.39	21.05	12.91
Muslims	16.52	19.43	15.24
Others	4.99	5.48	4.77
Wealth index (quintiles)			
Poorest	19.43	2.89	26.77
Poorer	21.21	8.68	26.77
Middle	21.28	16.99	23.19
Richer	20.65	30.11	16.45
Richest	17.44	41.34	6.83

Note: *Weights used in estimation process.*

Table 4 reports the mean and confidence intervals of the continuous variables used in the analysis.

Table 4: Sample profile of the continuous variables used in the study

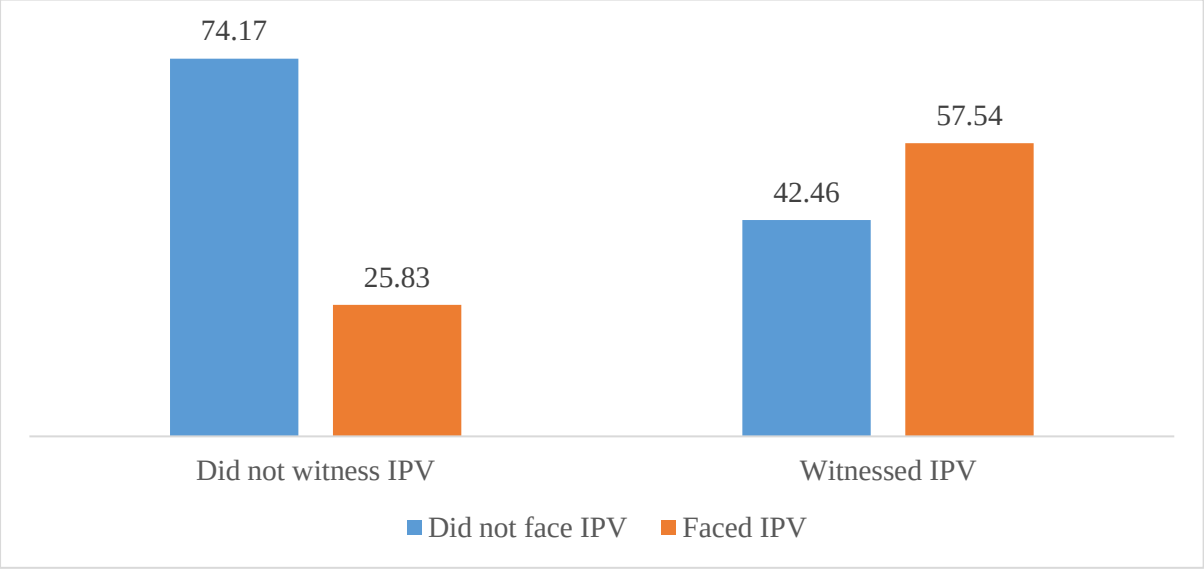
Variable	Total			Urban			Rural		
	Mean	95% CI		Mean	95% CI		Mean	95% CI	
Age of respondents	33.91	33.90	33.91	34.76	34.75	34.76	33.54	33.54	33.54
Wealth index scores	110387.70	110137.20	110638.30	840991.90	840642.40	841341.30	-204835.20	-205107.00	-204563.30
Attitudes towards spousal violence	-0.10	-0.10	-0.10	0.02	0.02	0.02	-0.15	-0.15	-0.15
Decision-making scores	-0.01	-0.01	-0.01	0.09	0.09	0.09	-0.05	-0.05	-0.05
Mobility scores	-0.02	-0.02	-0.02	0.13	0.13	0.13	-0.08	-0.08	-0.08
Control over money scores	-0.01	-0.01	-0.01	0.12	0.12	0.12	-0.07	-0.07	-0.07
Population density	2149.42	2148.09	2150.76	5159.83	5155.79	5163.88	834.75	834.51	834.99
Night light	4.23	4.23	4.23	12.21	12.20	12.21	0.79	0.79	0.79
Temperature	26.02	26.02	26.03	26.40	26.40	26.40	25.86	25.86	25.86

Note: *Weights used in estimation process.*

3.2 Incidence of IPV for women who witnessed parental violence as a child

In the sample, 57.54 per cent (95% CI: 57.51-57.57) of the respondents who witnessed father-to-mother violence women reported experiencing IPV as adults. This is greater than those who did not witness IPV during childhood; only 25.83 per cent (95% CI: 25.82-25.84) of such respondents' report adult IPV victimization (Figure 2).

Figure 2: Incidence of IPV for women who witnessed parental violence as a child



Note: *Weights used in estimation process.*

3.3 Incidence of IPV across correlates

The variations in the incidence of IPV for respondents who have witnessed parent-to-parent violence as a child across correlates are reported in Table 5. The results reveal that the difference in proportion of women reporting to have faced IPV between respondents who witnessed IPV and those who did not witness IPV as a child is positive and significant (at a one per cent level). This implies that respondents who witnessed childhood violence were (22-35 percentage points) more likely to experience IPV victimization in adulthood than those who did not witness such violence. This result holds across all the correlates. Further, this proportion was greater for respondents belonging to rural as compared to urban areas. The difference is higher among older women. The difference does not vary across education levels, mobility and financial autonomy. There are marginal variations in the difference across population density. The difference is relatively less in areas with high mean temperatures and medium level of night light.

Table 5: Percentage of women experiencing IPV across correlates

Correlates	Witnessed childhood violence			Did not witness childhood violence			Difference in mean (Percentage points)
	Faced IPV (%)	95% CI		Faced IPV (%)	95% CI		
Place of residence							
Urban	54.78	52.90	56.66	20.70	20.00	21.40	34.08***
Rural	58.65	57.63	59.68	25.64	25.21	26.07	33.01***
Respondent's current age							
15-19 years	40.57	33.96	47.18	17.65	15.06	20.25	22.91***
20-29 years	53.22	51.59	54.84	23.00	22.35	23.65	30.22***
30-39 years	58.81	57.37	60.25	25.21	24.62	25.80	33.60***
40-49 years	58.81	57.37	60.25	25.21	24.62	25.80	33.60***
Education							
No education	65.18	63.66	66.69	31.39	30.65	32.14	33.78***
Primary	60.19	57.91	62.48	27.95	26.94	28.97	32.24***
Secondary	53.69	52.32	55.07	21.77	21.25	22.30	31.92***
Higher	44.32	41.07	47.57	13.08	12.22	13.94	31.24***
Decision-making scores							
Low	59.77	58.31	61.22	27.49	26.85	28.13	32.28***
High	55.25	54.01	56.49	21.49	21.02	21.95	33.76***
Mobility scores							
Low	58.33	57.13	59.53	25.27	24.75	25.78	33.06***
High	57.01	55.64	58.38	23.53	23.01	24.05	33.48***
Control over money scores							
Low	57.30	56.06	58.54	25.12	24.61	25.63	32.18***
High	58.25	56.94	59.56	23.68	23.15	24.21	34.57***
Population density (based on quantiles)							
Low	57.37	55.81	58.94	22.54	21.91	23.17	34.83***
Medium	57.31	55.78	58.84	24.21	23.57	24.84	33.11***
High	59.03	57.42	60.63	26.72	26.06	27.38	32.31***
Night-light (based on quantiles)							
Low	58.09	56.53	59.66	24.64	24.00	25.28	33.46***

Correlates	Witnessed childhood violence			Did not witness childhood violence			Difference in mean (Percentage points)
	Faced IPV (%)	95% CI		Faced IPV (%)	95% CI		
Medium	58.38	56.86	59.89	26.96	26.29	27.62	31.42***
High	57.06	55.44	58.68	21.89	21.27	22.51	35.18***
Mean temperature (based on quantiles)							
Low	55.86	53.98	57.75	20.71	20.11	21.30	35.16***
Medium	62.70	61.09	64.32	28.27	27.61	28.93	34.44***
High	55.81	54.48	57.14	24.59	23.93	25.26	31.22***

Note: **** denotes Prob. <0.01.*

3.4 Econometric analysis

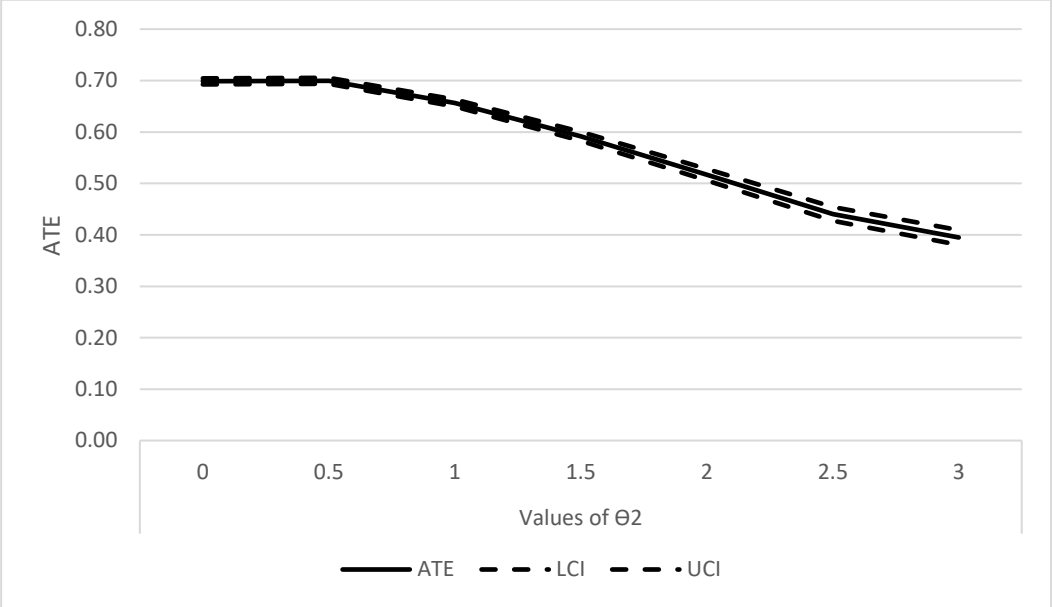
Figure 3 reports the ATE of witnessing parental violence across 28 combinations of cutoffs for witnessing violence as a child and facing violence as an adult. Figure 3 reveals an inverse-U shaped trend. The estimates, as observed in Figure 3 (see also Appendix Table B), reveal minimal levels of variations for $\theta_1 = \theta_2 = 0$, 0.5 and 1; observed variations in ATE are restricted to a narrow band (0.58 to 0.70). The stability of the estimated ATEs for $0.5 \leq \theta_2 \leq 1$ possibly reflects the empirical evidence indicating that the extent of misclasification is about 35 percent (Cullen, 2023), which implies that an acceptable level of θ_2 lies in the range 0.5 to 1.

Beyond $\theta_2 > 1$, particularly at $\theta_2 = 3$, there is a relatively large fall in ATE. However, for values of $\theta_1 = 3$ (see panel d), there are estimation problems, leading to dropping of observations or observations. So, the results for $\theta_1 = 3$ are not reliable for $\theta_2 = 1$ and 3.

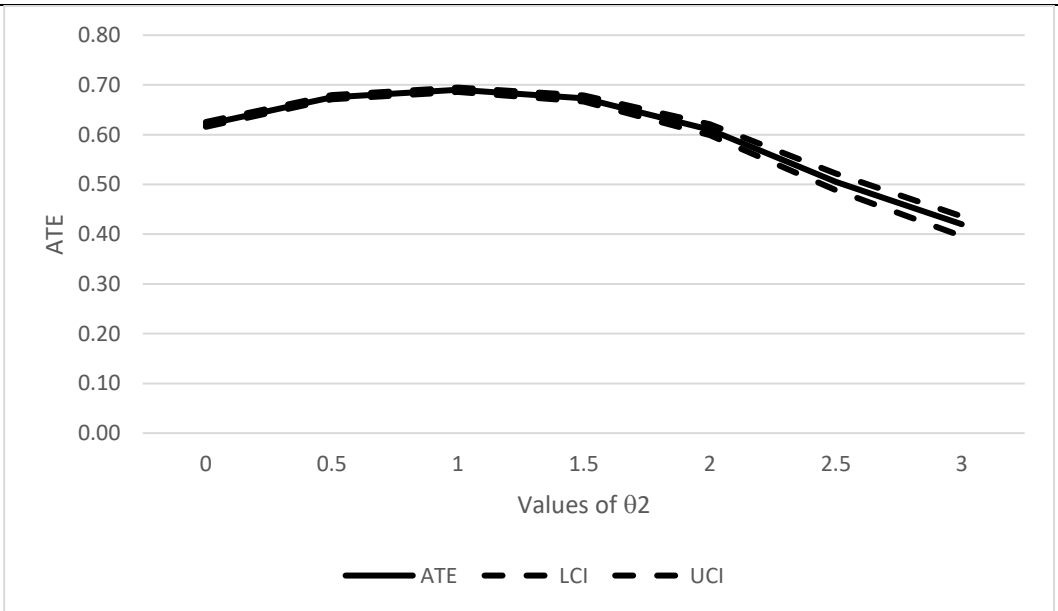
Barring these cases, therefore, the estimated ATE is robust to variations in the cut-offs. Confidence intervals are very narrow for all cutoffs. We also observe that, while variations in both the cut-offs affect ATE estimates, the estimates are more sensitive to variations in θ_2 vis-à-vis θ_1, particularly for $\theta_2 > 1$.

Figure 3: ATE of witnessing IPV as a child

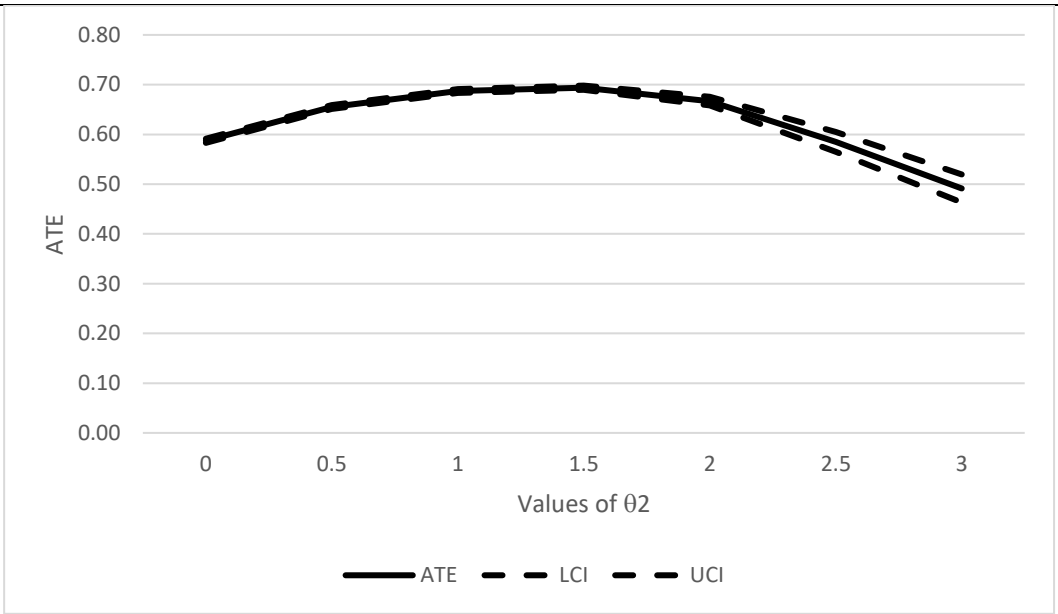
(a) ATE of witnessing IPV as a child for $\theta_1 = 0$



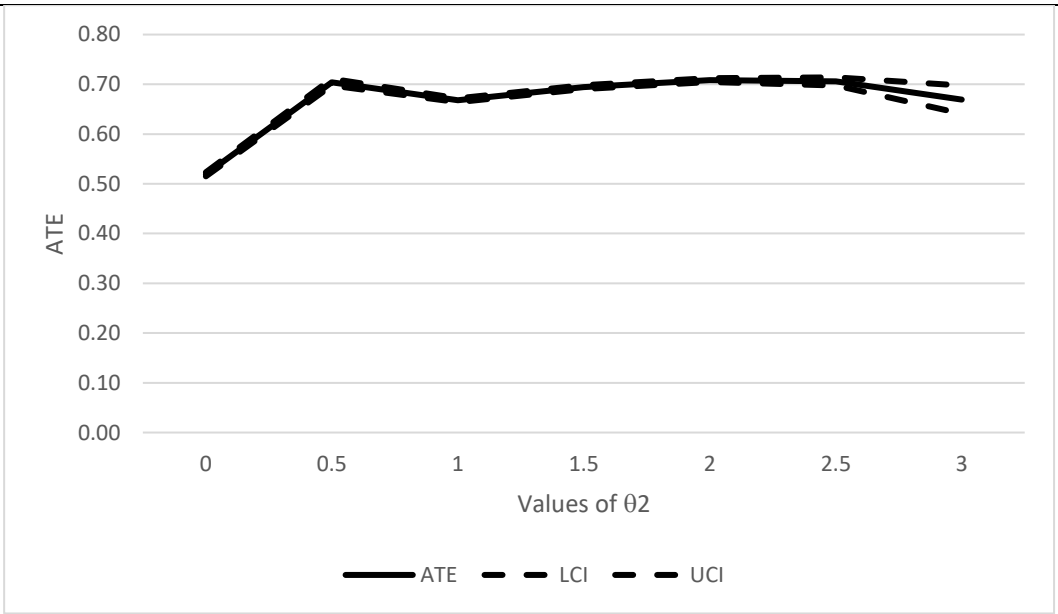
(b) ATE of witnessing IPV as a child for $\theta_1 = 0.5$



(c) ATE of witnessing IPV as a child for $\theta_1 = 1$



(d) ATE of witnessing IPV as a child for $\theta_1 = 3$



Note: *In (d), convergence and matching problems were faced for $\theta_2 = 0, 0.5$ and 1, leading to dropping of observations. So the results are not strictly comparable with other values of (θ_1, θ_2). Weights not used in estimation.*

3.5 Checking robustness: Distribution of bootstrapped ATEs

The distribution of the ATEs obtained from the bootstrapped samples are reported in Table 6. We focus on values of θ_1 and $\theta_2 \leq 1$, though the results are also reported for θ_1 and $\theta_2 = 3$. The analysis reveals that when θ_2 lies between 0 and 1, the ATE estimates are in a narrow range of

(0.58 to 0.72) across different percentiles. The ATE estimates from the bootstrapped samples exhibit minimal variations across the ten combinations of θ_1 and θ_2 (θ_1 =0, 0.5, and 1; θ_2 = 0, 0.5 and 1) and for (3, 1). Even in case of (0, 3), (0.5, 3), (1, 3), (3, 0) and (3, 3), the variation is reasonable (within 0.10). Only in the case of (3, 0.5), where there are estimation problems, is the range of coefficients high (0.63 to 0.83).

Table 6: Percentiles of ATEs from bootstrapped samples

Percentiles of ATEs from bootstrapping									
	1%	5%	10%	25%	50%	75%	90%	95%	99%
Cut-offs for adult IPV (θ_1 =0)									
Mean	0.67	0.68	0.68	0.69	0.70	0.70	0.71	0.72	0.72
Mean+0.5*SD	0.67	0.68	0.68	0.69	0.70	0.70	0.71	0.72	0.72
Mean+SD	0.62	0.64	0.64	0.65	0.66	0.66	0.67	0.67	0.68
Mean+3*SD	0.36	0.37	0.38	0.38	0.39	0.40	0.42	0.42	0.43
Cut-offs for adult IPV (θ_1 =0.5)									
Mean	0.61	0.61	0.61	0.62	0.62	0.62	0.63	0.63	0.63
Mean+0.5*SD	0.66	0.67	0.67	0.67	0.67	0.68	0.68	0.68	0.69
Mean+SD	0.68	0.68	0.68	0.69	0.69	0.69	0.70	0.70	0.70
Mean+3*SD	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46
Cut-offs for adult IPV (θ_1 =1)									
Mean	0.58	0.58	0.58	0.58	0.59	0.59	0.59	0.59	0.60
Mean+0.5*SD	0.65	0.65	0.65	0.65	0.65	0.66	0.66	0.66	0.66
Mean+SD	0.68	0.68	0.68	0.68	0.69	0.69	0.69	0.69	0.70
Mean+3*SD	0.44	0.45	0.46	0.48	0.49	0.51	0.52	0.52	0.53
Cut-offs for adult IPV (θ_1 =3)									
Mean	0.51	0.51	0.52	0.52	0.52	0.52	0.52	0.53	0.59
Mean+0.5*SD	0.63	0.64	0.65	0.67	0.70	0.71	0.72	0.77	0.83
Mean+SD	0.66	0.66	0.66	0.66	0.67	0.67	0.68	0.69	0.69
Mean+3*SD	0.61	0.63	0.64	0.65	0.67	0.68	0.68	0.69	0.70

Note: *Weights not used in estimation.*

3.6 Checking robustness: Robust standard errors

The results of the bootstrapping exercise to check the robustness of the ATE estimates are reported in Table 7 (see also Appendix Table C). The bootstrapping exercise confirms the statistical significance of the ATE estimates across all 16 models. Upon comparing the confidence intervals between the original model and the bootstrapped sample, we observe that the confidence intervals for both ATE and POM are wider in the latter. However, it is to be noted that these confidence intervals still remain reasonably narrow (generally, 0.04-0.05 and at most, 0.17). Moreover, the confidence intervals for ATEs show consistency across the three methods used viz., normal approximation, percentile-based, and bias-corrected approaches, yield similar results (refer to Appendix Table C). Overall, the results demonstrate that the estimates of ATE reported in Figure 3 are robust across different combinations of (θ_1, θ_2).

Table 7: Bootstrapped estimates (500 replications) of variations in ATE of witnessing parental violence (and POM) across cut-offs for witnessing violence and facing violence

Cut-offs	ATE	Percentile 95% CI		POM	Percentile 95% CI	
Cut-offs for adult IPV (θ_1 = 0)						
Mean	0.70***	0.67	0.72	0.23***	0.21	0.25
Mean + 0.5*SD	0.70***	0.68	0.72	0.17***	0.15	0.18
Mean + SD	0.66***	0.63	0.68	0.14***	0.13	0.15
Mean + 3*SD	0.39***	0.36	0.42	0.14***	0.12	0.15
Cut-offs for adult IPV (θ_1 = 0.5)						
Mean	0.62***	0.61	0.63	0.34***	0.33	0.35
Mean + 0.5*SD	0.68***	0.66	0.68	0.25***	0.24	0.25
Mean + SD	0.69***	0.68	0.70	0.19***	0.19	0.20
Mean + 3*SD	0.42***	0.38	0.45	0.17***	0.16	0.17
Cut-offs for adult IPV (θ_1 = 1)						
Mean	0.59***	0.58	0.60	0.38***	0.37	0.38
Mean + 0.5*SD	0.65***	0.65	0.66	0.28***	0.28	0.29
Mean + SD	0.69***	0.68	0.69	0.22***	0.22	0.23
Mean + 3*SD	0.49***	0.45	0.53	0.18***	0.17	0.18
Cut-offs for adult IPV (θ_1 = 3)						
Mean	0.52***	0.51	0.56	0.45***	0.42	0.46

Cut-offs	ATE	Percentile 95% CI		POM	Percentile 95% CI	
Mean + 0.5*SD	0.70***	0.64	0.81	0.22***	0.12	0.31
Mean + SD	0.67***	0.66	0.69	0.27***	0.25	0.28
Mean + 3*SD	0.67***	0.62	0.69	0.20***	0.19	0.20

Note: *Weights not used in estimation.*

4. Discussion

The present study establishes that IPV has negative externalities within the family; the effects spill-over from the primary victim to her daughters, increasing the likelihood that the latter will also become victims of IPV on becoming adults. Bootstrapping exercises indicate that the results from the original sample are robust. The long shadow of IPV is a serious challenge, particularly in developing countries where the societal and institutional support base for victims is poor.

The results of this study confirm that the intergenerational transmission of violence observed in developed countries also holds for patriarchal societies of South Asia. However, the estimates of ATE obtained in this study (under the no misclassification assumption) are lower than the values obtained in other studies: 1.9 (McKinney *et al.*, 2009), 1.99 to 2.02 (Renner and Slack, 2006), 2.0 (Whitfield *et al.*, 2003), 1.55 to 1.71 (Thompson *et al.*, 2006), 2.67 (Brassard *et al.*, 2020), 2.50 (Vung and Krantz, 2009). A possible reason for the difference in ATE estimates of this study with other studies is the assumption of misclassification made in this study. If women who have witnessed violence in their childhood under-report such incidents, then this can bias the ATE estimates. If such misreporting is more common among women who conceal their personal experience of IPV as an adult, that is, u (from equation 1) and e (equation 2) are positively correlated, then the ATE estimates will be overestimated.

The study contributes to the existing literature in several ways. Firstly, it uses data from a recently released nationally representative survey in India to analyse the impact of witnessing IPV. As a result, it extends knowledge on the impact of IPV derived from studies based in developed countries to developing countries with poor gender indicators. Secondly, in terms of methodology, it attempts to tackle issues like the presence of unobserved confounding variables affecting both treatment and outcome, and under-reporting of witnessing and facing IPV using a control function approach (Woolridge, 2010). Thirdly, the use of bootstrapping provides a

post estimation check of the robustness of the results, increasing the methodological strength of the paper.

However, the study has some limitations. Firstly, although IPV may take different violence, like emotional and sexual, the present study examines the effect of witnessing only physical violence. Secondly, it focusses on the effect of witnessing IPV upon daughters. Sons may also be traumatised by such experiences and may become prone to exhibit aggression as adults (Adams, 2006; Payne, Triplett and Higgins, 2011; Hines, 2015). Thirdly, recent studies reveal that the child may also be a victim of abuse in various forms (Moody *et al.*, 2018). The UN estimates that about 75 per cent of children aged 2 to 4 years regularly face physical violence at the hands of parents and caregivers, while 20 per cent of women and 8 per cent of men have faced sexual violence before the age of 18 years (World Health Organization, 2020). This also has serious long-term consequences on the victim. Unfortunately, DHS administers the domestic violence module to only women and covers only witnessing physical violence as a child and facing IPV as an adult. Extending the study to cover these issues using more robust methods than employed by existing studies will further advance our understanding of the long-term effects of IPV, and provides an exciting area for further research.

5. Conclusion

Exposure to IPV is being increasingly recognised as a form of child maltreatment (Gilbert, Kemp, *et al.*, 2009; Wathen and Macmillan, 2013). The present study shows that childhood exposure to IPV, even mere witnessing such violence, significantly increases the possibility of victimization when the child becomes an adult. As children are not passive agents but actively participants and co-creators of their social surroundings (Holt, Buckley and Whelan, 2008), the early involvement with IPV may cast a long shadow on their subsequent development. The present study makes a strong case for introducing child-centric measures to ensure their safety and welfare through the provision of preventive, supportive, protective, or therapeutic interventions (Gilbert, Kemp, *et al.*, 2009). A strong counselling system backed up by provisioning of mental health services for children, for instance, may play a crucial role in weakening the long-term effect of ACEs. Simultaneously, we should also recognize the potential role of positive mentors in the immediate environment of the child. Teachers may be trained to design signs of trauma and offer basic counselling services to children traumatized by IPV in the domestic sphere. We argue that, given the innate importance of child welfare and its relationship with long run growth and development, reducing IPV will enable the attainment

of not only Sustainable Development Goal 5.2 (eliminate all forms of violence against women and girls), but also ensure a sustainable and inclusive future for our children.

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Appendix

Appendix Table A: Indicators used for the dimension of attitudes towards violence, decision making, mobility, and control over money

Indicators for attitudes towards violence (AVAW)	**Indicators for decision-making dimension (Decision)**	**Indicators for mobility (Media)**	**Indicators for financial control (Money)**
Whether respondent thinks that wife-beating is justified if: V1) she goes out without telling the husband V2) she neglects the children V3) argues with husband V4) refuses to have sex with husband V5) doesn't cook food properly	Person who usually decides on: D1) respondent's health care D2) large household purchases D3) visits to family or relatives D4) what to do with the money husband earns D5) sexual intercourse with the husband when the respondent is not willing	Whether the respondent is usually allowed to visit (Mobility): M1) market M2) health facility M3) places outside the village	Whether the respondent has (Money): F1) Savings or bank account that she can alone decide to use F2) Money that she can alone decide to use

Appendix Table B: Variations in ATE of witnessing parental violence across cut-offs for witnessing vioelnce and facing violence

	ATE	95% CI		POM	95% CI	
Cut-offs for adult IPV (θ_1 =0)						
Mean	0.70***	0.69	0.70	0.23***	0.22	0.24
Mean+0.5*SD	0.70***	0.69	0.71	0.17***	0.16	0.17
Mean+SD	0.66***	0.65	0.66	0.14***	0.14	0.15
Mean+3*SD	0.39***	0.38	0.41	0.14***	0.13	0.14
Cut-offs for adult IPV (θ_1 =0.5)						
Mean	0.62***	0.62	0.63	0.34***	0.33	0.34
Mean+0.5*SD	0.68***	0.67	0.68	0.25***	0.24	0.25
Mean+SD	0.69***	0.69	0.69	0.19***	0.19	0.20
Mean+3*SD	0.42***	0.40	0.44	0.17***	0.16	0.17
Cut-offs for adult IPV (θ_1 =1)						
Mean	0.59***	0.58	0.59	0.38***	0.37	0.38
Mean+0.5*SD	0.65***	0.65	0.66	0.28***	0.28	0.28
Mean+SD	0.69***	0.68	0.69	0.22***	0.22	0.23
Mean+3*SD	0.49***	0.46	0.52	0.18***	0.17	0.18
Cut-offs for adult IPV (θ_1 =3)						
Mean	0.52***	0.52	0.52	0.45***	0.45	0.46
Mean+0.5*SD	0.70***	0.70	0.71	0.22***	0.21	0.22
Mean+SD	0.67***	0.66	0.67	0.27***	0.27	0.28
Mean+3*SD	0.67***	0.64	0.70	0.20***	0.19	0.20

***Note**: *** denotes Prob. < 0.01.*

Appendix Table C: ATE and PO means with bootstrapped confidence intervals

Cutoff	Statistic	Observed coef.	Bias	Bootstrap S.E.	95% CI		CI type
Cut-offs for adult IPV (θ_1=0)							
Mean	ATE	0.70	0.00	0.01	0.67	0.72	(N)
					0.67	0.72	(P)
					0.68	0.72	(BC)
	POM	0.23	0.00	0.01	0.21	0.25	(N)

					0.21	0.25	(P)
					0.21	0.25	(BC)
Mean+0.5*SD	ATE	0.70	0.00	0.01	0.68	0.72	(N)
					0.68	0.72	(P)
					0.68	0.72	(BC)
	POM	0.17	0.00	0.01	0.15	0.18	(N)
					0.15	0.18	(P)
					0.15	0.18	(BC)
Mean+SD	ATE	0.66	0.00	0.01	0.64	0.68	(N)
					0.63	0.68	(P)
					0.64	0.68	(BC)
	POM	0.14	0.00	0.01	0.13	0.15	(N)
					0.13	0.15	(P)
					0.13	0.15	(BC)
Mean+3*SD	ATE	0.39	0.00	0.02	0.36	0.42	(N)
					0.36	0.42	(P)
					0.37	0.43	(BC)
	POM	0.14	0.00	0.01	0.13	0.15	(N)
					0.12	0.15	(P)
					0.13	0.15	(BC)
Cut-offs for adult IPV (θ_1=0.5)							
Mean	ATE	0.62	0.00	0.01	0.61	0.63	(N)
					0.61	0.63	(P)
					0.61	0.63	(BC)
	POM	0.34	0.00	0.01	0.33	0.35	(N)
					0.33	0.35	(P)
					0.33	0.35	(BC)
Mean+0.5*SD	ATE	0.68	0.00	0.01	0.67	0.69	(N)
					0.66	0.68	(P)
					0.67	0.69	(BC)
	POM	0.25	0.00	0.00	0.24	0.25	(N)
					0.24	0.25	(P)
					0.24	0.25	(BC)

Mean+SD	ATE	0.69	0.00	0.01	0.68	0.70	(N)
					0.68	0.70	(P)
					0.68	0.70	(BC)
	POM	0.19	0.00	0.00	0.19	0.20	(N)
					0.19	0.20	(P)
					0.19	0.20	(BC)
Mean+3*SD	ATE	0.42	0.00	0.02	0.38	0.45	(N)
					0.38	0.45	(P)
					0.38	0.45	(BC)
	POM	0.17	0.00	0.00	0.16	0.17	(N)
					0.16	0.17	(P)
					0.16	0.17	(BC)
		Cut-offs for adult IPV (θ_1=1)					
Mean	ATE	0.59	0.00	0.00	0.58	0.60	(N)
					0.58	0.60	(P)
					0.58	0.60	(BC)
	POM	0.38	0.00	0.00	0.37	0.38	(N)
					0.37	0.38	(P)
					0.37	0.38	(BC)
Mean+0.5*SD	ATE	0.65	0.00	0.00	0.65	0.66	(N)
					0.65	0.66	(P)
					0.65	0.66	(BC)
	POM	0.28	0.00	0.00	0.27	0.29	(N)
					0.28	0.29	(P)
					0.27	0.29	(BC)
Mean+SD	ATE	0.69	0.00	0.00	0.68	0.69	(N)
					0.68	0.69	(P)
					0.68	0.70	(BC)
	POM	0.22	0.00	0.00	0.22	0.23	(N)
					0.22	0.23	(P)
					0.22	0.23	(BC)
Mean+3*SD	ATE	0.49	0.00	0.02	0.45	0.53	(N)
					0.45	0.53	(P)

					0.45	0.53	(BC)
	POM	0.18	0.00	0.00	0.17	0.18	(N)
					0.17	0.18	(P)
					0.17	0.18	(BC)
Cut-offs for adult IPV (θ_1=3)							
Mean	ATE	0.52	0.00	0.01	0.50	0.54	(N)
					0.51	0.56	(P)
					0.51	0.57	(BC)
	POM	0.45	0.00	0.01	0.43	0.48	(N)
					0.42	0.46	(P)
					0.42	0.46	(BC)
Mean+0.5*SD	ATE	0.70	-0.01	0.04	0.63	0.77	(N)
					0.64	0.81	(P)
					0.66	0.85	(BC)
	POM	0.22	0.02	0.05	0.12	0.32	(N)
					0.12	0.31	(P)
					0.10	0.30	(BC)
Mean+SD	ATE	0.67	0.00	0.01	0.65	0.69	(N)
					0.66	0.69	(P)
					0.66	0.69	(BC)
	POM	0.27	0.00	0.01	0.25	0.29	(N)
					0.25	0.28	(P)
					0.25	0.28	(BC)
Mean+3*SD	ATE	0.67	-0.01	0.02	0.63	0.71	(N)
					0.62	0.69	(P)
					0.63	0.70	(BC)
	POM	0.20	0.00	0.00	0.19	0.20	(N)
					0.19	0.20	(P)
					0.19	0.20	(BC)

Note: *(N), (P), and (BC) denote normal-based, percentile, and bias-corrected confidence intervals respectively.*