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# Education and Domestic Violence: Evidence from a School Construction Program in India

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# Education and Domestic Violence: Evidence from a School Construction Program in India

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**Abstract**

This study examines the impact of a public education program, targeting women's education, on the domestic violence faced by women in India. We use the 2015-16 Demographic Health Survey (DHS) and exploit a regression discontinuity design for a large-scale school construction program, the District Primary Education Program (DPEP), launched in 1994 in India. We find that the program leads to a 13% decrease in emotional domestic violence, a 26% decrease in less severe physical domestic violence, a 9% decrease in sexual violence, and a 10% decrease in injuries due to domestic violence. We explore potential mechanisms and observe that women's education improved by an average of 0.93 years without a corresponding increase in labor force participation, cash income, or decision-making power. Positive shifts in gender beliefs and attitudes towards domestic violence led to less justification of domestic violence among educated women, who also tend to marry wealthier men with progressive gender attitudes. In addition, educated women gain better access to information and are more likely to seek help from formal authorities. Overall, we find strong evidence for increased women's education, improved gender attitudes and beliefs, better partner quality, and improved access to information for women as potential mechanisms.

**Keywords:** Domestic Violence, Education Reforms, Women's Education, India, Human Capital, Gender Role Beliefs, Marriage Market, Reporting Crime.
**JEL Codes:** I21, I28, J12, J16, J24, K42.

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# 1 Introduction

Global statistics reveal that around 27% of women have experienced physical or sexual violence from an intimate partner at least once in their lifetime (WHO, 2021). Furthermore, domestic violence is significantly more prevalent in developing countries[1], with economically disadvantaged women being particularly vulnerable. Domestic violence is a pervasive problem affecting women's health, physical, mental, and reproductive health, as well as child outcomes (Aizer (2011), Campbell (2002), Carlson (2000), Erten et al. (2018), Huth-Bocks et al. (2001), and Koenen et al. (2003)), posing severe barriers to their autonomy in private and public spaces (Rana et al., 2023). India mirrors this disturbing global pattern with a rate of 37% of self-reported cases of domestic violence by Indian women in 2005-2006 (NFHS 3). During the early 2000s, India witnessed a decline in domestic violence incidents[2] along with an improvement in female literacy rates.[3] Concurrently, the late 1990s and early 2000s were marked by the launch of extensive educational reform by the Indian government. Given the importance of domestic violence and its aftermath for victims, it is essential to understand the policies that can prevent it. In this paper, we examine how the district primary education program, a large school construction program, affects domestic violence in India.

Estimating the causal link between education and domestic violence poses challenges due to confounding factors such as household wealth and attitudes toward violence. We utilize the DPEP in India as a quasi-experimental design, similar to the approach of Duflo (2004) and Duflo (2001) for Indonesia's school construction program, to isolate the impact of education. This method allows us to clearly identify the causal effect of increased education through DPEP, exploring its direct influence on domestic violence with a regression discontinuity setup.

The District Primary Education Program, DPEP[4], was implemented in a staggered way

[1] Duvvury et al. *Intimate Partner Violence: Economic Costs and Implications for Growth and Development*, World Bank, November 2013.

[2] Based on NFHS 3 (2005-2006) and NFHS 4 (2015-16) data.

[3] Female literacy rates increased by 11.3% and 14.4% between 2001-2011 and 2010-2021 (Indian census).

[4] In the rest of the paper, we use conversely *District Primary Education Program* and its acronym *DPEP*.

and built around 160,000 new schools in India between 1994 to 2004, targeting districts below the 1991 national average female literacy rate of 39.3%. The identification assumption is that districts that are eligible for the program, as indicated by the female literacy cutoff variable, are comparable to those who are just missing out on the program by a close margin.[5] The program was implemented at the district level and we observe imperfect compliance with the implementation of the program. Therefore, we use a fuzzy regression discontinuity design to estimate the impact of DPEP on domestic violence. The fuzzy regression discontinuity (RD) provides a local average treatment effect (LATE), as we use the cutoff indicator as an instrument for DPEP assignment. In our analysis of the mechanisms, we explore the potential channels using the fuzzy RD and a $2SLS$ approach. We use the cutoff indicator as an instrument for women's education.

The primary step of our analysis is to examine the effect of DPEP on domestic violence. We show that women in districts that implemented DPEP experience less domestic violence than those who did not. More specifically, we find that the program reduces any type of domestic violence by 32 percentage points, emotional violence by 13 percentage points, less severe physical violence by 26 percentage points, sexual violence by 9 percentage points, and falls of injuries by 10 percentage points. Furthermore, we explore the potential mechanisms to understand falls in domestic violence. We show that DPEP increases women's education by 0.93 years using fuzzy RD specification. This result is in line with the findings of Agarwal et al. (2023), Akresh et al. (2023), and Sunder (2020), which also find an increase in women's education due to the DPEP using the regression discontinuity framework.

We further explored how the improvement in women's education due to DPEP can reduce domestic violence. We find that DPEP does not improve the probability that women work in the workforce and the likelihood of receiving cash income decreases. This highlights an intriguing fact about India; despite significant school reforms, female labor force partici-

[5]If we know the respondent's current location, we do not have data on her birthplace or where she went to school. However, Beauchamp et al. (2017) show that most of female migration in India (73%) occurs at the district level, similar to the implementation of the DPEP.

pation has not improved over the past two decades. Consistent with this result, we find no improvement in household decision-making power for women. This indicates that there is no change in bargaining power due to improvements in outside options for women. These results suggest that economic channels predict an increase in domestic violence. However, the overall results showed the opposite trend.

Thus, to understand what drives the primary results, we then look at non-economic and non-income channels, starting with gender attitudes and beliefs of women. Women's belief in greater gender equality and less tolerance toward domestic violence leads to a higher likelihood of retaliation (e.g., reporting to the police) and increases the opportunity cost of violence. Overall, we find that there is a significant improvement in the gender attitudes of women, more educated women justify less violence, thanks to the program and the resulting increase in education. This can also translate into a decline in domestic violence. Our estimates are comparable with the findings in the existing literature. Friedman et al. (2016) finds educated young women are less likely to accept domestic violence in Kenya. Mocan et al. (2012) finds that education improves attitudes towards domestic violence in Sierra Leone. However, Erten et al. (2018) finds no consistent effect of education reform in improving gender roles and attitudes toward domestic violence.

Next, we analyze the characteristics of the partner of educated women and the channel of access to information. Overall, we find a significant improvement in partner's gender attitudes toward domestic violence. There is a fall in the justification of domestic violence for women who go out, neglect children, argue, refuse sex, are unfaithful, or are disrespectful. This can lead to finding a partner with better gender beliefs and attitudes toward domestic violence. We also find that educated women marry relatively wealthier partners. This can also reduce financial stress and domestic violence. Finally, to investigate the access to information mechanism, we use access to information indicators, such as reading newspapers or using mobile devices, and seeking help from formal and informal authorities. We find that women in the DPEP districts are 17% more likely to read newspapers and 13% more likely

to read mobile text messages than non-DPEP districts. There is also suggestive evidence that women in districts treated with DPEP seek more help from formal institutions.

While there exists a robust body of literature on the socioeconomic outcomes of school construction, to our knowledge, our study pioneers the investigation into the effects of school construction programs on various types of domestic violence against women, along with the mechanisms driving these effects. Unlike Friedman et al. (2016), who broadly examine education's impact on violence, and Agarwal et al. (2023) who find the District Primary Education Program leads to a fall in domestic violence in marriage market outcomes, our research offers detailed insights into its effects on different types of violence. In contrast to Agarwal et al. (ibid.), we specifically focus on domestic violence as our primary variable of interest. Furthermore, we shed light on the potential impact of education on the likelihood of reporting violence and its prospective impact on domestic violence. Khanna (2023) examines the impact of DPEP on education within India, while Duflo (2001), Duflo (2004), and Rohner et al. (2019) discuss the effects of a school construction program in Indonesia on education and conflict, respectively. Our research fills a critical gap by conducting a causal analysis of education reforms targeted toward girls and their long-term impacts on domestic violence. By incorporating insights from both economic and non-economic literature, we extend the work of Erten et al. (2018), Friedman et al. (2016), and Mocan et al. (2012), to offer a holistic examination of education's role in influencing domestic violence. Crucially, this paper underscores the need to focus beyond traditional channels, predominantly focused on income and labor force participation, to understand the comprehensive mechanisms through which improved education affects domestic violence. This approach is especially relevant in contexts such as India, where participation in the female labor force has remained relatively stagnant in recent years.

The rest of the paper is organized as follows. Section 2 provides background information on the District Primary Education Program , which led to significant increases in educational attainment among girls. Sections 3 and 4 outline the data and empirical strategies used to

estimate the causal effects of education on domestic violence. Section 5 presents the main results, which show that the program is associated with a reduction in domestic violence. Section 6 discusses the potential mechanisms of DPEP through education. Finally, Section 7 concludes the paper by emphasizing the potential benefits of policies to improve access to education and highlighting the scope for future research.

# 2 Background: DPEP

The District Primary Education Program is one of the most extensive school construction programs launched in 1994 by the central government of India in collaboration with state governments and private donors. The primary objective of the program is to build primary schools to increase access and quality of primary education and reduce the gender gap in education. In addition to school construction, the other interventions under DPEP were community mobilization, establishment of academic resource centers, teacher training, and enrollment drives (Agarwal et al., 2023). It is important to mention that the DPEP program did not change the school curriculum; in other words, it did not become gender-based.

Since the main objective of this program was to improve enrollment in primary education in India, with a particular focus on female education, the program was targeted to districts with poor primary school enrollment of women. To be eligible to receive funds under this program, a district must have an average female literacy rate below the national average of 39.3% in 1991. The program was launched in the districts between 1994 and 2002, as illustrated in Figure A1, with phase-wise implementation across the districts of India. The implementation of the program was divided into 4 phases, and according to the status of district allocation after the 1991 census, 216 districts were covered under DPEP and 237 were not. According to the allocation of districts in 2015-16, a total of 270 districts were covered by all phases of the DPEP from 1994.[6] Following the status of the allocation of districts after

[6]We follow the district allocation used during the Census 1991 and during the NFHS 2015-16 Round to be consistent with the initial allocation and the main NFHS round of our study.

the 1991 census, Phase 1 of the program included 48 districts, with implementation spanning from 1994 to 2002−2003. Phase 2 included 88 districts, starting in 1996−1997 and concluding in 2002 − 2003, while Phase 3 covered 42 districts, from 1997 − 1998 to 2003 − 2004. The final phase saw the introduction of the program in 48 new districts between 1999 and 2002, which continued until 2008. Notably, in some districts, DPEP implementation coincided with the launch of the Sarva Shiksha Abhiyan (SSA) or 'Education for All' program in 2002. To mitigate the potential confounding effects of SSA, we conducted a robustness check by excluding districts that began the first implementation in 2002 or later. Overall, the program covered 216 (270 after considering the bifurcations) districts in 18 states, resulting in the establishment of 86, 850 new schools and 83, 500 alternative school centers. [7]

Studies have found that DPEP successfully improves the probability of completing primary education and overall schooling years, particularly for girls in India (Azam et al., 2017; Jalan et al., 2002). Khanna (2023) found positive effects of the program on education, but heterogeneous effects on the outcomes of the labor market. The primary objective of the DPEP was to improve the status of primary and upper primary schools, where the average age of enrollment is at least 6 years. To delineate our study cohorts, we employ a methodology that classifies individuals based on their age relative to the program's start year in their district. This approach ensures the inclusion of women who were within the reach of the educational system at the launch of DPEP and are expected to benefit from the long-term impacts of the program. Specifically, for districts where the program began in 1994, our analysis includes women who were 19 years of age or younger at the beginning, projecting their age to 40 or younger by 2015, the year of the NFHS survey. This age-adjusted inclusion criterion is applied progressively for each subsequent phase of the program's rollout, accounting for the varying start years up to 2002. The choice of 19 as cutoff age is based on capturing those at the threshold of completing their schooling and joining the marriage

[7]Districts in India are carved out to form new districts during and after the program implementation; however, we collapse all the newly carved districts to their origin district as recorded in the 1991 census or we consider the status of district allocation in 2015-16.

market, thus most likely to directly benefit from the program's interventions.

In essence, this age-based classification criterion is designed to capture the cohort of women directly influenced by the interventions of the DPEP, allowing a focused evaluation of its effectiveness in influencing incidences of domestic violence.

# 3 Data

Our analysis uses data from multiple sources, primarily focusing on the Women's Questionnaire of the National Family Health Survey (NFHS) 4 (2015-16), particularly the responses to the domestic violence module, and data from the National Institute of Educational Planning and Administration (NIEPA) regarding the implementation of the DPEP program. Furthermore, we used the 1991 Indian census to determine the district eligibility for the DPEP program and incorporated NFHS data for mechanism studies and balance tests. The NFHS-5 (2019-21) data are utilized for robustness checks.

Variable descriptions and summary statistics are detailed in Tables 1 and 2, respectively, categorized into several key areas: *treatment* encompasses variables related to the DPEP program's implementation and the 1991 female literacy rate as reported by NIEPA; *characteristics* include demographics such as age and education from NFHS; *domestic violence* covers self-reported instances by women; *labor market* contains data on women's employment and income; *decision* focuses on women's empowerment indicators like household decision-making and income control; *women gender attitude* examines women's justifications for experiencing violence; *husband/partner's gender attitude* explores men's justifications for perpetrating violence; *partner quality* assesses the attributes of women's husbands or partners; *information* gauges the respondents' access to information; and *seek help* identifies whether women sought external assistance in response to violence.

Data on the progress of school construction across districts under the DPEP are collected from various government reports published by the National Institute of Educational Planning

and Administration (NIEPA). Our study excluded union territories from our analysis because the program was not implemented in any union territory. Therefore, we consider the 270 districts covered between the fourth phases as treated districts. As explained in the previous section, the DPEP program was intended to be implemented in districts with a female literacy rate below the 1991 national average of 39.3%. To exploit the female literacy cutoff of 1991, we now consider the districts that implemented DPEP under phases $1, 2, 3$ and 4 as the treated units (or group) , while the districts that were never covered under DPEP are considered the units of the comparison cohort or control group. If we follow the district allocation in 2015-16, 410 districts were not covered under the program. In our analysis, we use the *Female Literacy Rate Centered (1991)* calculated by subtracting the 1991 female literacy national average, 39.3%, from the *District Female Literacy Rate*.

We use the Women's Questionnaire from the 2015-2016 National Family Health Survey[8] to create indicators of the self-reported incidence of domestic violence. The Women's Questionnaire of the National Family Health Survey ensures reliability, first, participants selected to answer the domestic violence module are chosen at random, with a limit of one woman per household. Second, and more importantly, interviews are only conducted if the safety and well-being of the women are not jeopardized; indeed, if interviewers cannot guarantee complete privacy throughout the entire interview regarding domestic violence, they will skip the module entirely.[9]

[8]NFHS-4, 2015-16

[9]`https://dhsprogram.com/data/Guide-to-DHS-Statistics/17_Domestic_Violence.htm`, last accessed the $20^{th}$ March 224.

**Table 1** Description of Variables

| | Description |
|---|---|
| **NIEPA and Census, 1991** | |
| *Treatment* | |
| DPEP | Received the DPEP Program |
| Female Literacy Rate Centered (1991) | Difference between the district female literacy rate and the national female literacy average in 1991 |
| Eligible for DPEP | Has a female literacy rate below the national average in 1991 (39.3%) |
| **NFHS, 2015-16** | |
| *Characteristics* | |
| Age | Age of the respondent (woman) |
| Educ. | Education in single years (woman) |
| *Domestic violence* | |
| Overall | Have experienced at least one of the following domestic violence types |
| Emotional | Experienced any emotional violence |
| Less Severe | Experienced any less severe violence |
| Severe | Experienced any severe violence |
| Sexual | Experienced any sexual violence |
| Any Injury | Experienced any injury from husband/partner's violence |
| *Labour Market* | |
| Employed | Respondent is currently working |
| Working Outside | Respondent works outside (her family) |
| Cash Income | Respondent receives cash income |
| *Decision* | |
| Own Health | Respondent decides own health care |
| HH Purchases | Respondent decides on large household purchases |
| Own Earnings | Respondent decides how to use own earnings |
| Husband's Earnings | Respondent decides how to use husband's earnings |
| Own Contraception | Respondent decides for the use of contraception |
| *Women Gender Attitude* | |
| Going Out | Beating justified if wife goes out without telling |
| Neglect Children | Beating justified if wife neglects children |
| Argue | Beating justified if wife argues with husband |
| Refuse Sex | Beating justified if wife refuses to have sex with husband |
| Not Cooking | Beating justified if wife doesn't cook food properly |
| Unfaithful | Justifies domestic violence if wife unfaithful |
| Disrespect | Justifies domestic violence if wife disrespects |
| *Husband/Partner's Gender Attitude* | |
| Husband: Going Out | Beating justified if wife goes out without telling |
| Husband: Neglect Children | Beating justified if wife neglects children |
| Husband: Argue | Beating justified if wife argues with husband |
| Husband: Refuse Sex | Beating justified if wife refuses to have sex with husband |
| Husband: Not Cooking | Beating justified if wife doesn't cook food properly |
| Husband: Unfaithful | Justifies domestic violence if wife unfaithful |
| Husband: Disrespect | Justifies domestic violence if wife disrespects |
| *Husband/Partner Quality* | |
| Husband/Partner Employed | Husband/Partner: Currently working |
| Husband/Partner's Educ. | Husband/Partner: Education in single years |
| Husband/Partner's Alcohol Abuse | Husband/Partner: Often being drunk |
| Husband/Partner 'Not Poor' | Husband/Partner with a wealth index from middle to richest |
| *Information* | |
| Read Newspaper | Respondent reads newspaper or magazine |
| Financial Knowledge | Respondent has bank/saving account that she uses |
| Business Information | Respondent knows about business loan programs in her area |
| Use Mobile Phone | Respondent has mobile phone that she uses |
| Read Mobile Text | Respondent is able to read text messages |
| *Seek Help* | |
| Social Service | Respondent seeks help from social service organization |
| Religious Leader | Respondent seeks help from religious leader |
| Police | Respondent seeks help from police |
| Lawyer | Respondent seeks help from lawyer |
| State ID | State ID number |
| District ID | District ID number |

**Table 2** Descriptive Statistics

| | Mean | SD | Min | Max | N |
|---|---|---|---|---|---|
| **NIEPA and Census, 1991** | | | | | |
| *Treatment* | | | | | |
| DPEP | 0.40 | 0.49 | 0 | 1 | 549,007 |
| Female Literacy Rate Centered (1991) | -3.10 | 17.08 | -32 | 55 | 472,423 |
| Eligible for DPEP | 0.62 | 0.48 | 0 | 1 | 472423 |
| **NFHS, 2015-16** | | | | | |
| *Characteristics* | | | | | |
| Age | 26.03 | 7.14 | 15 | 40 | 549,007 |
| Educ. | 7.49 | 5.01 | 0 | 20 | 549,007 |
| *Domestic violence* | | | | | |
| Overall | .3129505 | .4636992 | 0 | 1 | 47,998 |
| Emotional | 0.12 | 0.33 | 0 | 1 | 49,230 |
| Less Severe | 0.27 | 0.45 | 0 | 1 | 49,230 |
| Severe | 0.08 | 0.27 | 0 | 1 | 49,230 |
| Sexual | 0.07 | 0.25 | 0 | 1 | 49,230 |
| Any Injury | 0.07 | 0.25 | 0 | 1 | 49,230 |
| *Labour Market* | | | | | |
| Employed | 0.21 | 0.41 | 0 | 1 | 95,962 |
| Working Outside | 0.26 | 0.44 | 0 | 1 | 26,824 |
| Cash Income | 0.76 | 0.43 | 0 | 1 | 26,824 |
| *Decision* | | | | | |
| Own Health | 0.10 | 0.30 | 0 | 1 | 63,502 |
| HH Purchases | 0.04 | 0.20 | 0 | 1 | 59,571 |
| Own Earnings | 0.18 | 0.38 | 0 | 1 | 13,520 |
| Husband/Partner Earnings | 0.04 | 0.19 | 0 | 1 | 59,064 |
| Own Contraception | 0.08 | 0.27 | 0 | 1 | 172,514 |
| *Women Gender Attitude* | | | | | |
| Going Out | 0.23 | 0.42 | 0 | 1 | 94,662 |
| Neglect Children | 0.29 | 0.45 | 0 | 1 | 94,654 |
| Argue | 0.26 | 0.44 | 0 | 1 | 94,370 |
| Refuse Sex | 0.13 | 0.33 | 0 | 1 | 93,454 |
| Not Cooking | 0.17 | 0.38 | 0 | 1 | 94,739 |
| Unfaithful | 0.23 | 0.42 | 0 | 1 | 94,303 |
| Disrespect | 0.35 | 0.48 | 0 | 1 | 94,487 |
| *Husband/Partner's Gender Attitude* | | | | | |
| Husband: Going Out | 0.15 | 0.35 | 0 | 1 | 49,681 |
| Husband: Neglect Children | 0.18 | 0.38 | 0 | 1 | 49,699 |
| Husband: Argue | 0.19 | 0.39 | 0 | 1 | 49,604 |
| Husband: Refuse Sex | 0.08 | 0.26 | 0 | 1 | 49,561 |
| Husband: Not Cooking | 0.09 | 0.29 | 0 | 1 | 49,731 |
| Husband: Unfaithful | 0.21 | 0.41 | 0 | 1 | 49,465 |
| Husband: Disrespect | 0.27 | 0.44 | 0 | 1 | 49,558 |
| *Husband/Partner's Quality* | | | | | |
| Husband/Partner's Employed | 0.91 | 0.28 | 0 | 1 | 49,924 |
| Husband/Partner's Educ. | 8.00 | 4.86 | 0 | 20 | 66,006 |
| Husband/Partner Alcohol Abuse | 1.69 | 0.58 | 0 | 2 | 15,506 |
| Husband/Partner 'Not Poor' | 0.61 | 0.49 | 0 | 1 | 49,925 |
| *Information* | | | | | |
| Read Newspaper | 0.42 | 0.49 | 0 | 1 | 549,007 |
| Financial Knowledge | 0.51 | 0.50 | 0 | 1 | 95,962 |
| Business Information | 0.37 | 0.48 | 0 | 1 | 95,962 |
| Use Mobile Phone | 0.47 | 0.50 | 0 | 1 | 95,962 |
| Read Mobile Text | 0.75 | 0.43 | 0 | 1 | 44,105 |
| *Seek Help* | | | | | |
| Social Service | 0.00 | 0.03 | 0 | 1 | 18,039 |
| Police | 0.01 | 0.07 | 0 | 1 | 18,039 |
| Religious Leader | 0.00 | 0.04 | 0 | 1 | 18,039 |
| Lawyer | 0.00 | 0.04 | 0 | 1 | 18,039 |
| District ID | | | 1 | 638 | 549,007 |
| State ID | | | 1 | 35 | 549,007 |

*Notes*: Summary statistics for different data-sets combined. NFHS (2015-16): Sample from women questionnaire for all those who were young in 1994-2005. Other datasets include Census of India (1991): District level Primary census abstracts. The combined data consists of total 549,007 observations from 638 districts (including splits) out of which 271 got DPEP and remaining did not.

The National Family Health Survey (NFHS) is a multi-round large-scale survey conducted in a representative sample of households throughout India[10] and is run by the Government of India, more specifically by the Ministry of Health and Family Welfare. Of the 723,875 eligible women identified for single interviews, 699,686 completed the interview. Among them, 83,397 women were selected for the domestic violence questions and 79,729 completed the module, of which 69.79% were from rural India. In our empirical analysis, we filter respondents who are part of the domestic violence module. The response rate for the domestic violence module is 96%. The women interviewed were between 15 and 49 years old. If we have information about the respondent's current residence, we do not have data on her birthplace or educational history. However, Beauchamp et al. (2017) demonstrates that although female migration is prevalent in India, 73% of it occurs at the district level, akin to the DPEP implementation.

Our study uses an age-based methodology to identify women impacted by the District Primary Education Program (DPEP), focusing on those of school age during its introduction. For districts initiating the program in 1994, we include women up to 40 years of age by 2015, the year of the NFHS survey. This criterion is adjusted for each DPEP phase, ensuring that we capture those who were 19 or younger at each phase's start, reflecting the transition from education to potential marriage market entry. This approach accounts for the varied start years of the program through 2002, with the aim of analyzing the long-term educational and social impacts of DPEP. Furthermore, note that in this paper, we only study domestic violence endured by women by their husbands/partners and not by any other relatives. As we focus on the long-term impact of school construction on domestic violence, we use the 'ever experienced (over lifetime)", rather than a short-term description of domestic violence. We distinguish five types of variables for individual and self-reported *domestic violence* by a woman according to the questionnaire: *overall (domestic violence), emotional, less severe domestic violence, severe domestic violence, sexual domestic violence,* and *injuries domestic*

[10]http://rchiips.org/nfhs/, last consulted the 13.11.22

*violence*. We also utilize the NFHS-5 (2019-21) domestic violence module in a similar manner for robustness.[11]

To understand the potential mechanisms and underlying channels of our study, we utilize variables from the NFHS-4 Women's Questionnaire along with data on education levels for both women and men. Specifically, we examine the total years of schooling for female respondents (*Educ.*) and their husbands/partners (*Men's Educ.*), and *Age* of women respondents. The Domestic Violence Module of the DHS specifies that women included must have been in a marital or non-marital partnership at some point in their lives, a criterion for their selection in this module. As the survey focuses on women, it does not collect data on men unless they are partners of the women respondents selected for the domestic violence module. Therefore, our data set encompasses information exclusively on the partners of women identified within this module.

Employment status (*Employed*) and income levels (*Cash Income*, *Use own money*) further contribute to our analysis of women's economic status and an indicator of bargaining power within the household. Decision-making within households is assessed through ordinal variables such as *HH Purchase*, *Own Earnings*, *Husband's Earnings*, *Own Contraception*, and *Own Health*, collectively categorized under *decisions*.

Our analysis also includes a detailed examination of the reasons cited by women for experiencing domestic violence from their husbands or partners, a component that we classify under *women's gender attitude*. This analysis is informed by seven variables derived from the questionnaire: *Going out*, *Neglect children*, *Refuses sex*, *Not cooking*, *Unfaithful*, and *Disrespectful*. The first five of these variables serve to illuminate perceptions of gender roles and the acceptability of domestic violence. In contrast, the last two variables are indicative of the perceptions of the female respondents about the quality of their husbands or partners, later discussed in *husband/partner's quality*. In a parallel analysis, we explore the justifications provided by husbands or partners for engaging in domestic violence, an aspect

[11]The specific description of these variables can be found in A1.

that we label as *husband/partner's gender attitude*. For all the aforementioned questions, if the female respondents answer yes, the variable is assigned the value 1; if not, the variable remains 0.

Furthermore, we define *alcohol abuse* by the husband or partner as the frequency with which they are intoxicated, a factor alongside the husband or partner's employment, education, and wealth status, specifically not being impoverished, to delineate what we classify as *partner or husband's quality*. This comprehensive approach allows us to assess the multifaceted dimensions of domestic violence.

Media use, including *Reads Newspaper*, *Business Information*, *Financial Knowledge*, *Use Mobile Phone*, and *Read Mobile Text*, serves as a proxy for women's access to information, while their propensity to seek help is gauged through interactions with institutions like *Police*, *Lawyer*, *Social Service*, and *Religious Leader*.

Ordinal variables such as *alcohol abuse*, *poor*, *HH purchases* are transformed into binary variables for analytical clarity, similar to the conversion of *Reading Newspaper* frequency into a binary measure. For *HH purchases*, it is derived from large household purchases, an ordinal variable taking the value 1 to 6: 1 if the respondent alone makes these decisions, 2 if the respondent and the husband / partner are both taking this decision, 3 if the husband or partner alone makes this decision, and 4 and 5 if someone else is taking the decision. We create a binary variable *HH purchases* if and only if the original variable is equal to one. Similarly, *Reading Newspaper* is derived from a variable looking at the *frequency of reading newspapers or magazines* that takes the value 0 if the respondent answers 'not at all', 1 if the respondent answers less than once a week, and 2 if the respondent answers at least once a week. We create a binary variable that takes the value of zero if the respondent answers 'not at all' and 1 otherwise. Note that for some variables, the missing values or the respondent answering *'don't know'* is replaced as a missing value, . in Stata software was used for this analysis. As said earlier, we subsample for the answers for who responds to domestic violence; however, we do not subsample for the mechanism analysis, to have

more power to our analysis. We regrouped all information on variables and the creation of variables in Table A1.

# 4 Empirical Strategy

The decision to invest in education is correlated with unobserved family, social, and individual characteristics. These unobserved indicators can also influence domestic violence in households. These characteristics can include, but are not limited to, family values and beliefs about education, socioeconomic status, cultural attitudes toward gender roles, parental education levels, and the availability of educational resources within the community. On an individual level, personal traits such as motivation, resilience, and aspirations also play a crucial role. Furthermore, external factors such as peer influence, social norms, and perceived value of education in improving life chances can significantly impact this decision. Each of these elements contributes to the heterogeneity in educational investments across different households and communities, reflecting the multifaceted nature of educational attainment and its implications for broader social outcomes. Therefore, naively estimating the causal impact of women's education in years on domestic violence will likely lead to a biased estimation due to the endogeneity concerns.

The District Primary Education Program, a national-level policy initiative, introduces a quasi-experimental variation in educational accessibility. Districts that had an average female literacy rate below the national threshold of 39.3 percent, as reported in the 1991 Census, were designated to benefit from the program's interventions. Leveraging the exogenous variation in educational opportunities offered by DPEP, this study seeks to explore two critical questions:

1. What is the impact of DPEP, a comprehensive school construction program, on domestic violence?

2. How does the District Primary Education Program (DPEP) impact domestic violence?

Particularly, we explore its effects on women's education and subsequent influences on female labor participation, decision-making power, attitudes towards violence, partner quality, access to information, and seeking help.

First, we estimate the effect of DPEP treatment on indicators of domestic violence. There is imperfect compliance with the implementation of DPEP. Some districts below the female literacy cutoff did not receive treatment despite being in the treatment category, while some districts above the cutoff received treatment. In such a setting, a fuzzy regression discontinuity design, FRDD, can be applied to estimate treatment effects.

Our FRDD approach rests on two key assumptions: first, that assignment to the DPEP based on the literacy rate cutoff is quasi-random, ensuring comparability between districts just below and above the threshold; and second, that our instrumental variable (IV) - eligibility for DPEP funding - only influences domestic violence outcomes through its effect on actual treatment receipt, adhering to the exclusion restriction principle.

We implement a two-stage FRDD methodology. The first stage models the likelihood of DPEP receipt as a function of eligibility, and the second stage utilizes these probabilities to evaluate DPEP's effect on domestic violence indicators. This approach, encapsulated in Equations 1 and 2, allows us to address non-compliance by instrumenting actual treatment with eligibility, isolating the effect among 'compliers'—districts whose treatment status matches their eligibility.

The drivers of non-compliance, such as administrative and resource constraints or political considerations, are pivotal in interpreting our findings. By focusing our analysis on districts near the eligibility cutoff, we leverage the quasi-random variation in DPEP treatment to obtain a cleaner estimation of its impact. Examining districts within a narrow margin around the cutoff is crucial, as it enhances the credibility of our quasi-experimental design by assuming that districts on either side of the threshold are otherwise similar, thereby minimizing bias in our estimated treatment effects.

$$DPEP_{id} = \alpha + \gamma \mathbb{1}[X_d \leq c] + f(X_d) + \epsilon_{id} \quad for \quad c - h \leq X_d \leq c + h \tag{1}$$

$$DV_{id} = \beta + \tau_{FRD} \widehat{DPEP}_{id} + g(X_d) + \varepsilon_{id} \quad for \quad c - h \leq X_d \leq c + h \tag{2}$$

where $X_d$ is the centered assignment variable (district female literacy rate - 39.3). $DPEP_{id}$ is a dummy that takes the value of one if the individual belongs to a district that receives DPEP. $\mathbb{1}[X_i \leq c]$ is a discontinuous and deterministic function of the female literacy rate that equals one if the centered female literacy rate of the district is below 0, and zero otherwise; $f(X_d)$ and $g(X_d)$ are functions used to flexibly model $X_d$ and allow for different slopes on different sides of the cutoff, and $h$ is selected using the mean square error (MSE-RD) optimal bandwidth; $\widehat{DPEP}_{id}$ is the estimated probability of treatment from the first stage; $\tau_{FRD}$ is the main coefficient of interest, which provides us with an estimate of the impact of the DPEP on the outcome variables.

Second, we estimate the impact of the increase in women's education on domestic violence and indicators of well-being. The cutoff indicator $\mathbb{1}[X_d \leq c]$, the program assignment rule, is used as an instrument for the increase in women's education. Given the quasi-random variation in DPEP assignment, the DPEP indicator for the district can predict an increase in education for women in the DPEP districts. Using a two-stage least squares ($2SLS$) approach, we estimate the impact of an increase in women's education on domestic violence and other indicators. Equation 3 estimates the first-stage relevance of the DPEP indicator instrument on the increase in women's education. In Equation 3, the instrument $\mathbb{1}[X_d \leq c]$ captures the discontinuity in the relationship between $Educ_{id}$ and the literacy rate of the female in the district. As the identification is around the cutoff, the analysis is carried out in the neighborhood of the cutoff. We use the optimal bandwidth estimated from the above fuzzy RDD estimations. $\tau_{IV}$ is the main coefficient of interest, which estimates the impact of an increase in women's education on the outcome variable. This approach not only underscores the instrumental relevance of the assignment of the DPEP program as a credible

predictor of educational improvements but also solidifies the foundation for attributing observed changes in outcome variables directly to shifts in education levels, thus reinforcing the validity and reliability of our findings within the context of this instrumental variable analysis. The $2SLS$ approach is given by the following equation:

$$Educ_{id} = \alpha + \gamma \mathbb{1}[X_d \leq c] + f(X_d) + \epsilon_{id} \quad for \quad c - h \leq X_d \leq c + h \tag{3}$$

$$DV_{id} = \beta + \tau_{IV} \widehat{Educ}_{id} + g(X_d) + \varepsilon_{id} \quad for \quad c - h \leq X_d \leq c + h \tag{4}$$

We also present the reduced-form estimates in equation 5, where we use the cutoff indicator variable as a proxy for an exogenous increase in education. The coefficient $\tau_{RF}$ gives us the effect of being eligible for the DPEP program. We present RD plots using reduced-form estimates.

$$Y_{id} = \alpha + \tau_{RF} \mathbb{1}[X_d \leq c] + f(X_d) + \varepsilon_{id} \quad for \quad c - h \leq X_d \leq c + h \tag{5}$$

## 4.1 Validation Check RDD

We provide three tests to validate the regression discontinuity design. First, we show a discontinuity in receiving treatment near the assignment cutoff point. Districts below the cutoff point show a significant increase in the probability of receiving treatment. Figure 1 shows an increase of approximately 20-25 percentage points when the district is below the cutoff. We use this discontinuity as an exogenous change in treatment and further increase in education for individuals in the DPEP district.

Second, we check whether there is any manipulation at the district level around the cutoff. The DPEP program was introduced in 1994, using the cutoff criteria for national-level female literacy rates in districts in 1991. As the eligibility criteria for DPEP funding were based on predetermined district-level female literacy rates, individuals and districts do not have precise control over the selection of the program. We perform the Cattaneo et

al. (2020) manipulation test to check for discontinuity in the forcing variable (district-level female literacy rates). Figure 2 shows the overlap of confidence intervals, indicating that there was no manipulation around the cutoff in the female literacy rate. Districts around the cutoff point are similar in terms of female literacy rates.

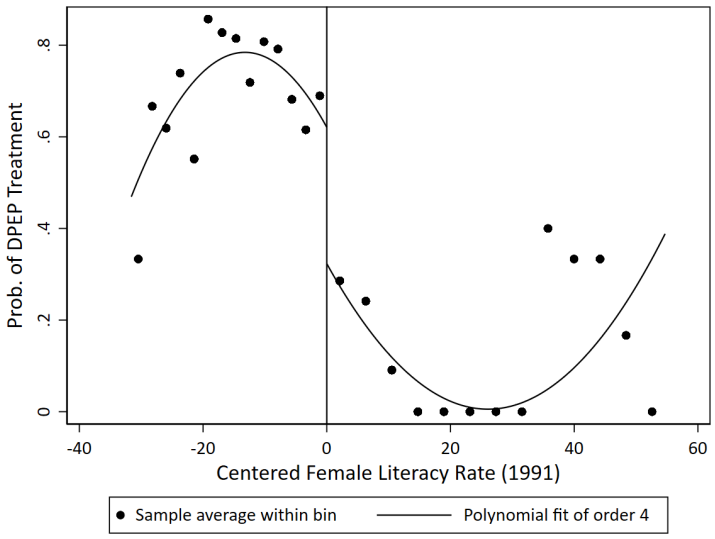


**Figure 1** Probability of Treatment if Eligible

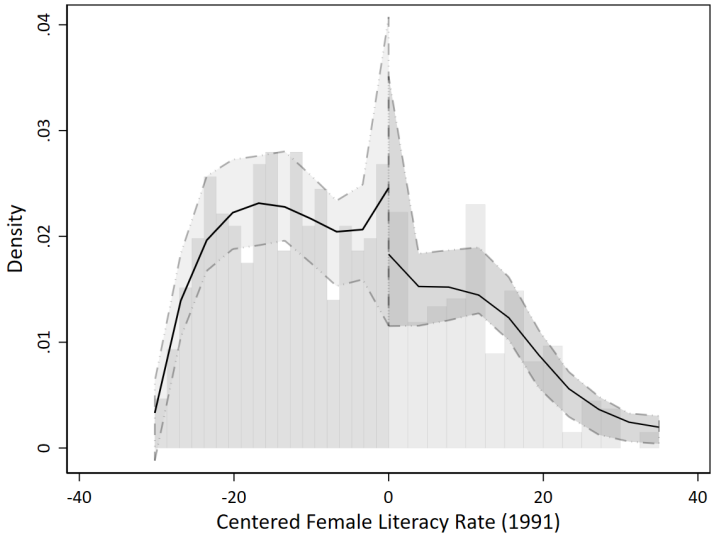


**Figure 2** Density of Forcing Variable: Manipulation Test

**Table 3** Balance test covariates (Female)

| | (1) Sex ratio | (2) %Primary25-44 | (3) %Married 15-24 | (4) %Married 25-44 | (5) %Main work |
|---|---|---|---|---|---|
| Robust | -37.061 | 0.016 | 0.080 | 0.024 | -0.137 |
| | [59.878] | [0.022] | [0.117] | [0.048] | [0.191] |
| Sample Mean | 928.18 | 0.10 | 0.58 | 0.93 | 0.29 |
| BW districts | 164 | 270 | 202 | 201 | 244 |
| Bandwidth | 10 | 16 | 12 | 12 | 15 |
| VCE method | NN | NN | NN | NN | NN |
| BW type | mserd | mserd | mserd | mserd | mserd |

*Notes*: The balance test checks the difference between DPEP and non-DPEP districts before the program was implemented. We use a fuzzy RDD design to estimate the impact on the predetermined variables (Calonico et al., 2017). The bandwidth selection is done using data-driven mean square error (MSE-RD) optimal bandwidth methodology. The estimation is done at the district level. We use nearest neighbor (NN) cluster robust standard errors at district-age level.

**Table 4** Balance test covariates (male)

| | (1) Sex ratio | (2) %Primary25-44 | (3) %Married 15-24 | (4) %Married 25-44 | (5) %Main work |
|---|---|---|---|---|---|
| Robust | -37.061 | 0.008 | 0.077 | 0.072 | 0.096* |
| | [59.878] | [0.043] | [0.070] | [0.075] | [0.050] |
| Sample Mean | 928.18 | 0.15 | 0.24 | 0.85 | 0.81 |
| BW districts | 164 | 180 | 148 | 157 | 157 |
| Bandwidth | 10 | 11 | 9 | 10 | 10 |
| VCE method | NN | NN | NN | NN | NN |
| BW type | mserd | mserd | mserd | mserd | mserd |

*Notes*: The balance test checks the difference between DPEP and non-DPEP districts before the program was implemented. We use a fuzzy RDD design to estimate the impact on the predetermined variables (Calonico et al., 2017). The bandwidth selection is done using data-driven mean square error (MSE-RD) optimal bandwidth methodology. The estimation is done at the district level. We use nearest neighbor (NN) cluster robust standard errors at district-age level.

Third, we perform a balance test using predetermined variables at the district level. Here, we want to check if there is a difference in districts below and above the cutoff before the intervention. We use the fuzzy RDD methodology, as shown in Equations 1 -2. We use district-level indicators from the 1991 census, such as the sex ratio, completed primary education, the proportion of the married population, and the proportion of the population

employed. We also segregate this by gender at the district level. Bandwidth selection is performed using the data-driven mean square error (MSE-RD) optimal bandwidth methodology. The estimation is done at the district level. Tables 3 and 4 present the results of the balance test. Except *Male Main Work*, we find that there is no significant difference between districts around the cutoff point for all important indicators. The districts around the cutoff within the optimal bandwidth are comparable to each other.

# 5 Main Result: Impact of DPEP

The main question of interest in this study is to estimate the impact of DPEP on domestic violence. First, we provide reduced-form estimates, $\tau_{RF}$, using the equation 5. We present the results of sharp RDD in graphs and fuzzy RDD specification in Table 5. Figure 3 shows the impact of DPEP on any violence experienced by women. This indicator takes the value one if a woman reports *Yes* to at least one of these categories of domestic violence: emotional, less severe, severe, sexual, and injuries, and zero otherwise. There is a significant decrease in women experiencing domestic violence due to DPEP. The fall is around 10 percentage points for the DPEP districts compared to the non-DPEP districts. We also estimate the impact of DPEP on other forms of domestic violence, such as emotional, less severe, and any injuries, respectively, Figures 4, 5, and 6. There is a decrease in emotional violence by 4.5 percentage points, less severe physical violence by 9.2 percentage points, and any injury by 3.2 percentage points due to DPEP. The estimates in reduced form do not significantly affect the experience of severe and sexual violence, as shown in Figures A4a and A4b.

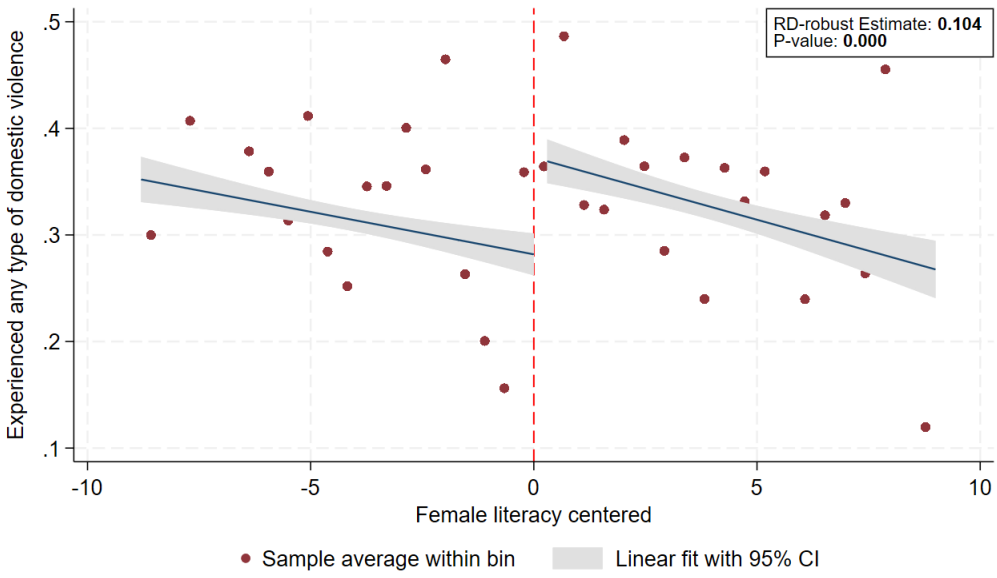


**Figure 3** Effect of DPEP on Women Experiencing Any Domestic Violence

Given the imperfect compliance in implementing DPEP, we provide evidence using the fuzzy regression discontinuity setup, as shown in equations 1 and 2. Table 5 shows the fuzzy regression discontinuity estimates $\tau_{FRD}$. Our analysis reveals that DPEP significantly reduces overall domestic violence (any violence) by 32 percentage points, emotional violence by 13 percentage points, less severe physical violence by 26 percentage points, sexual violence by 9 percentage points, and injuries by 10 percentage points, although it does not significantly impact severe physical violence. The Local Average Treatment Effect (LATE) estimates are specific to a subset of the population at the margin of the DPEP intervention. This distinction underscores that the estimated effects are localized, not generalizable across all potential participants, but focused on those at the close margin of the eligibility threshold. This targeted analysis improves precision in estimating the impact of DPEP, highlighting its effectiveness in reducing domestic violence among those directly affected by the program. [12]

The larger effect sizes observed in our fuzzy regression discontinuity (RD) analysis com-

[12]In Figure 3, reduced form RDD indicates a decrease of 9 percentage points (p.p.) in domestic violence at the program eligibility threshold. Subsequent fuzzy RDD analysis estimates the LATE, 32 p.p. for overall domestic violence, which can be approximated as $\frac{9}{0.6-0.3}$ p.p., adjusting for the variation in program participation probabilities between approximately 30 p.p. and 60 p.p. at the threshold, as observed in Figure 1.

pared to reduced-form estimates underscore the importance of examining the LATE. This methodological distinction reveals the nuanced impact of DPEP, particularly when treatment assignment follows imperfect compliance. This approach not only corroborates the causal link between education and reduced domestic violence, as suggested by previous studies, but also highlights the need for large-scale interventions to effectively address all forms of violence.

**Table 5** Impact of DPEP on Domestic Violence

| | Any Violence | Emotional | Less severe | Severe | Sexual | Any Injury |
|---|---|---|---|---|---|---|
| DPEP | -0.32*** | -0.13** | -0.26*** | -0.04 | -0.09*** | -0.10*** |
| | [0.07] | [0.05] | [0.06] | [0.04] | [0.03] | [0.04] |
| Observations | 40636 | 40636 | 40636 | 40636 | 40636 | 40636 |
| Control Mean | 0.34 | 0.14 | 0.29 | 0.09 | 0.07 | 0.07 |
| BW-left | 7.29 | 6.68 | 8.53 | 6.14 | 9.14 | 6.99 |
| BW-right | 7.29 | 6.68 | 8.53 | 6.14 | 9.14 | 6.99 |
| BW type | mserd | mserd | mserd | mserd | mserd | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on domestic violence variables. **p<0.05;***p<0.01

When compared with the existing literature, such as (Erten et al., 2018), which discusses the broader impacts of female education on domestic violence, our findings present a nuanced contrast. Unlike their paper, which does not identify any effect of education reforms on physical and sexual violence, our analysis reveals significant impacts in these areas. However, our results align with them regarding the influence on psychological violence, paralleling our estimates of emotional violence. In contrast to Friedman et al. (2016), who explore the effect of education on violence without delving into violence types, our study provides detailed insights into the differential impacts on various forms of violence. Furthermore, Mocan et al. (2012) highlights the empowering role of education for women, which is consistent with our observations on the reduction of domestic violence.

Table A2 confirms the persistent impact of DPEP on reducing domestic violence, as evidenced by the results of the analysis using another data source, the NFHS-5 (2019-21)

survey. The program's effect on reducing emotional violence is marked by a 7 percentage points decrease, underscoring its significant and sustained influence. The program also achieves a substantial reduction in severe and sexual violence, by 13 percentage points and 9 percentage points, respectively, further attesting to its robustness across various forms of domestic violence.

Table A3 represents robust estimates, detailing the effects of DPEP on domestic violence outcomes that address the potential confounding factor. These estimates are specific to districts that implemented DPEP prior to 2002, a delineation designed to mitigate potential confounding influences from the Sarva Shiksha Abhiyan (SSA) program. Furthermore, in Tables A4, A5, and A6, our analysis confirms that the policy's impact remains robust across variations in regression specifications, including selection of the optimal bandwidth, Kernel selection, and polynomial order.

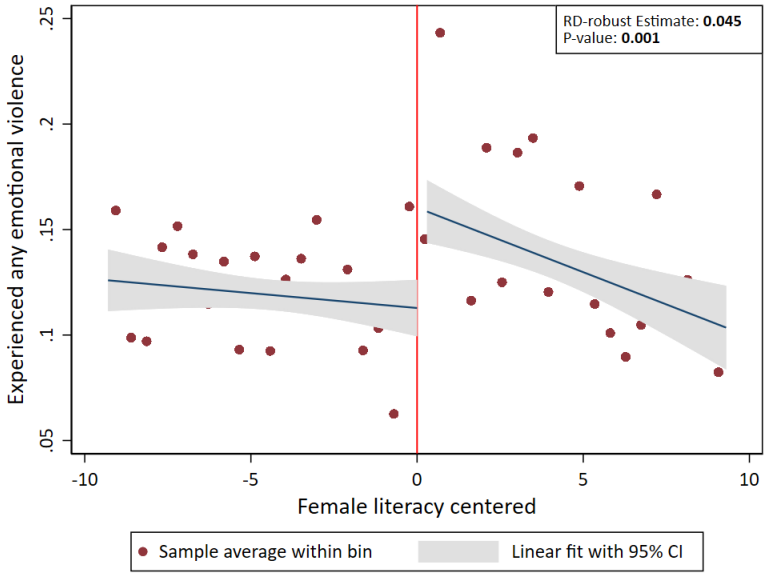


**Figure 4** Effect of DPEP on Women Experiencing Any Emotional Violence

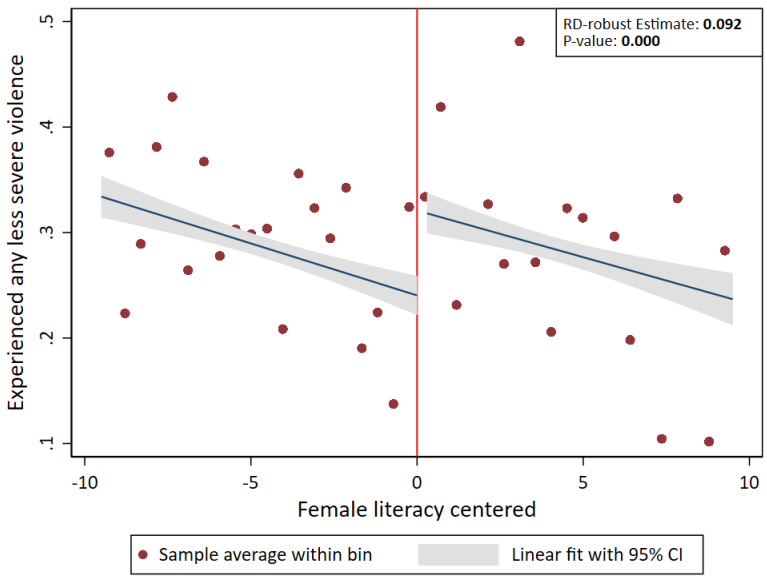


**Figure 5** Effect of DPEP on Women Experiencing Less Severe Violence

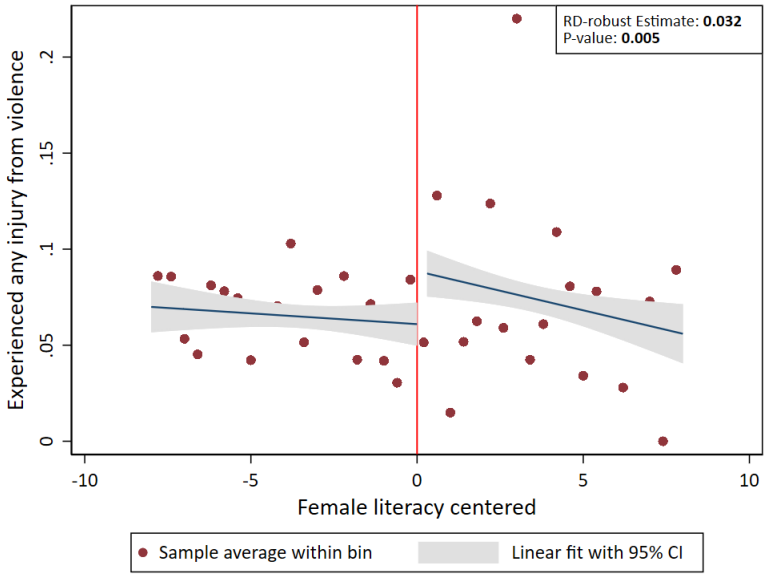


**Figure 6** Effect of DPEP on Women Experiencing Any Injury

# 6 Potential Mechanisms

We hypothesize that one of the primary underlying factors behind the effect of DPEP on domestic violence is that DPEP impacts women's education and consequently influences

various factors that affect domestic violence. We will explore these potential mechanisms in the following subsections. To explore this hypothesis, we first estimate the impact of DPEP on changes in years of education for women. Figure 7 visually represents the discontinuity around the cutoff. The X-axis represents the forcing variable, the female literacy rate, centered around zero (fem. literacy rate - 39.3). The dots, in red, are equally spaced bins of the districts. Each red dot represents an average sample within the bin. Districts below the cutoff are eligible to receive funds in the DPEP. These districts comprise the treated group. Districts above the cutoff were the control districts that were not eligible for the program. Here, we show the impact of DPEP using a sharp RDD[13] (reduced-form estimates). In Figure 7, there is a jump in the slope or level of education for districts below the cutoff. The change in education for women is approximately 0.3 years for DPEP districts. This estimate is comparable to those reported in the literature. Agarwal et al. (2023) and Sunder (2020) also find an increase in women's education for DPEP using the regression discontinuity framework. Akresh et al. (2023) studies the large-scale education program in Indonesia and finds an increase in women's education by around 0.5 years. In Figure 7, we find that education for women increased the number of years of schooling for women in the DPEP-treated districts. We estimate the reduced form using Equation 5. Additionally, Table 6 shows that DPEP has increased women's education by 0.95 schooling years.

[13]Regression Discontinuity Design

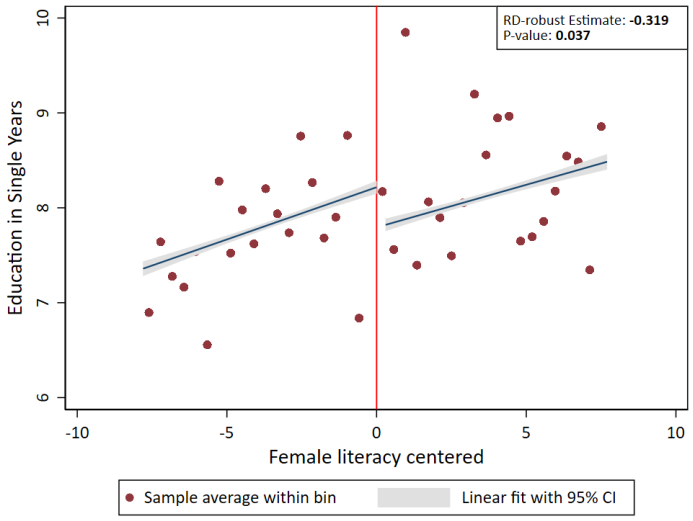


**Figure 7** Effect of DPEP on Women's Education

In Table A7 in the Appendix, we find the effect of the rise in women's education on domestic violence against women following the IV estimation strategy in Equations 3–4. The direction of the results is consistent with the effect of DPEP on domestic violence. Therefore, we find significant evidence of the effect of the increase in women's education on domestic violence against women.

In the next step, we briefly explore existing theories and literature that shed light on the mechanisms behind the incidence of domestic violence and investigate how an increase in women's education via DPEP can lead to a decline in domestic violence.

First, we briefly discuss each of these theories and the relevant supporting literature. We inspect the following conceptual models of domestic violence: outside options and bargaining power, instrumental and expressive violence, exposure reduction, gender role, and domestic violence attitudes, quality of partner, and likelihood of seeking help. Next, we investigate the causal link between the rise of women's education and the fall in domestic violence in the potential mechanism section. In particular, we delve into DHS questions involving labor market outcomes, intra-household decision-making, attitudes toward domestic violence, quality of partners, and access to information.

**Table 6** Impact of DPEP on Women and their Partners' Education

| | Educ. |
|---|---|
| DPEP | 0.93* |
| | [0.57] |
| Observations | 463992 |
| Control Mean | 8.08 |
| BW-left | 4.89 |
| BW-right | 4.89 |
| BW type | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on women's number of years of schooling. **p<0.05;***p<0.01

## 6.1 Labor Market Outcomes and Intrahousehold Decision-making

### Outside Options and Bargaining Power

The economic theory of the outside option and household bargaining suggests that the increase in the relative income of a female partner increases her outside option. An increase in outside options improves intra-household bargaining power. This reduces the threat of domestic violence from her partner because the woman is no longer financially dependent on her spouse. The seminal works of Manser et al., 1980 and Aizer, 2010 highlight that the potential wage determines the outside options of women. Improving the conditions of the labor market for women will reduce domestic violence, even if the current absolute wage or employment status does not change.

### Instrumental and Expressive Violence

Instrumental violence is when domestic violence is used to extract resources (e.g., income) from the wife. Expressive violence is when the Husband/Partner uses violence to reduce his

stress.[14] Thus, instrument violence and expressive violence operate in opposite directions when the wife's income increases. Instrumental violence predicts a positive relationship between the spouse's resources and domestic violence by the male partner. The incentive for the male partner to use domestic violence as a resource extraction tool could increase if he observes that his partner has higher wealth or wage income. Expressive violence predicts a negative relationship between spouse's income and domestic violence by a male partner. The potential impact of increased women's education on labor market outcomes could generate opposite effects via instrumental and expressive violence channels. Hence, we investigate the impact of female education on labor market outcomes to understand the dominant influence.

**Exposure Reduction**

Criminologist theory of exposure reduction suggests that if couples spent less time together, that would lead to less domestic violence. For instance, an increase in employment for the wife could decrease domestic violence by reducing the time the couple spent together.

In this study, we investigate these four channels to explore the effect of the increase in female education on overall employment, employment outside family activities, income, and assets. Improved labor market outcomes could also impact domestic violence through a higher likelihood of reporting. Employed women with better financial resources are more likely to report the crime; therefore, the husband / partner has a higher opportunity cost for choosing domestic violence.

The above four income channels are bargaining power and outside options, instrumental and expressive violence, and exposure reduction. These channels depend on the participation of women in the labor force due to increased education. To check the impact of an increase in education on labor force participation, we use the methodology shown in Section 4. Table 7 shows the impact of the program using Equations 1 and 2. Although the DPEP program does not significantly impact working or participating in the labor market for women, the

[14]Domestic violence is the event, but instrument and expressive are the causes.

coefficient suggests a negative effect, as shown in column 1 of Table 7. There is a significant 30 percent decrease in the probability of receiving cash income. The fall in cash income suggests ambiguity due to less incentive to use violence to extract resources, but higher chances of expressive violence. However, the results imply that the intra-household decision-making power of DPEP-treated women did not increase. Furthermore, this finding is corroborated in columns 2, 4, and 5 in Table 8, where we observe that the intra-household decision making power to purchase large household items, spend the husband's earnings, and use contraception decreased for women in the treated districts.

**Table 7** Impact of DPEP on Labour Market Outcomes

| | Employed | Working Outside | Cash Income |
|---|---|---|---|
| DPEP | -0.08 | 0.01 | -0.30** |
| | [0.05] | [0.09] | [0.13] |
| Observations | 78518 | 22285 | 22285 |
| Control Mean | 0.22 | 0.21 | 0.85 |
| BW-left | 8.83 | 7.85 | 5.67 |
| BW-right | 8.83 | 7.85 | 5.67 |
| BW type | mserd | mserd | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on female labor market outcomes. **p<0.05;***p<0.01

**Table 8** Impact of DPEP on Women's Intrahousehold Bargaining Power

| | Own Health | HH Purchases | Own Earnings | Husband's Earnings | Own Contraception |
|---|---|---|---|---|---|
| DPEP | -0.07 | -0.06** | -0.01 | -0.06** | -0.09*** |
| | [0.04] | [0.02] | [0.15] | [0.03] | [0.03] |
| Observations | 52344 | 49053 | 11361 | 48662 | 146220 |
| Control Mean | 0.10 | 0.04 | 0.20 | 0.05 | 0.09 |
| BW-left | 7.49 | 8.54 | 6.60 | 7.92 | 6.77 |
| BW-right | 7.49 | 8.54 | 6.60 | 7.92 | 6.77 |
| BW type | mserd | mserd | mserd | mserd | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on female intrahousehold bargaining power. **p<0.05;***p<0.01

We show the impact of the increase in women's education on labor market outcomes

and intrahousehold decision-making power in Table 9 using equations 3 and 4.[15] Columns 3 and 4 in Table 9 strengthen the findings of fuzzy RDD estimates, showing a reduction in intra-household decision-making power for more educated women. We also find a significant adverse effect on women's labor force participation in column 1, which implies a decrease in potential outside options for women. These results suggest that the outside options and bargaining theory hypotheses would predict a rise in domestic violence. However, the results in section 5, *Main Result: Impact of DPEP*, shows an opposite trend. Hence, we argue that the negative effect of lower bargaining power is outweighed by other non-income channels in the following subsections.

**Table 9** Impact of Women's Education on Labor Market and Intrahousehold Bargaining

| | Employed | Own Health | HH Purchases | Husband's Earnings |
|---|---|---|---|---|
| Education | -0.03 | -0.02 | -0.02* | -0.03* |
| | [0.02] | [0.02] | [0.01] | [0.01] |
| Observations | 15444 | 10316 | 9652 | 9621 |
| Control Mean | 0.23 | 0.11 | 0.05 | 0.05 |
| CD Fstat | 30.66 | 12.83 | 11.94 | 10.54 |

*Notes* This table shows the IV estimates the impact of women's education on labor market and intrahousehold bargaining variables when instrument is not very weak. The regressions are run using the mserd BW of 4.93 **p<0.05;***p<0.01

## 6.2 Gender Role and Domestic Violence Attitudes

An increase in years of schooling for women could lead to more progressive gender role beliefs. If an educated woman believes in greater gender rights, it could improve the attitude toward domestic violence, and men would have a higher disincentive to commit domestic violence. Women's belief in greater gender equality leads to a higher likelihood of retaliation (e.g., reporting to the police) and increases the opportunity cost of violence. For example, if a woman justifies beating for some reason (five circumstances are investigated in our study),

[15]For some variables, the program assignment rule becomes a weak instrument for women's education, as shown in Tables A8 and A9. IV regression with dependent variables, working outside, cash income, own earnings, own contraception suffers from weak instrument problem.

the partner is more likely to choose violence. However, social honor and status could be correlated with women's education. Educated women may be less likely to disclose or report domestic violence to protect the honor or social status of their families. The honor premium may lead to a fall in gender beliefs and attitudes of women due to an increase in education. This makes the impact of education on gender attitudes of women ambiguous.

To investigate the improvement in the gender attitudes of women, we use the same methodology as that described in section 4. We show results for the impact of DPEP and an increase in education in Tables 10 and 11, respectively. In the first five columns, we study the following indicators: 'Do women justify violence if they go out without permission, neglect children, argue, refuse sex, or do not cook properly?' In columns 6-7, the indicators show: 'Do women justify violence if they are unfaithful or disrespectful to their partner?' Ideally, women should not justify violence under any circumstances. In our data, 23% of women, on average, justify violence if they go out without telling, and 29% of women justify violence if they do not care for children. Furthermore, 22% of the women justified violence if they were unfaithful to their partner and 29% if they are disrespectful to their partner.

We find that women in DPEP districts justify violence less than women in non-DPEP districts in Table 10. There is a decrease in justifying violence by 19% and 39% for being unfaithful and disrespectful, respectively. Overall, we find a significant improvement in the gender attitudes of women, both due to the program and an increase in education. There is around a 28% fall in justifying violence for the indicator of going out and 29% for the indicator of neglecting children. Table 11 shows that a one-year increase in schooling significantly improves gender attitudes. There is a 7% and 11% fall in justifying violence for being unfaithful and disrespectful, respectively, for the one-year rise in education. Further, there is a fall in justifying violence by around 9 percent for going out and neglecting children. These results suggest a significant improvement in attitudes towards domestic violence, which can further translate into a fall in domestic violence due to the less tolerant behavior of women against domestic violence. Interestingly, the improvement in the gender beliefs of

women due to education does not support the honor premium hypothesis.

Our estimates are comparable to findings in the literature. Friedman et al. (2016) find educated young women are less likely to accept domestic violence in Kenya. Mocan et al. (2012) find that education improves attitudes towards domestic violence in Sierra Leone. However, Erten et al. (2018) find no consistent effect of education reform on improving gender roles and attitudes toward domestic violence.

**Table 10** Impact of DPEP on Women's Attitudes towards Domestic Violence

| | Going out | Neglect children | Argues | Refuse sex | Not cooking | Unfaithful | Disrepectful |
|---|---|---|---|---|---|---|---|
| DPEP | -0.28*** | -0.29*** | -0.10 | -0.05 | -0.04 | -0.19*** | -0.39*** |
| | [0.07] | [0.07] | [0.06] | [0.05] | [0.05] | [0.06] | [0.08] |
| Observations | 77477 | 77470 | 77266 | 76548 | 77536 | 77183 | 77339 |
| Control Mean | 0.27 | 0.33 | 0.28 | 0.14 | 0.19 | 0.22 | 0.37 |
| BW-left | 6.23 | 6.70 | 5.17 | 5.20 | 5.31 | 5.00 | 5.62 |
| BW-right | 6.23 | 6.70 | 5.17 | 5.20 | 5.31 | 5.00 | 5.62 |
| BW type | mserd | mserd | mserd | mserd | mserd | mserd | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on women's attitudes towards justifying domestic violence. **p<0.05;***p<0.01

**Table 11** Impact of Women's Education on Attitudes towards Domestic Violence

| | Going out | Neglect children | Argues | Refuse sex | Not cooking | Unfaithful | Disrepectful |
|---|---|---|---|---|---|---|---|
| Education | -0.09*** | -0.09*** | -0.02 | -0.03* | -0.03** | -0.07*** | -0.11*** |
| | [0.02] | [0.02] | [0.02] | [0.01] | [0.02] | [0.02] | [0.03] |
| Observations | 15645 | 15633 | 15593 | 15448 | 15646 | 15576 | 15619 |
| Control Mean | 0.27 | 0.33 | 0.28 | 0.14 | 0.19 | 0.22 | 0.36 |
| CD Fstat | 27.02 | 26.26 | 28.04 | 24.86 | 25.96 | 26.65 | 27.27 |

*Notes* This table shows the IV estimates the impact of women's education on their attitude towards domestic violence when instrument is not very weak.. The regressions are run using the mserd BW of 4.93 **p<0.05;***p<0.01

## 6.3 Characteristics of Husband or Partner

The rise in the number of years of schooling of female partners may lead to better matching in the marriage market. Akresh et al. (2023) and Agarwal et al. (2023) show that educated women have better marriage market outcomes due to increased education. Educated women match wealthier households, and this can reduce financial stress and decrease domestic violence after marriage. They also have better access to healthcare, improved contraception

use, and lower fertility levels. This can be due to marrying partners with better qualities, such as improved gender attitudes and gender rights beliefs, which reduce domestic violence. However, school construction under DPEP is also likely to affect the husband/partner's education, which could also directly affect the quality of the partner and confound the potential channel. With our DHS sample, we do not find any significant effect of DPEP on the schooling years of the husbands/partners of the surveyed women[16], as shown in Table 12 using equations 1 and 2, and Figure 8 using equation 5. Thus, the results of the characteristics of the partner are driven by better marriage market outcomes of the women and are not affected by the effect of DPEP on the husband/partner's education itself.

**Table 12** Impact of DPEP on Husband's Education

| | Partner/Husband's Educ. |
|---|---|
| DPEP | 0.58 |
| | [0.72] |
| Observations | 54454 |
| Control Mean | 8.13 |
| BW-left | 5.82 |
| BW-right | 5.82 |
| BW type | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on husband's number of years of schooling. $^{**}p<0.05;^{***}p<0.01$

[16]This does not mean that DPEP does not affect male education, but rather that we do not find a significant impact of DPEP on education for the husbands/partners of the women surveyed.

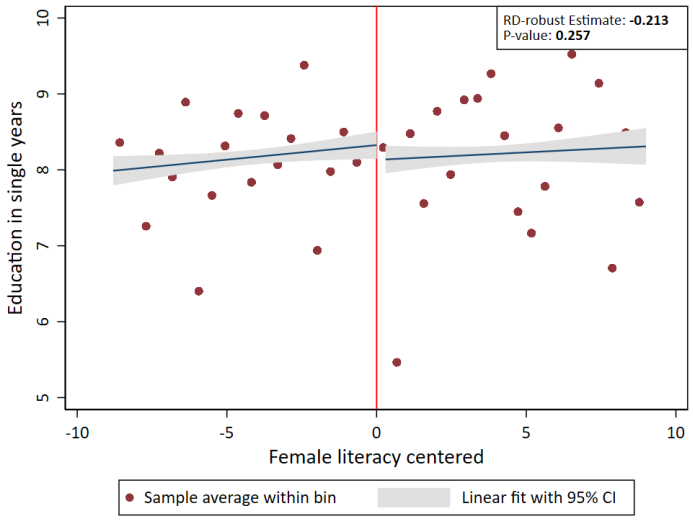


**Figure 8** Effect of DPEP on Husband/Partner's Education

Tables 13, 18, 15, 16 show the impact of DPEP and of the increase in women's education on partner quality, such as gender attitudes, employment, education, income of the husband/partner. We find that there is overall a significant improvement in the husband/partner's gender attitudes towards domestic violence. There is a decrease in the justification of domestic violence by husbands/partners for women going out, neglecting children, arguing, refusing sex, being unfaithful, or being disrespectful in Table 13. Although the significance of going out and arguing drops, the result is consistent for most variables in the IV estimation. We also find that educated women can find a better match in the marriage market, leading to a partner with better gender beliefs and attitudes toward domestic violence. In column 3 of Table 15, we find that women in DPEP-treated districts are 37% more likely to marry richer partners. The result is consistent in the IV estimation, as in column 3 in Table 16.[17] This situation can also reduce financial stress due to economic conditions and domestic violence. Therefore, both channels, women's beliefs and attitudes and better partner quality, led to a reduction in domestic violence for educated women.

[17]Note that 'alcohol abuse' is dropped from the IV estimation table due to a weak instrument issue.

**Table 13** Impact of DPEP on Husband/Partner's Attitude towards Domestic Violence

| | Going out | Neglect children | Argues | Refuse sex | Not cooking | Unfaithful | Disrepectful |
|---|---|---|---|---|---|---|---|
| DPEP | -0.17*** | -0.31*** | -0.16*** | -0.18*** | -0.02 | -0.24*** | -0.35*** |
| | [0.06] | [0.06] | [0.05] | [0.05] | [0.06] | [0.06] | [0.08] |
| Observations | 41016 | 41051 | 40986 | 40920 | 41086 | 40842 | 40948 |
| Control Mean | 0.16 | 0.21 | 0.19 | 0.09 | 0.12 | 0.24 | 0.30 |
| BW-left | 6.77 | 8.14 | 11.86 | 7.21 | 4.99 | 9.61 | 6.75 |
| BW-right | 6.77 | 8.14 | 11.86 | 7.21 | 4.99 | 9.61 | 6.75 |
| BW type | mserd | mserd | mserd | mserd | mserd | mserd | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on on husband/partner's attitudes towards justifying domestic violence. **p<0.05;***p<0.01

**Table 14** Impact of Women's Education on Husband's Attitude towards Domestic Violence

| | Going out | Neglect children | Argues | Refuse sex | Not cooking | Unfaithful | Disrepectful |
|---|---|---|---|---|---|---|---|
| Education | -0.02 | -0.07*** | -0.03 | -0.05*** | 0.00 | -0.05** | -0.07*** |
| | [0.02] | [0.02] | [0.02] | [0.02] | [0.01] | [0.02] | [0.03] |
| Observations | 8648 | 8669 | 8656 | 8630 | 8677 | 8630 | 8656 |
| Control Mean | 0.17 | 0.23 | 0.21 | 0.10 | 0.12 | 0.25 | 0.32 |
| CD Fstat | 23.95 | 23.45 | 22.96 | 22.63 | 22.62 | 24.24 | 22.82 |

*Notes* This table shows the IV estimates the impact of women's education on husband's attitudes towards domestic violence when the instruments are not weak. The regressions are run using the mserd BW of 4.93 **p<0.05;***p<0.01

**Table 15** Impact of DPEP on Husband/Partner's Characteristics

| | Employed | Educ. | Non Poor | Alcohol Abuse |
|---|---|---|---|---|
| DPEP | -0.01 | 0.58 | 0.37*** | -0.00*** |
| | [0.04] | [0.72] | [0.08] | [0.00] |
| Observations | 41226 | 54454 | 41227 | 2446 |
| Control Mean | 0.95 | 8.13 | 0.67 | 1.00 |
| BW-left | 5.10 | 5.82 | 5.54 | 2.68 |
| BW-right | 5.10 | 5.82 | 5.54 | 2.68 |
| BW type | mserd | mserd | mserd | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on husband/partner's quality attributes. **p<0.05;***p<0.01

**Table 16** Impact of Women's Education on Husband/Partner's Characteristics

| | Employed | Educ. | Non Poor |
|---|---|---|---|
| Education | -0.01 | 0.49** | 0.07*** |
| | [0.01] | [0.20] | [0.02] |
| Observations | 8494 | 10721 | 8494 |
| Control Mean | 0.95 | 8.27 | 0.68 |
| CD Fstat | 23.04 | 13.69 | 23.04 |

*Notes* This table shows the IV estimates the impact of women's education on husband/partner's other attributes of quality when the instrument is not weak. The regressions are run using the mserd BW of 4.93. **p<0.05;***p<0.01

## 6.4 Access to Information and Likelihood of Seeking Help

Criminologists' theory suggests that the incentive of a criminal declines if the likelihood of reporting a crime increases. Donohue III et al. (2001) discuss the conceptual framework and the application of the model in the United States and Iyer et al. (2012) find supporting evidence for crime against women in India. When the likelihood of reporting domestic violence increases, the opportunity cost of committing domestic violence increases, and the incentive for the husband/partner to choose violence decreases. The rise in women's education could lead to a higher likelihood of reporting because of improved gender rights beliefs, as discussed earlier. In addition, educated women have better access to information and knowledge, which should help them report violence to the police; this is a tedious process.

Tables 17 and A11 show the results of the impact of DPEP and the increase in women's education on access to information, which could be seen as a proxy for reporting indicators, respectively. The indicators *Read Newspaper-Read Text* are listed in Tables 1 and A1. In columns 1 and 5 of Table 17, we find that women in DPEP districts are 17% and 13% more likely to read newspaper and mobile text messages, respectively, than in non-DPEP districts. The IV estimation in Table A11 corroborates the findings for educated women. The estimation also shows that educated women are more likely to have a bank account that

signifies their financial knowledge. The increase in women's access to information in DPEP districts improves their propensity to report. A higher likelihood of reporting increases the opportunity cost of committing domestic violence against educated women. The threat of reporting can reduce the incidence of domestic violence.

**Table 17** Impact of DPEP on Access to Information

| | Read Newspaper | Financial Knowledge | Business Information | Use Mobile | Read Text |
|---|---|---|---|---|---|
| DPEP | 0.17*** | 0.07 | -0.52*** | 0.02 | 0.13*** |
| | [0.05] | [0.06] | [0.11] | [0.06] | [0.05] |
| Observations | 463992 | 78518 | 78518 | 78518 | 35564 |
| Control Mean | 0.44 | 0.52 | 0.43 | 0.50 | 0.77 |
| BW-left | 3.85 | 7.63 | 4.16 | 10.59 | 8.73 |
| BW-right | 3.85 | 7.63 | 4.16 | 10.59 | 8.73 |
| BW type | mserd | mserd | mserd | mserd | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on access to mediums of information.**p<0.05;***p<0.01

**Table 18** Impact of Women's Education on Husband's Attitude towards Domestic Violence

| | Going out | Neglect children | Argues | Refuse sex | Not cooking | Unfaithful | Disrepectful |
|---|---|---|---|---|---|---|---|
| Education | -0.02 | -0.07*** | -0.03 | -0.05*** | 0.00 | -0.05** | -0.07*** |
| | [0.02] | [0.02] | [0.02] | [0.02] | [0.01] | [0.02] | [0.03] |
| Observations | 8648 | 8669 | 8656 | 8630 | 8677 | 8630 | 8656 |
| Control Mean | 0.17 | 0.23 | 0.21 | 0.10 | 0.12 | 0.25 | 0.32 |
| CD Fstat | 23.95 | 23.45 | 22.96 | 22.63 | 22.62 | 24.24 | 22.82 |

*Notes* This table shows the IV estimates the impact of women's education on husband's attitudes towards domestic violence when the instruments are not weak. The regressions are run using the mserd BW of 4.93 **p<0.05;***p<0.01

We also investigate whether more educated women are more likely to report domestic violence to formal authorities (police, lawyers) than informal organizations such as religious leaders or social service organizations. In Table A12, we observe that women in the DPEP districts are more likely to seek help from the police and lawyers. However, the results are insignificant, which may be due to the small sample size. These findings highlight the need for further investigation into whether more educated women have a higher probability of reporting domestic violence to formal law enforcement authorities.

# 7 Conclusion

Domestic violence against women has been recognized throughout the world as a severe violation of human rights and a public health problem. The high prevalence and impact of this practice on women's mental, physical, and economic conditions warrant an urgent response. Therefore, it is necessary to identify effective preventive and response policies to reduce violence against women. In this study, we examine the impact of a school construction program and the associated increase in women's education on domestic violence against women in India. The main objective is to understand the dominant channels through which education can reduce violence. Using a natural experiment, we provide causal estimates of the effect of a school construction program on the probability of experiencing any form of domestic violence against women. Furthermore, to isolate the effect of an increase in women's education on domestic violence, we use the program assignment rule as an instrument for education.

We find that educated women have a lower probability of experiencing domestic violence. Decreases in gender violence are primarily attributed to improved gender attitudes, partner behaviors, increased access to information, and proactive help-seeking, rather than changes in women's economic situation or decision-making authority within the household. Improvements in gender beliefs and access to information can increase the opportunity costs of committing domestic violence as domestic violence reporting increases. Our results imply that strategies that address attitudes and beliefs that justify violence against women can be instrumental in reducing gender-based violence. Hence, education can enhance non-income channels, such as gender attitudes and access to information, which could reduce violence, in addition to the economic channel of outside options. Due to data constraints, our study is preliminary in understanding how educational improvement improves the likelihood of seeking help. Future studies could explore in detail how education can increase the likelihood of reporting domestic violence to formal authorities, as an increase in reporting domestic violence could be an essential factor in reducing the prevalence of domestic violence.

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# A Appendix

## A.1 Background and Data

**Table A1** Description of Variables and Codebook (Continued to the next page)

| Variable Name | Name in the NFHS 2015-16 | Variable Codebook |
|---|---|---|
| **NIEPA and Census, 1991** | | |
| *Treatment* | | |
| DPEP | dpep | Binary variable |
| Female Literacy Rate Centered (1991) | flitd | Continous variable |
| Eligible for DPEP | Derived from flitd | Binary variable by construction<br>Eligible for DPEP is equal to 1 if Female Literacy Rate Centered (1991)<0<br>Eligible for DPEP = 0 if Female Literacy Rate Centered (1991)>0 |
| *Characteristics* | | |
| Age | v012 | Continous variable |
| Educ. | v113 | Continous variable |
| **NFHS, 2015-16** | | |
| *Domestic violence* | | |
| Overall | Binary variable, take the value 1 if at least one of these variables, d104,d106,d107,d108,d111, is equal to 1 | |
| Emotional | d104 | Binary variable |
| Less Severe | d106 | Binary variable |
| Severe Experienced | d107 | Binary variable |
| Sexual Experienced | d108 | Binary variable |
| Any Injury | d111 | Binary variable |
| *Labour Market* | | |
| Employed | v714 | Binary variable<br>Binary variable by construction |
| Working Outside | derived from v719 | Working Outside is equal to 0 if<br>the respondent is working for a family member<br>& is equal to 1 if<br>she is either working for someone else or is self-employed |
| Cash Income | Derived from v741 | Cash income is equal to 1 if the respond answers that<br>she receives cash only or cash and in-kind earnings<br>and 0 if she is not paid or receives only in-kind earnings |
| *Decision* | | |
| Own Health | Derived from v743a | Own Health is equal to 1 if and only if<br>the respondent is the only one that usually decides for her own health<br>Binary variable by construction |
| HH Purchases | Derived from v743b | HH Purchases is equal to 1 if and only if the respondent is the one alone<br>that usually decides on large household purchases<br>Binary variable by construction |
| Own Earnings | Derived from v739 | Own Earnings is equal to 1 if and only if the respondent is the one alone<br>who usually decides on how to spend her own earnings |
| Husband's Earnings | v743_f | Binary variable by construction |
| Own Contraception | Derived from v632 | Own contraception is equal to if and only if<br>the respondent is the main decider for contraception |
| *Women Gender Attitude* | | |
| Going Out | v744a | Binary variable (*don't know* answers are considered as missing values) |
| Neglect Children | v744b | Binary variable (*don't know* answers are considered as missing values) |
| Argue | v744c | Binary variable (*don't know* answers are considered as missing values) |
| Refuse Sex | v744d | Binary variable (*don't know* answers are considered as missing values) |
| Not Cooking | v744e | Binary variable (*don't know* answers are considered as missing values) |
| Unfaithful | s936f | Binary variable (*don't know* answers are considered as missing values) |
| Disrespect | s936g | Binary variable (*don't know* answers are considered as missing values) |
| *Husband/Partner's Gender Attitude* | | |
| Husband: Going Out | mv744a | Binary variable (*don't know* answers are considered as missing values) |
| Husband: Neglect Children | mv744b | Binary variable (*don't know* answers are considered as missing values) |
| Husband: Argue | mv744c | Binary variable (*don't know* answers are considered as missing values) |
| Husband: Refuse Sex | mv744d | Binary variable (*don't know* answers are considered as missing values) |
| Husband: Not Cooking | mv744e | Binary variable (*don't know* answers are considered as missing values) |
| Husband: Unfaithful | sm706f | Binary variable (*don't know* answers are considered as missing values) |
| Husband: Disrespect | sm706g | Binary variable (*don't know* answers are considered as missing values) |
| *Husband/Partner Quality* | | |
| Husband/Partner Employed | mv714 | Binary variable |
| Husband/Partner's Educ. | v715 | Continuous variable (*don't know* answers are considered as missing values)<br>Binary variable by construction |
| Husband/Partner's Alcohol Abuse | Derived from d114 | Husband Alcohol Abuse if equal to 1 if the respondent's husband or partner<br>is drunk often; and equal to 0 if he is sometimes or never.<br>Binary variable by construction |
| Husband/Partner 'Not Poor' | Derived from mv190 | Takes the value 1 if the wealth index of the husband/partner's is middle, rich or richest<br>and takes the value 0 if wealth index of the husband/partner's is poor or poorest |

Note: Binary variables are $\{0, 1\}$. For some variables of the NFHS, the authors only asked the question to a random sample of respondents.

**Table A1** Description of Variables and Codebook (Continued)

| Variable Name | Name in the NFHS 2015-16 | Variable Codebook |
|---|---|---|
| *Information* | | |
| | | Binary variable by construction |
| Read Newspaper | v157_a | Read Newspaper is equal to 1 if the respondent reads newspaper or magazine less than once a week, at least once a week, or almost everyday; and 0 if not at all |
| Financial Knowledge | s929 | Binary Variable |
| Business Information | s933_a | Binary Variable |
| Use Mobile Phone | s930 | Binary variable |
| Read Mobile Text | s930c | Binary variable |
| *Seek Help* | | |
| Social Service | d119xb | Binary variable |
| Religious Leader | d119xf | Binary variable |
| Police | d119xe | Binary variable |
| Lawyer | d119xg | Binary variable |
| State ID | id | Cardinal number variable |
| District ID | statecd | Cardinal number variable |

Note: Binary variables are $\{0, 1\}$. For some variables of the NFHS, the authors only asked the question to a random sample of respondents.

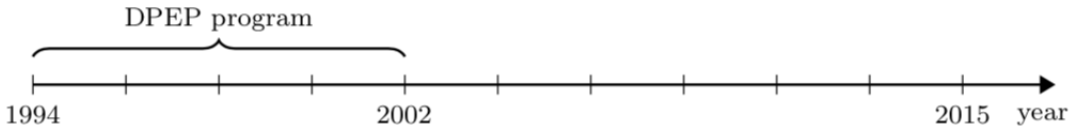



**Figure A1** Timeline: DPEP Implementation Phases

## A.2 Main Result: Impact of DPEP

### Robustness Check: Other Data Source

**Table A2** Impact of DPEP on Domestic violence (NFHS5, 2019-21)

| | (1) Emotional | (2) Less Severe | (3) Severe | (4) Sexual | (5) Injuries |
|---|---|---|---|---|---|
| DPEP | -0.07* | 0.05 | -0.13** | -0.09** | -0.00 |
| | [0.04] | [0.09] | [0.06] | [0.05] | [0.06] |
| Observations | 20285 | 20285 | 20285 | 20285 | 20285 |
| Control Mean | 0.12 | 0.23 | 0.07 | 0.05 | 0.06 |
| Bandwidth (BW) | 2.06 | 2.84 | 3.58 | 2.44 | 3.95 |
| BW-type | mserd | mserd | mserd | mserd | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on domestic violence variables using the NFHS-5 survey round (2019-21). **p<0.05;***p<0.01

### Robustness Check: Addressing Potential Confounding Program

**Table A3** Impact of DPEP on Domestic Violence

| | Any Violence | Emotional | Less severe | Severe | Sexual | Any Injury |
|---|---|---|---|---|---|---|
| DPEP | -0.33*** | -0.10** | -0.30*** | -0.04 | -0.10*** | -0.10** |
| | [0.07] | [0.05] | [0.07] | [0.04] | [0.03] | [0.04] |
| Observations | 40040 | 40040 | 40040 | 40040 | 40040 | 40040 |
| Control Mean | 0.34 | 0.15 | 0.30 | 0.09 | 0.07 | 0.08 |
| BW-left | 5.67 | 5.66 | 6.14 | 5.41 | 7.50 | 5.80 |
| BW-right | 5.67 | 5.66 | 6.14 | 5.41 | 7.50 | 5.80 |
| BW type | mserd | mserd | mserd | mserd | mserd | mserd |

*Notes* Table presents Fuzzy RD estimates of DPEP's impact on domestic violence, excluding districts with potential SSA confounding by focusing on pre-2002 DPEP implementations. **p<0.05;***p<0.01

**Robustness Checks: Specification Changes**

**Table A4** Impact of DPEP on Domestic Violence

| | Any Violence | Emotional | Less severe | Severe | Sexual | Any Injury |
|---|---|---|---|---|---|---|
| DPEP | -0.24*** | -0.10*** | -0.22*** | -0.05** | -0.09*** | -0.07*** |
| | [0.04] | [0.03] | [0.05] | [0.02] | [0.02] | [0.03] |
| Observations | 40636 | 40636 | 40636 | 40636 | 40636 | 40636 |
| Control Mean | 0.35 | 0.15 | 0.30 | 0.09 | 0.07 | 0.08 |
| BW-left | 3.63 | 4.78 | 3.93 | 5.24 | 4.53 | 5.17 |
| BW-right | 10.65 | 11.49 | 7.43 | 11.08 | 9.07 | 10.57 |
| BW type | msetwo | msetwo | msetwo | msetwo | msetwo | msetwo |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on domestic violence variables. **p<0.05;***p<0.01

**Table A5** Impact of DPEP on Domestic Violence

| | Any Violence | Emotional | Less severe | Severe | Sexual | Any Injury |
|---|---|---|---|---|---|---|
| DPEP | -0.33*** | -0.07 | -0.32*** | -0.05 | -0.17*** | -0.12** |
| | [0.10] | [0.07] | [0.10] | [0.05] | [0.05] | [0.05] |
| Observations | 40636 | 40636 | 40636 | 40636 | 40636 | 40636 |
| Control Mean | 0.34 | 0.14 | 0.29 | 0.08 | 0.07 | 0.07 |
| BW-left | 6.39 | 6.98 | 6.75 | 8.90 | 8.90 | 9.12 |
| BW-right | 6.39 | 6.98 | 6.75 | 8.90 | 8.90 | 9.12 |
| BW type | mserd | mserd | mserd | mserd | mserd | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on domestic violence variables. **p<0.05;***p<0.01

**Table A6** Impact of DPEP on Domestic Violence

| | Any Violence | Emotional | Less severe | Severe | Sexual | Any Injury |
|---|---|---|---|---|---|---|
| DPEP | -0.26*** | -0.14*** | -0.23*** | -0.05 | -0.07** | -0.07*** |
| | [0.05] | [0.04] | [0.05] | [0.04] | [0.03] | [0.03] |
| Observations | 40636 | 40636 | 40636 | 40636 | 40636 | 40636 |
| Control Mean | 0.34 | 0.14 | 0.29 | 0.09 | 0.07 | 0.07 |
| BW-left | 7.20 | 7.46 | 7.12 | 6.00 | 7.73 | 6.91 |
| BW-right | 7.20 | 7.46 | 7.12 | 6.00 | 7.73 | 6.91 |
| BW type | mserd | mserd | mserd | mserd | mserd | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on domestic violence variables. **p<0.05;***p<0.01

## RD Plots

We present the RD plots for any experience of severe and sexual domestic violence using estimates in reduced form as shown in Equation 5, where we use the cutoff indicator variable as a proxy for an exogenous increase in education.

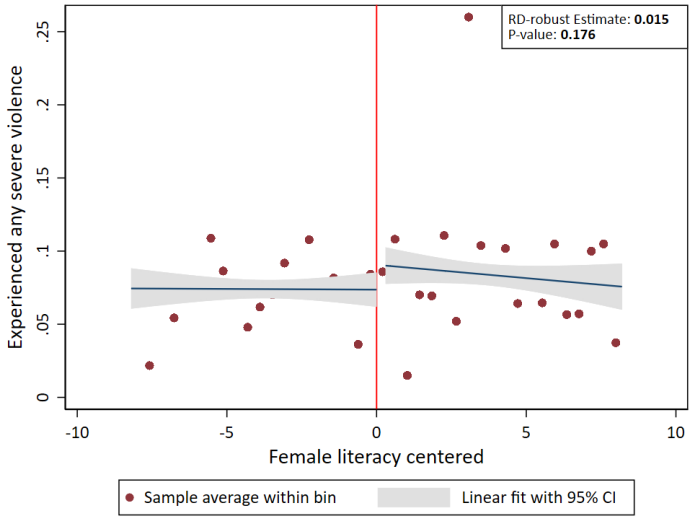



**Figure A2** Effect of DPEP on Women Experiencing Any Severe Violence

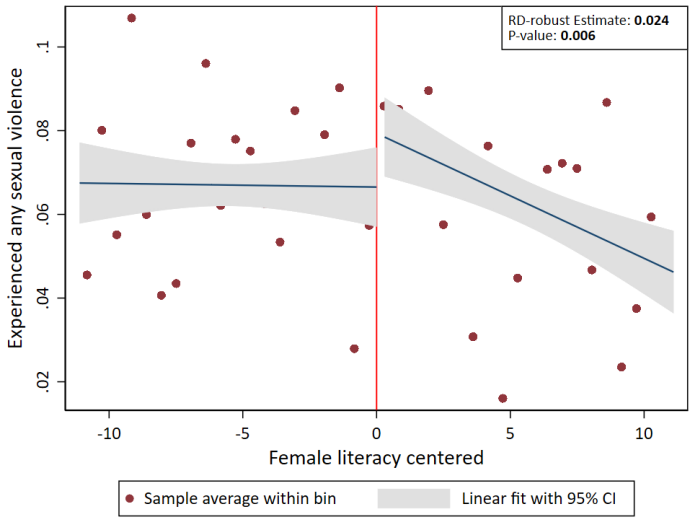



**Figure A3** Effect of DPEP on Women Experiencing Any Sexual Violence

## A.3 Potential Mechanisms

### Effect of Women's Education

We find the effect of women's education on domestic violence using IV estimation in eq. 3-4.

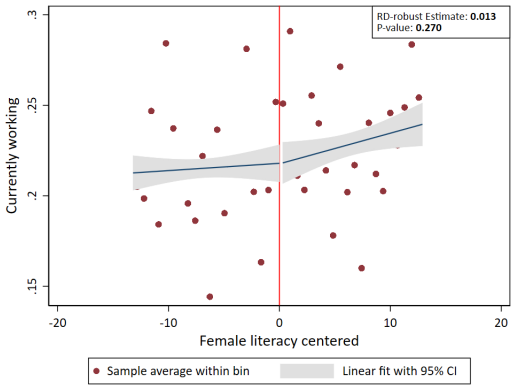
**Table A7** Impact of Women's Education on Domestic Violence

| | Any Violence | Emotional | Less severe | Severe | Sexual | Any Injury |
|---|---|---|---|---|---|---|
| Education | -0.21** | -0.08* | -0.19** | -0.01 | -0.07* | -0.06* |
| | [0.10] | [0.05] | [0.09] | [0.02] | [0.04] | [0.03] |
| Observations | 8087 | 8087 | 8087 | 8087 | 8087 | 8087 |
| Control Mean | 0.35 | 0.15 | 0.30 | 0.09 | 0.07 | 0.08 |
| CD Fstat | 5.06 | 5.06 | 5.06 | 5.06 | 5.06 | 5.06 |

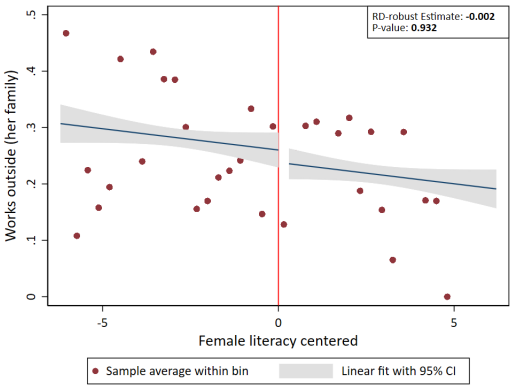
*Notes* This table shows the IV estimates the impact of women's education on domestic violence variables. The regressions are run using the mserd BW of 4.93 **p<0.05;***p<0.01

### Mechanisms: RD Plots

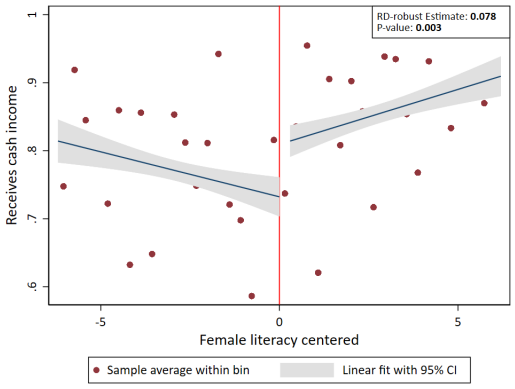
We present the RD plots for the variables explored to understand the potential mechanisms using reduced-form estimates.



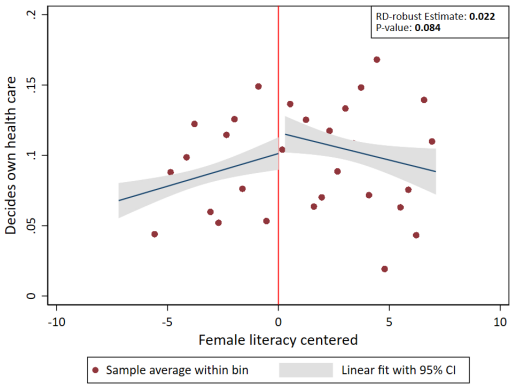

**(a)** Women's Employment



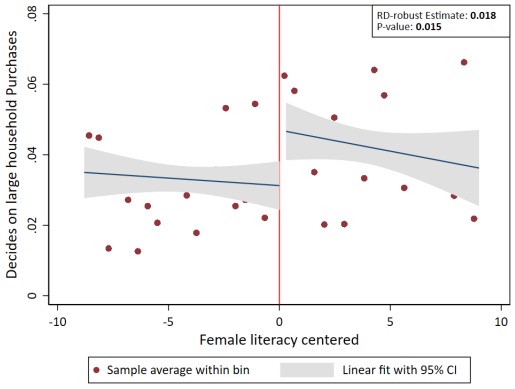

**(b)** Women's Employment Outside Family



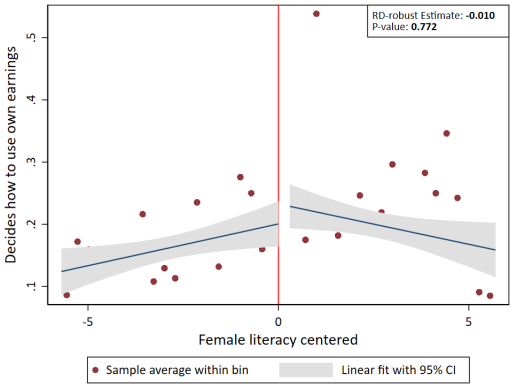

**(c)** Women Receiving Cash Income




**(d)** Women Deciding Own Health Care

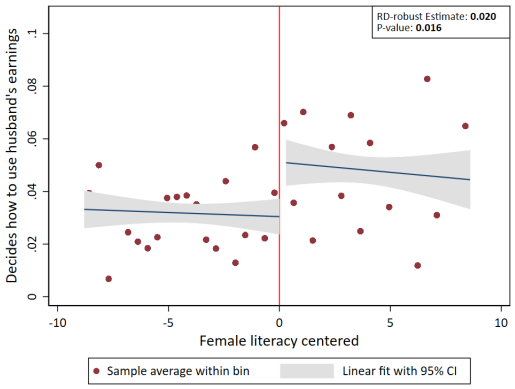



**(e)** Women Deciding on Large Household Purchases

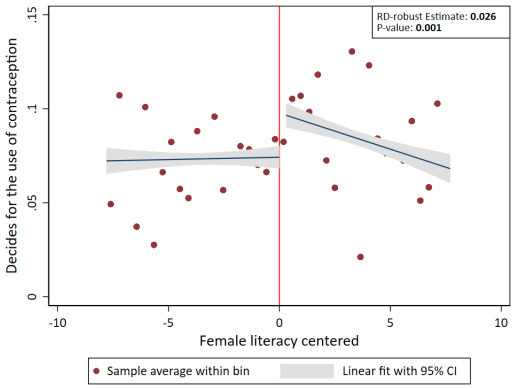



**(f)** Women Deciding to Use Own Earnings

**Figure A4** Effect of DPEP on Women's labour Market Outcomes and Intrahousehold Decision-making (Continued on the next page)



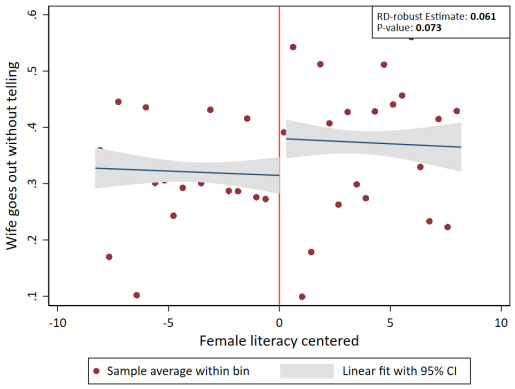

**(g)** Women Deciding to Use Husband/Partner's Earnings



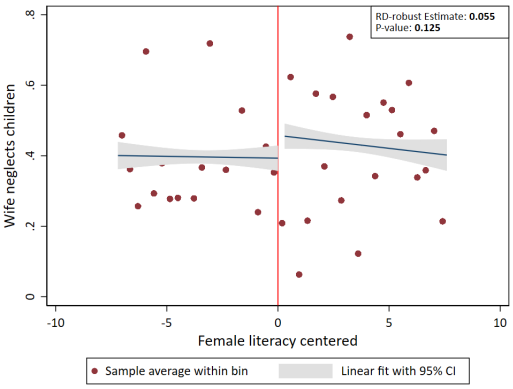

**(h)** Women Deciding Use of Contraception

**Figure A4** (Continued) Effect of DPEP on Women's labour Market Outcomes and Intrahousehold Decision-making

## Gender Role and Domestic Violence Attitudes

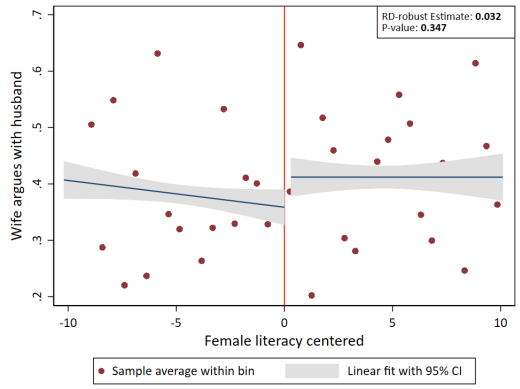



**(a)** Wife Going Out Without Telling

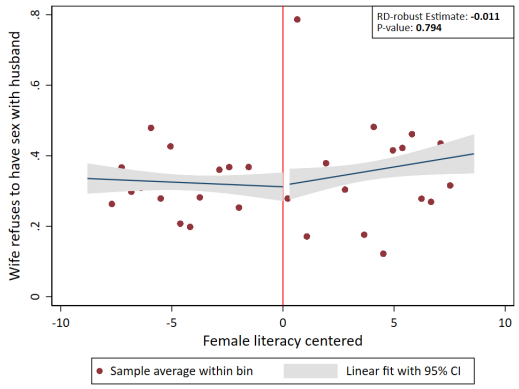



**(b)** Wife Neglecting Children

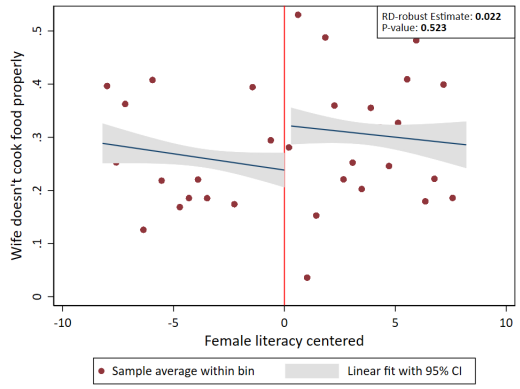
**Figure A5** Effect of DPEP on Women's Gender Attitudes towards Domestic Violence
(Continued on the next page)



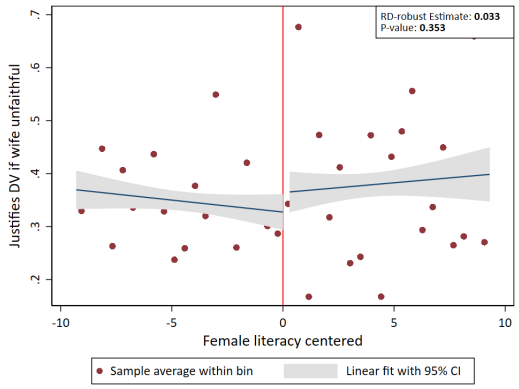

**(c)** Wife Arguing with Husband/Partner



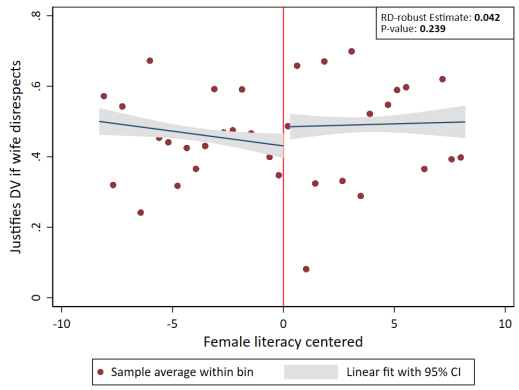

**(d)** Wife Refusing to Have Sex with Husband/Partner




**(e)** Wife Not Cooking Food Properly



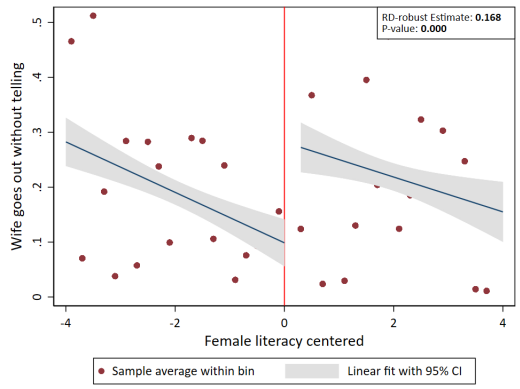

**(f)** Justifying DV if Wife is Unfaithful



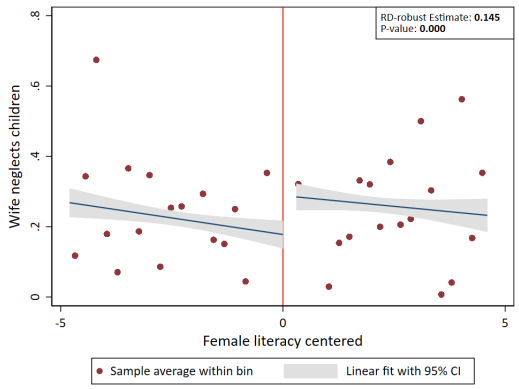

**(g)** Justifying DV if Wife Disrespects

**Figure A5** (Continued) Effect of DPEP on Women's Gender Attitudes towards Domestic Violence

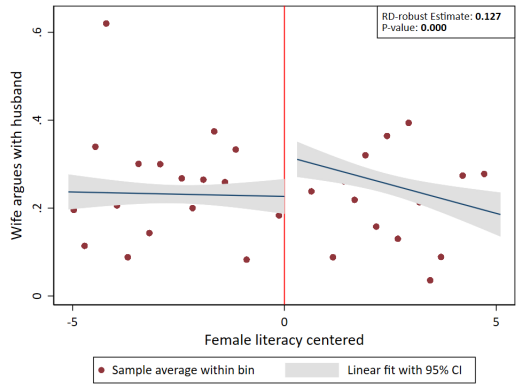
## Quality of Husband or Partner



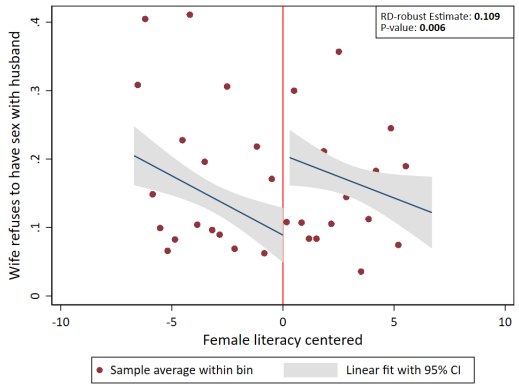

**(a)** Wife Going Out Without Telling



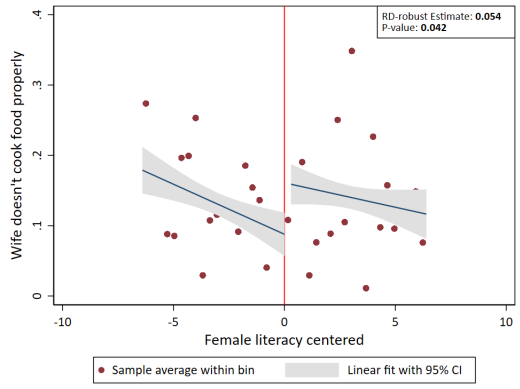

**(b)** Wife Neglecting Children



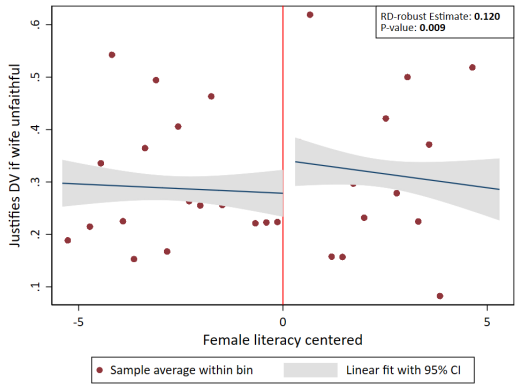

**(c)** Wife Arguing with Husband/Partner




**(d)** Wife Refusing to Have Sex with Husband/Partner

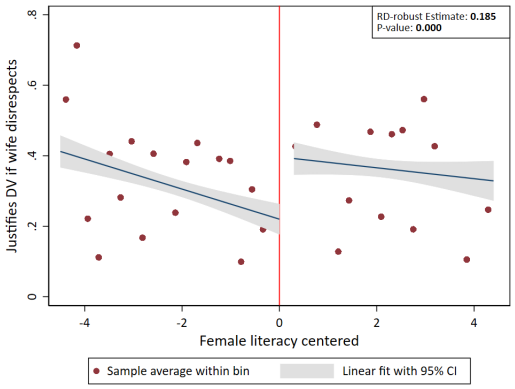



**(e)** Wife Not Cooking Food Properly

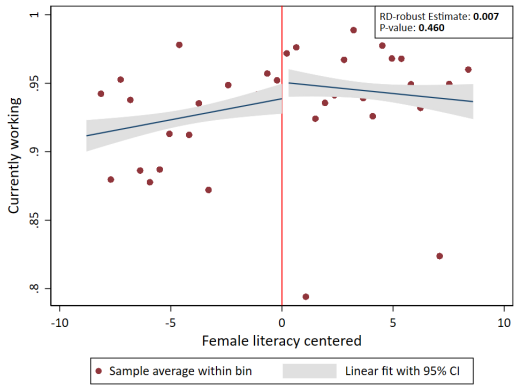



**(f)** Justifying DV if Wife Unfaithful

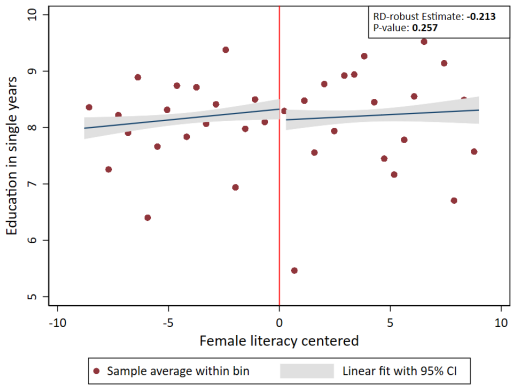
**Figure A6** Effect of DPEP on Husband/Partner's Quality (Continued on the next page)



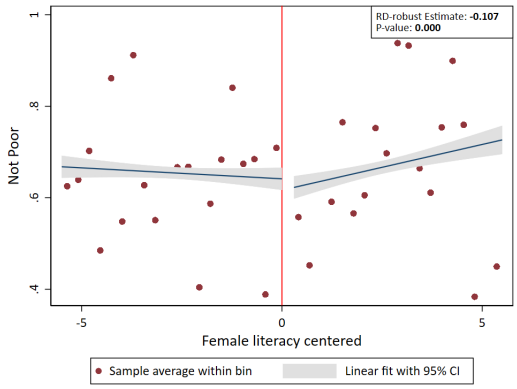

**(g)** Justifying DV if Wife Disrespects



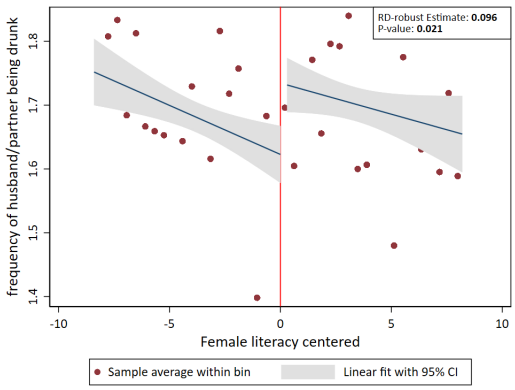

**(h)** Employment




**(i)** Education



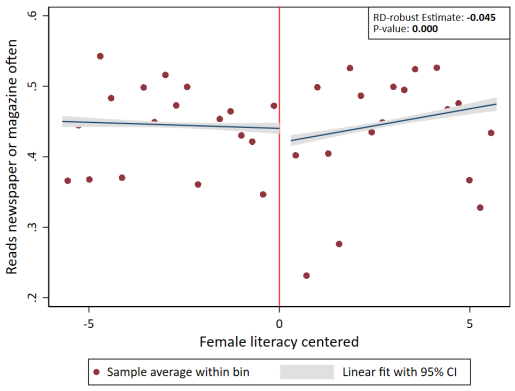

**(j)** Wealth Status: Not Poor



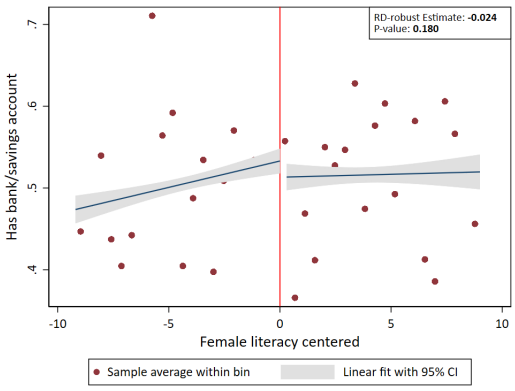

**(k)** Often drunk (Alcohol Abuse)

**Figure A6** (Continued) Effect of DPEP on Husband/Partner's Quality

## Access to Information and Seeking Help

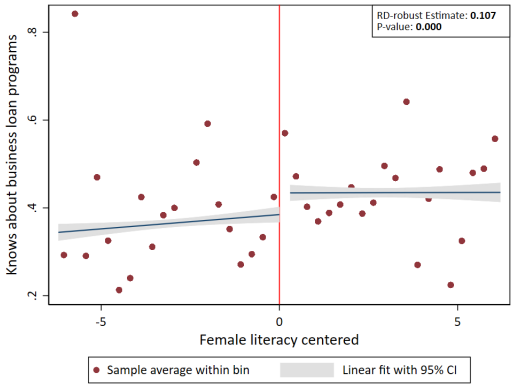



**(l)** Reads Newspaper or Magazine Often

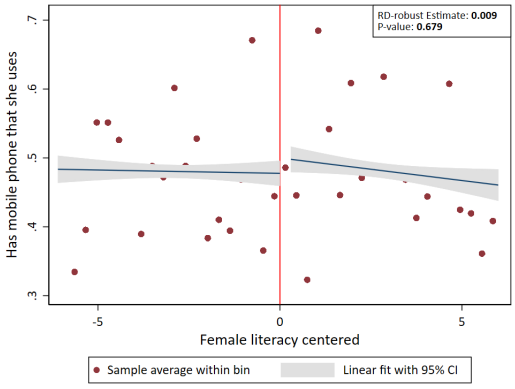



**(m)** Bank/Savings Account

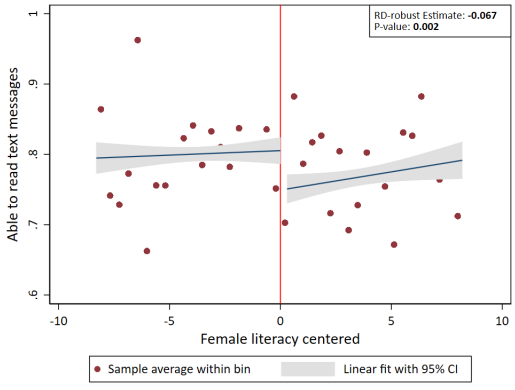
**Figure A6** Effect of DPEP on on Access to Information (Continued on the next page)




**(n)** Aware of Business Loan Programs




**(o)** Mobile Phone




**(p)** Able to Read Text Messages

**Figure A6** (Continued) Effect of DPEP on Access to Information

**Mechanisms: IV Estimates**

The following tables show the full IV estimation results (for those cases where some of the variables of potential mechanisms suffer from weak instrument problems) using eq. 3 and 4 for our variables of interest to analyse potential mechanisms.

**Table A8** Impact of Women's Education on Labor Market Outcomes

| | Employed | Working Outside | Cash Income |
|---|---|---|---|
| Education | -0.03 | -0.01 | -0.11* |
| | [0.02] | [0.04] | [0.06] |
| Observations | 15444 | 4450 | 4450 |
| Control Mean | 0.23 | 0.22 | 0.84 |
| CD Fstat | 30.66 | 5.52 | 5.52 |

*Notes* This table shows the IV estimates the impact of women's education on labor market variables. The regressions are run using the mserd BW of 4.93 **p<0.05;***p<0.01

**Table A9** Impact of Women's Education on Intrahousehold Bargaining

| | Own Health | HH Purchases | Own Earnings | Husband's Earnings | Own Contraception |
|---|---|---|---|---|---|
| Education | -0.02 | -0.02* | -0.11 | -0.03* | -0.24 |
| | [0.02] | [0.01] | [0.38] | [0.01] | [0.33] |
| Observations | 10316 | 9652 | 2435 | 9621 | 32138 |
| Control Mean | 0.11 | 0.05 | 0.22 | 0.05 | 0.09 |
| CD Fstat | 12.83 | 11.94 | 0.12 | 10.54 | 0.57 |

*Notes* This table shows the IV estimates the impact of women's education on intrahousehold bargaining power of women. The regressions are run using the mserd BW of 4.93 **p<0.05;***p<0.01

**Table A10** Impact of Women's Education on Husband/Partner's Quality

| | Employed | Educ. | Non Poor | Alcohol Abuse |
|---|---|---|---|---|
| Education | -0.01 | 0.49** | 0.07*** | -0.00 |
| | [0.01] | [0.20] | [0.02] | [0.00] |
| Observations | 8494 | 10721 | 8494 | 524 |
| Control Mean | 0.95 | 8.27 | 0.68 | 1.00 |
| CD Fstat | 23.04 | 13.69 | 23.04 | 0.47 |

*Notes* This table shows the IV estimates the impact of women's education on husband/partner's other attributes of quality. The regressions are run using the mserd BW of 4.93. **p<0.05;***p<0.01

### Access to Information and Likelihood of Seeking Help

Table A12 shows the impact of the program using equation 1 and 2. Similarly, we show the impact of an increase in women's education in Table A13, using equation 3 and 4.

**Table A11** Impact of Women's Education on Access to Information

| | Read Newspaper | Financial Knowledge | Business Information | Use Mobile | Read Text |
|---|---|---|---|---|---|
| Education | 0.08*** | 0.06*** | -0.10*** | 0.01 | 0.07*** |
| | [0.01] | [0.02] | [0.03] | [0.02] | [0.02] |
| Observations | 92717 | 15444 | 15444 | 15444 | 7351 |
| Control Mean | 0.45 | 0.52 | 0.43 | 0.50 | 0.76 |
| CD Fstat | 76.62 | 30.66 | 30.66 | 30.66 | 16.69 |

*Notes* This table shows the IV estimates the impact of women's education on access to information. The regressions are run using the mserd BW of 4.93. **p<0.05;***p<0.01

**Table A12** Impact of DPEP on Likelihood of Seeking Help

| | Social Service | Religious Leader | Police | Lawyer |
|---|---|---|---|---|
| DPEP | -0.00 | -0.01 | 0.02 | 0.01 |
| | [0.01] | [0.01] | [0.03] | [0.01] |
| Observations | 12365 | 12365 | 12365 | 12365 |
| Control Mean | 0.00 | 0.00 | 0.01 | 0.00 |
| BW-left | 13.03 | 7.72 | 10.03 | 9.41 |
| BW-right | 13.03 | 7.72 | 10.03 | 9.41 |
| BW type | mserd | mserd | mserd | mserd |

*Notes* This table shows the Fuzzy RD-robust estimates of the impact of DPEP on seeking help from institutional and non-institutional support.**p<0.05;***p<0.01

**Table A13** Impact of Women's education on Seeking Help

| | Social Service | Religious Leader | Police | Lawyer |
|---|---|---|---|---|
| Education | -0.01 | -0.00 | 0.01 | 0.02 |
| | [0.03] | [0.02] | [0.05] | [0.04] |
| Observations | 2982 | 2982 | 2982 | 2982 |
| Control Mean | 0.00 | 0.00 | 0.01 | 0.00 |
| CD Fstat | 0.31 | 0.31 | 0.31 | 0.31 |

*Notes* This table shows the IV estimates the impact of women's education seeking help from institutional and non-institutional support. The regressions are run using the mserd BW of 4.93. **p<0.05;***p<0.01

## A.4 Mechanisms: Conceptual framework

The Tables A14 - A18 summarise the relationship (direction) between our variables of the study and domestic violence by highlighting underlying direct (first-order effect) potential channel(s).

**Table A14** Labour Market Outcomes and Domestic Violence

| *Variable* | *Relationship with Domestic Violence: Theoretical Predictions* | | | | |
|---|---|---|---|---|---|
| | *Outside Options and Bargaining* | *Instrumental Violence* | *Expressive Violence* | *Exposure Reduction* | *Reporting Likelihood* |
| *Employed* | (-) | n/a | n/a | (-) | (-) |
| *Working Outside* | (-) | n/a | n/a | (-) | (-) |
| *Cash Income* | (-) | (+) | (-) | n/a | (-) |

**Table A15** Intrahousehold Bargaining and Domestic Violence

| *Variable* | *Relationship with Domestic Violence: Theoretical Predictions* | | | |
|---|---|---|---|---|
| | *Outside Options and Bargaining* | *Instrumental Violence* | *Expressive Violence* | *Exposure Reduction* |
| *Own Health* | (-) | n/a | n/a | n/a |
| *HH Purchases* | (-) | n/a | n/a | n/a |
| *Own Earnings* | (-) | n/a | n/a | n/a |
| *Husband's Earnings* | (-) | n/a | n/a | n/a |
| *Own Contraception* | (-) | n/a | n/a | n/a |

**Table A16** Domestic Violence Attitudes of Women and Husband/Partner and Domestic Violence

| *Variable* | *Relationship with Domestic Violence: Theoretical Predictions* | | |
|---|---|---|---|
| | *Attitude towards Violence* | *Gender Role Beliefs* | *Reporting Likelihood* |
| *Justify DV: Going Out* | (+) | (+) | (+) |
| *Justify DV: Neglect Children* | (+) | *(+)* | (+) |
| *Justify DV: Argue* | (+) | (+) | (+) |
| *Justify DV: Refuse Sex* | (+) | (+) | (+) |
| *Justify DV: Not Cooking* | (+) | (+) | (+) |
| *Justify DV: Unfaithful* | (+) | (+) | (+) |
| *Justify DV: Disrespect* | (+) | (+) | (+) |

**Table A17** Quality of Husband/Partner and Domestic Violence

| *Variable* | *Relationship with Domestic Violence: Theoretical Predictions* | | | | |
|---|---|---|---|---|---|
| | *Instrumental Violence* | *Expressive Violence* | *Exposure Reduction* | *Violence Attitude* | *Gender Role Beliefs* |
| *Husband/Partner Employed* | n/a | (-) | (-) | n/a | n/a |
| *Husband/Partner's Educ.* | n/a | n/a | n/a | (+/-) | (+/-) |
| *Husband/Partner's Alcohol Abuse* | n/a | n/a | n/a | (+) | n/a |

**Table A18** Access to Information, Seeking Help, and Domestic Violence

| **Question/Variable** | **Relationship with Domestic Violence: Theoretical Predictions** | | |
|---|---|---|---|
| | **Violence Attitude** | **Gender Role Beliefs** | **Reporting Likelihood** |
| *Read Newspaper* | n/a | n/a | (+) |
| *Financial Knowledge* | n/a | n/a | (+) |
| *Business Information* | n/a | n/a | (+) |
| *Use Mobile Phone* | n/a | n/a | (+) |
| *Read Mobile Text* | n/a | n/a | (+) |
| *Seek Help: Social Service* | n/a | n/a | (+/-) |
| *Seek Help: Religious Leader* | n/a | n/a | (+/-) |
| *Seek Help: Police* | n/a | n/a | (+) |
| *Seek Help: Lawyer* | n/a | n/a | (+) |