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Violence Against Women studied in connection to Gender Discrimination and Gender Biased Norms in India

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Declaration

I hereby declare that this thesis has not been and will not be submitted in whole or in part to another University for the award of any other degree.

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Sayantani Ghosh, Doctor of Philosophy

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SUMMARY

This PhD thesis analyses the issue of violence against women (VAW) in India in connection to gender discrimination and gender biased (GB) norms against women. My first paper examines the association of domestic violence with gender disparity in various dimensions in the Indian society. Using secondary data sources, I find that district-level gender disparities have notable associations (both direct and inverse) with various measures of domestic violence (DV) in the households. My second paper examines the association of various forms of VAW with son preference (SP) and sex ratio at birth (SRB) in India through a panel data analysis. The main findings of this paper are here that with rising SRB and SP in the districts (which is evidence for a strong bias favouring male children), women on average face significantly more violence, in line with previous literature. My third paper analyses the primary data collected from a field experiment done in and around the city of Kolkata, India. It studies the effects of education through entertainment (edutainment) on the revealed opinions of people regarding the sensitive topics of GB norms and VAW. My main results indicate that the treatment group responded to the sensitive items on a list survey more than the control group on average. I find that exposure to the treatment led to an overall reluctance among participants to reveal attitudes towards the sensitive topics of GB norms and VAW. Additionally, edutainment participants reveal regressive attitudes for gender-norms, while progressive attitudes for VAW, even when asked indirectly.

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Dedication

I dedicate this PhD thesis work to my dear parents, Mrs. Suktara Ghosh (my mother) and Late Mr. Swaraj Kumar Ghosh (my father).

Ma-Baba,
This is for you.

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Chapter 1

Introduction

> *"The prevalence of violence against women remains staggering... Investment in prevention of violence does not just build safer communities, it also creates a foundation for equality and well-being for everyone."*
>
> *- Sima Bahous, UN Women Executive Director*

Violence against women (VAW) remains a pervasive and deeply troubling issue across both developing and developed nations (UNWomen (2024)). It is not only a violation of fundamental human rights, but also a profound challenge to the principles of equality, safety, and freedom. Beyond its devastating personal toll, the United Nations recognizes VAW as a serious impediment to national development and global socio-economic progress (UN (1993), WHO (1997), World Bank (2019)).

In the context of India, despite increasing media reach, rise of non-profit welfare organisations and laws in place to make women feel safer and more empowered, crimes against women[1] continue to take place in great numbers. According to the 2023 National Crime report, 51 cases get registered every hour across the country. India has been ranked one of the lowest in terms of health and survival of females consecutively for the last few Global Gender Gap reports (GGGR) (GGGR (2014)).

This brings me to enquire if the inherent cultural gender biased norms and the consequent gender discrimination against women is at the root of these crimes. The notion that male

[1] Horrific cases like those of "*Nirbhaya*" in 2012 and very recently "*Abhaya*" in 2024 have highlighted the gravity of this issue in India time and again.

is the superior gender, or that female is the "weaker sex" runs very deep in the Indian society (Saravanan (2000), Coomaraswamy (2005)). Indeed, some earlier research works like those of Aizer (2010), Eswaran and Malhotra (2011), Amaral and Bhalotra (2017), Bandyopadhyay et al. (2020) and Amaral et al. (2021) have previously studied gender inequality and gender norms as potential causes for VAW, focussing on different aspects of this problem. This research adds to the existing literature by empirically exploring the dynamics of this relationship in a more holistic manner in the Indian socio-economy. The findings of this PhD research thesis are based on both primary (third paper) and secondary data analyses (first and second papers).

My first paper focuses only on domestic violence (DV) faced by the women in India, given DV is the most commonly reported type of VAW. According to WHO (2018), worldwide 27% of the ever married women experienced DV in their lifetime from their current or former intimate partner. In India, this proportion of women facing DV was found to be 35% in 2018. Using secondary data sources, I study the association of DV with a district-level Gender Disparity Ratio Index (GDRI) that combines the gender disparities in all the four sectors of education, health, employment and decision-making. The main finding is that with gender disparity increasing in the districts, women's experience of sexual domestic violence falls, indicating the presence of a "male backlash" effect. Additionally, with district GDRI increasing, men justify beating up wives more, especially in the scenario that she doesn't cook food properly. I find that a 1 unit increase in the district GDRI is significantly associated with a 1.61 percentage point decrease in the probability that a woman experiences sexual DV. I further find that a 1 unit increase in the district GDRI is significantly associated with a 2.51 percentage point increase in the probability that a man considers beating his wife justified in the event that she fails to cook food properly. As further robustness checks, I test the model on Domestic Violence z-score index, and PCA Indices for Women's Opinion on DV and Men's Opinion on DV. I find that the main results to be consistent in general with my robustness checks and with previous literature like Eswaran and Malhotra (2011) and Aizer (2010).

In my second paper, a panel data collected from secondary data sources is used to study the relationship of gender norms (male child preference) with all kinds of violent crimes against women (both domestic and public). The biased preference for male children is measured by district sex ratios at birth (SRB) and son preference index (SPI). It exam-

ines how SRB and SP from a given year relates to the violence against women (VAW) measures in the following year in a district. My main model here uses district-level crimes data for VAW for the years 2001-2019. The primary findings of this chapter are here that with SRB and SPI increasing, women on average face significantly more violence at the district level. With a 1% increase in SRB, the expected total VAW rate is found to increase by 3.65% in the districts. Also, with 1% point increase in female son preference index (FSPI), the expected total VAW rate increases by 6% in the districts. These results are consistent with a number of robustness checks carried out and also with the previous literature, especially the paper by Amaral and Bhalotra (2017) which found a positive causal relationship between youth sex-ratio and VAW. The overall results point to the direction of gender biased norms being positively associated with VAW. Where negative associations are found, they are interpreted as evidences of some "male backlash" in the society, in line with previous literature like Bandyopadhyay et al. (2020) that finds evidence of male backlash in increasing rates of VAW as women get more empowered.

The third paper is based on a field experiment in the city of Kolkata, India, conducted from November 2023 to January 2024 that studies the educating effect of entertainment (termed as edutainment) on the gender biased norms and opinions on violence against women. The field experiment was designed in the pattern of a Randomised Controlled Treatment (RCT) following Banerjee et al. (2019) and Bulte and Lensink (2019). The post-treatment data is mainly collected through a list survey (Bulte and Lensink (2019)), which is a method used to reveal the attitudes of the participants regarding the sensitive topics of gender biased norms and violence against women (VAW) more truthfully. The results are analysed using a mean difference analysis and using the maximum likelihood (ML) model adjusted for design effects. The primary findings of the ML model suggest that participants who watched movies breaking gender norms (treatment) responded more than those who watched movies on general themes (control). However, in both the groups, exposure to the sensitive statement in the list survey created some level of awareness, which in turn led to an overall reluctance in endorsing the sensitive attitude. A second key finding arises from reverse-coding the list survey question on gender norms, which is negatively framed and reflects gender-regressive attitudes, is here that respondents in the edutainment group reveal more gender-progressive attitudes on the list survey question on gender norms. In contrast, for the positively framed and more sensitive list survey question on attitude towards VAW, respondents reveal less gender-progressive attitudes.

Taken together, these results suggest that participants disclose their underlying attitudes differently depending on the framing of the sensitive item and the degree of sensitivity associated with the behaviour being measured.

The main contributions of this PhD research is that it shows the strong evidence of violence against women (VAW) being related with gender discrimination and gender biased norms in the context of Indian socio-economy. It also provides evidence that in order to effectively address the issue of VAW, along with other measures, policy-makers need to target the deep-rooted gender biased attitudes through mass awareness programmes specifically designed for the adult population.

Chapter 2

Domestic Violence and its Association with Gender Disparity in India

2.1 Introduction

Domestic violence[1] (DV) is the most commonly occurring violence against women (VAW), which unfortunately also is the most unreported kind. In fact, about 38% of the murders of women, as reported in the World Bank (2019), have been carried out by an intimate partner or spouse. DV has severe negative consequences on the dynamics within a household, including health and well-being of women and children of the household (Heise et al. (1994), Rawlings and Siddique (2020)). Since household is the primary constituent unit of the socio-economic fabric, studying domestic violence and factors associated with it seems imperative. Much of the previous works in the literature like Aizer (2010), Eswaran and Malhotra (2011) and Bhalotra et al. (2021) link DV with gender disparity in the society. By "gender disparity", I mean disparity and discrimination in various socio-economic facets on the basis of gender (i.e. between males and females).

In India, as accounted by the 4th National Family Health Survey (NFHS-4 Report (2015)[2]), about 31% of the married women have gone through physical, sexual or emotional abuse

[1] According to the convention on preventing VAW and combating domestic violence by the Council of Europe (2011), Domestic Violence Against Women (DVAW) has been defined as any act of physical, sexual, psychological or economic violence occurring within the domestic unit or between present/ former sexual partners/ spouses, irrespective of whether the abuser shares the same residence with the victim currently or has shared in the past.

[2] The data provided by the Demographic Health Surveys (DHS) for India is collected primarily by the National Family Health Surveys (NFHS).

by their spouses. I find that there remains a gap in studying domestic violence (DV) in relation with gender disparity in India in a holistic way. And, I attempt to fill this gap in the literature by answering the main research question of this paper: *does district-level gender disparity have any association with the domestic violence in the Indian households?*

This paper uses data from the 4th and 5th National Family Health Surveys, i.e. NFHS-4(2015-16) and NFHS-5(2019-21), obtained from the DHS website. I answer my research question by building a district-level Gender Disparity Ratio Index (GDRI), closely following the methodology of Global Gender Gap Ratio (as explained in GGGR (2014)) and also improving on the various other existing indices as systematically analysed by Ferrant (2013). The GDRI measures disparity between men and women, in all the four sectors of education, health, employment and decision-making. I then study the association of district-level GDRI with various forms of individual-level domestic violence and opinions on domestic violence (DV). It is found that GDRI is negatively associated with women's opinions on DV. A 1 unit increase in the district GDRI is significantly associated with a 1.61 percentage point decrease in the probability that a woman experiences sexual DV. I also find that a 1 unit increase in the district GDRI is significantly associated with a 2.51 percentage point increase in the probability that a man considers beating his wife justified in the event that she fails to cook food properly. As further robustness checks, I run regressions on a Domestic Violence index created using z-scores, following Bhalotra et al. (2021). I further create separate indices for women's and men's opinions on domestic violence (WODVI and MODVI) using principal component analysis (PCA) and run regressions. I find that the main results are consistent with the general findings in my robustness checks. The results are also in line to the literature of both the male backlash theories (like Eswaran and Malhotra (2011)) and the gender inequality being positively related to DV (like Aizer (2010)).

Following this introductory section, this paper is structured as follows. In Section 2 I review the previous literature and background on DV and gender disparity and also the literature linking the two, identifying the research gap into which this paper fits. Section 3 discusses the data sources and the variable construction for my empirical models. In Section 4, I explain the research methodology used in the paper and the summary statistics of the main model. Section 5 discusses the main results and inferences from my data analysis. Section 6 discusses some additional results generated on other methods. And

lastly, I draw the conclusions in section 7.

2.2 Literature Review and Background

This section, in addition to reviewing the literature, also provides some background to my own research questions, solidifying my motivation. There is a great body of literature studying the scenario of domestic violence (DV) and intimate partner violence (IPV) in connection to the themes of intra-household bargaining model, male backlash theory, support services and laws, health and well-being of children, dowry economics and gender inequity and discrimination. There is evidence of increasing rates of DV being associated with both the lack of women empowerment and the rise of women empowerment within the household dynamics. However, the topic of DV in connection to district gender inequality in the Indian economy seems to be somewhat understudied.

I begin with intra-household bargaining, which is a popular family-economic model used to study domestic violence against women (DVAW). A prominent earlier work in this field is by Farmer and Tiefenthaler (1996) that uses a strategic non-cooperative bargaining model (in game theory) to demonstrate that women experiencing DV use support services as a credible threat point when they go back to their abusive husbands. This is crucial in reducing the incidences of spousal violence experienced by them and in improving their overall quality of life by increasing their bargaining power.

In the paper by Amaral et al. (2021), the impact of recently established women police stations (WPS) in India is examined on the reporting of gender based violence and on women empowerment. They find evidence of women's labour supply increasing after the establishment of WPS, as they feel much safer with the WPS in place as the costs of reporting[3] violence seem to fall[4]. In the context of support services available to battered women in the LDCs, Sato et al. (2022) also find that in rural India even though SHGs can help reduce DV in the short run, in the medium run DV may increase as SHG participation increases tension between men and women[5] This might be indicative of a "male backlash effect", which is the phenomenon where DV increases with women's options and

[3]Due to the shaming, lack of empathy and often further harassment in male operated police stations (Heise et al. (1994), Saravanan (2000)

[4]Amaral and Bhalotra (2017) use administrative crime data and data from the implementation of WPS establishments across Indian cities.

[5]Sato et al. (2022) use data from rural areas in the Indian state of Andhra Pradesh for the years 2004, 2006 and 2007 to investigate the impact of participation in self help groups (SHG) on the domestic violence frequency.

freedom increasing as men feel threatened of losing their authority within the household, atleast in the short-run.

Another important paper that I follow in connection to intra-household bargaining is the one by Eswaran and Malhotra (2011) that studies the relationship of DV with gender norms in South Asia and specifically in India. The authors observe that abusers use violence to increase their bargaining power within the household, in line with evolutionary theories. They further find that better employment opportunities are often accompanied by increased wife battering, suggesting male backlash again. So, the authors suggest that along with such opportunities, more help services for battered women must be created to control DV. In similar lines, a more recent paper by Nuhu (2015) uses an intra-household bargaining model on DV and demonstrates that straight-forward, simply laid out laws against DV can protect women from domestic abuse, by improving women's bargaining power in the household and helping them to have more rights to take decisions for the children.

"Male Backlash" is also studied as the underlying cause of intimate partner violence (IPV) in urban India by Dhanaraj and Mahambare (2022), who find that employed and salaried women after marriage face considerably higher IPV levels compared to women who are engaged in household chores only and work without pay. They introduce the concept of "female guilt channel" [6], which in turn increases their exposure to IPV - a result that shows me women are biased against themselves. IPV in connection to paid work is also studied by Aizer (2010), who empirically proves that reducing wage differences between men and women increases women's bargaining power within the household, thereby decreasing incidences of DV. The author finds that over long run, the steady decline in the wage gap between men and women is reflected in significant decrease (about 9% decrease) in DV incidences. However, Aizer (2010) doesn't find male backlash in her study, though that is perhaps because Aizer's study uses me panel data and contextual factors might matter here.

A major sub-category of domestic violence (DV) that the literature discusses widely is the violence suffered by women in India due to dowry-related reasons. Women in marriages and intimate relationships are known to suffer DV due to inability to meet the de-

[6]The "female guilt channel" refers to the phenomenon where employed women justify IPV more than women who are not involved in paid employment.

mands for dowry[7] as discussed by both Saravanan (2000) and Heise et al. (1994). Dowry deaths are also quite common among the extreme forms of domestic violence in India. An early paper by Menon (1999) describes the oft-practiced manoeuvre of "bride-burning"[8] in dowry-related crimes. Despite being on the verge of losing life, an Indian woman is threatened by her in-laws or husband to conceal the truth from the police. This forces her to choose silence, as observed by Saravanan (2000), trapping her into a miserable life of constant violence. Dowry deaths seem to have risen over the years as empirically analysed in the paper by Dang et al. (2018). Belur et al. (2014) have in fact examined in their theoretical paper the sole situation of bride-burning cases in India, interviewing burn victims in Delhi and Mumbai. They observed that most of these victims do not report being abused out of fear: fear of what the in-laws might do and fear of being unable to protect their children. Both Belur et al. (2014) and Dang et al. (2018) mention high inefficiency of the police and the judiciary system in punishing the perpetrators associated with the dowry deaths[9]. Dang et al. (2018) conclude that the strong influence of the biased social gender norms need to be addressed in order to really cure the society of such an aggressive patriarchy.

Earlier theoretical papers like Heise et al. (1994) and Saravanan (2000) also discuss how DV and intimate partner violence (IPV) often have significant health consequences, leading to illness, injuries and even in death of women. Furthermore, investigating the impact of IPV faced by pregnant women on the children born, Rawlings and Siddique (2020) [10] find that children of abused mothers are 0.4% more likely to die within the first thirty days after birth in comparison to children of mothers who did not face any abuse during the pregnancy[11].

Bhalotra et al. (2021) study the impact of variations in male and female rates of unemployment on intimate partner violence (IPV) in developing countries over ten years.

[7] Dowry is the practice of giving money, goods or/and jewellery by the bride's family to the groom's family during the wedding Saravanan (2000).

[8] Bride-burning refers to setting fire on the bride or a newly married woman by the husband and in-laws, who usually claim afterwards that the woman died of a kitchen accident.

[9] The authors construct a "marriage squeeze" variable, whereby with rise in age, females are increasingly forced to "adjust" to husband's family's demands. This is because it is perceived that the marriageability of adult females falls with rise in age, causing the amount of dowry to be paid the bride's family to rise, which when they are unable to pay, the husband and in-laws may beat up the bride.

[10] They use data from the Demographic and Health Surveys (DHS) across 30 various developing nations on about 0.6 million children born between the years 1975-2013.

[11] They also observe that the likelihood of death increases with time after birth by about 0.9% within a year and 1.5% within first five years of being born; and even if the children survive, they show low weight at birth, followed by stunted growth.

They find that a 1% increase in male unemployment rate leads to 2.75% increase in physical domestic violence faced by women owing to the psychological stress created by the unemployment. It is also found by the authors that female unemployment conditional on male unemployment leads to a reduction of domestic violence. The relationship between economic opportunities and DVAW has been explored by many authors. Gebresilassie (2019) also demonstrates the importance of economic independence and higher education for women to reduce DV in Ethiopia[12]. He finds that husband's level of education, sex composition of child and women's lower economic status were among the statistically significant factors affecting DV faced by women.

Gender inequality and discrimination also has important implications for economic development. Duflo (2012) shows how on one hand, development drives down gender inequality while on the other hand, gender inequality hinders development. Discussing a vicious circle exists between gender inequality and economic development, in lines with Duflo (2012), Ferrant (2013) develops the Multidimensional Gender Inequality Index (MGII)[13], which is closely followed in the development of an index in this paper. The MGII ranking of countries by extent of gender inequality shows me that South Asia suffers from most gender inequality (Ferrant (2013)). However, Jayachandran (2015) discusses the different mechanisms[14] through which gender inequality and economic development are related[15] and shows that with economic growth, gender inequality in most countries is likely to reduce.

Thus, from the above discussion of the literature, I observe that in many of the previous papers like Sato et al. (2022), Farmer and Tiefenthaler (1996) and Amaral et al. (2021) who study domestic violence (DV) in the context of support services and women-friendly administration available to battered women. Then again, while papers like Aizer (2010) and Eswaran and Malhotra (2011) have studied DV as an outcome for inequality in gender roles, some important dimensions of gender inequality have not been taken into account by them. This is despite various existing gender inequality measures, which already take into account a number of human development dimensions, as highlighted by Ferrant (2013).

[12]The author uses data from the 2016 Ethiopia Demographic and Health Survey from a sample of 2,663 women, who were interviewed with the specially designed domestic violence module.

[13]which has been developed using the data from UNDP, World Development Indicators and other sources for the years 2000-2010 following the methodology of the Gender Inequality Index (GII) of UNDP. Ferrant (2013) uses multiple correspondence analysis (MCA) to create a non-linear weighted index of gender inequality measured across eight dimensions of gender inequality identified.

[14]These mechanisms are: expansion of the services sector, technological advancement in carrying out household chores, and with medical advancement the risk and frequency of childbirth getting reduced.

[15]She uses data from the 2011 Demographic and Health Survey (DHS); World Values Survey (WVS), wave 5 data; and from World Development Indicators (WDI) of the World Bank.

My contributions to this body of literature therefore would therefore be: (1) building an index measuring the gender disparity at the district-level, i.e., disparity between men and women, within the household in all the four sectors of education, health, employment and household decision-making, (2) creating an index for opinions of domestic violence by using principal component analysis (PCA), (3) using this gender disparity index in studying empirically the link between gender disparity and DV.

2.3 Data and Variable Construction

In order to empirically model the main research question, I use data from the National Family Health Survey (NFHS) Data for the years 2015-16 and 2019-21, i.e., NFHS-4 and NFHS-5, collected from the website of Demographic and Health Surveys (DHS). The NFHS is an all-India survey done with a sample of a few representative households from every district in India. NFHS-4 (2015-16) was the collected data from a total of 601,509 households, with 699,686 women and 112,122 men (NFHS-4 Report (2015)). It was conducted by 14 field agencies over the period of 20th January 2015 to 4th December 2016. NFHS-4 also provided data for certain new important indicators of health and family welfare, like abortion, violence during pregnancy etc. NFHS-5 (2019-21) was collected over the years of 2019, 2020 and 2021, with the COVID-19 pandemic causing some disruption in the data collection process (NFHS-5 Report (2020)).

Both of these surveys collect information in four areas: Household, Individual, Couple and Biomarker. I use data from the women's and men's recodes from both NFHS-4 and NFHS-5 for the gender disparity model, combining them to get a total of 1,423,801 number of observations originally. However, after removing the outliers of all the variables from the dataset, I was left with 117,799 observations to run the GDRI regressions on[16]. In all its analyses, DHS uses sample weights to make the sample a representative of the entire population. These rounds of NFHS collected data on some indicators of family welfare and health, which are relevant to this research, like opinions on sexual behaviour and presence of domestic violence.

[16]When combining these two datasets, I could only take the variables for which data was available in both the years and often for both the genders, even though some other variable might have been better suited to my data analysis. Also, I removed all the outliers from my data.

2.3.1 GDRI Data and Construction

Using the NFHS data, the gender disparity in this paper is captured by an index, which I call the Gender Disparity Ratio Index (GDRI), modelled in the pattern of Global Gender Gap Ratio (GGGR) (GGGR (2014)). The GDRI combines four district-level gender disparity (GD) variables measuring the disparity between men and women in education, employment, health, and household decision-making. For education, highest level of education attained and literacy level have been considered. Highest Education Level (HEL) is a binary variable, with "primary or no education" taking value 0 and "secondary or higher education" taking value 1. Literacy (Lit) is also a binary variable with "can read partially or not at all" taking value 0 and "can read" as 1.

For employment, I consider whether the person is currently working or not. If the person is currently working, then the response value is 1, otherwise 0. For health, I take into account whether the person is taking any medication for diabetes and high blood pressure[17]. If the respondent is taking medicine, then value is 1, otherwise 0. The use of medication-taking as the relevant indicator aligns with widespread public health practice: BP and diabetes are among the few chronic conditions for which women across socioeconomic settings frequently undergo free check-ups and receive regular medication from village-level health centres. For household decision-making (HDM), whether wife has a say in large household purchases has been considered[18].

[17]The idea was to capture the disparity in male and female health condition as well as capture the awareness about it. The health component of the GDRI relies on two conditions measured consistently in NFHS-4 and NFHS-5 for women aged 15–49: high blood pressure and diabetes. Both conditions are relatively common in this age group. Hypertension prevalence among women 15–49 has ranged roughly between 12–15%, and diabetes between 2–4%, according to the descriptive statistics in both NFHS rounds (Yadav et al. (2023), Rana et al. (2024)). Even when the woman herself or members of the household people are aware of the woman suffering from a commonly diagnosed health condition like blood pressure or diabetes, their need for medical treatment is often overlooked. Improvement in female health condition is not just a responsibility of the woman alone, but also of the other household members. GDRI's health dimension therefore captures not only gender differences in 'treatment conditional on diagnosis', but also gender differences in health awareness, diagnosis rates, and access to routine screening. In the Indian context, where awareness gaps and delayed detection are themselves important forms of gender inequality in health, this conditional structure is substantively meaningful rather than merely a limitation. Also, these variables were consistently available for both men and women across the two waves, while other health variables like "who decides on your healthcare?" or "number of of visits to the hospital/ clinic" are not uniformly available.

[18]I do not take any other decisions into account for the following reasons: (1) This is one of the most important economic decisions within the household affecting women. (2) Taking other decision variables was not possible as not every question's responses were available in both the men's and women's datasets. (3) This variable takes into account the perceptions of men and women regarding whether the wife has a say and measures the disparity on that. There may be reporting error for this. But, if the wives think more than the husbands that wives have a say, i.e., the ratio being in favour of women, then disparity in HDM is less, and vice-versa.

For each of these variables, I then calculate the district averages (in terms of percentages). Using these district averages, the district gender disparity ratios for each of the individual indicators are calculated. Then, for each of the four dimensions of education, employment, health and household decision-making, I calculate the weighted averages. For education and health, which constitute of more than one indicator, the gender disparity ratio is calculated by taking the weighted average of the gender disparity ratios of the two constituting indicators. So, for education, I calculate the weighted average of the gender disparity ratios of highest education level (HEL) and literacy level. Similarly, for health, I calculate the the weighted average of the gender disparity ratios of diabetes medication and blood pressure medication usage.

The gender disparity ratio is in terms of male to female ratio in order to keep gender disparity directly proportional to women's well-being in every dimension. Intuitively, as women become worse off in comparison to men, or men become better off with respect to women, gender disparity rises. So, with the values of GDRI increasing, gender disparity rises; while with the GDRI values falling, gender disparity falls. Finally, the simple average of these four weighted averages gives me the Gender Disparity Ratio Index (GDRI). In constructing the GDRI, I considered all observations that did not represent meaningful numerical values as outliers and excluded them from my dataset. Specifically, NFHS codes responses such as "don't know," "not applicable," "refused," or "other" using extreme placeholder values (typically 9, 99, or 999, depending on the variable). These are not true outliers in the statistical sense but non-numeric missing categories. I therefore removed all observations taking the values 9, 99, or 999 before computing the gender-disparity ratios. This prevented non-responses from mechanically inflating or distorting the GDRI and ensured that the index reflected only valid and substantive respondent information.

The Gender Disparity Ratio Index (GDRI) is therefore measured by taking the simple average of the weighted averages of the gender disparity ratios of education, employment, household decision making and health measured at the district-level. In line with the methodology used in the Global Gender Gap Reports (GGGR) (GGGR (2014)), in order to find out the weights, I first calculate the standard deviations for each of the indicator ratio variables, and normalise them by dividing 0.01 with each of these standard deviations. So, if SD_a is the standard deviation for disparity ratio variable i, then I get w'_i by normalising it as follows: $w'_i = \frac{0.01}{SD_i}$. Then, if the dimension x is measured by, say, three

variables a, b and c, then the final weight for the variable a is calculated as follows:

$$w_{\mathrm{a}} = \frac{{w'}_{\mathrm{a}}}{{w'}_{\mathrm{a}} + {w'}_{\mathrm{b}} + {w'}_{\mathrm{c}}} \tag{2.1}$$

Next, the weighted average of all the three indicators, represented by variables a, b and c, constituting the dimension x is calculated to find the weighted average of the dimension x as follows:

$$WA_{\mathrm{x}} = \frac{w_{\mathrm{a}} * a + w_{\mathrm{b}} * b + w_{\mathrm{c}} * c}{3} \tag{2.2}$$

In my paper, the GDRI constitutes four dimensions, i.e., education (Edu), employment (Emp), health (Heal) and household decision making (HDM). Therefore, x = Edu, Emp, Heal, HDM. Employment (measured by currently working status) and Household decision-making (measured by whether wife has final say in large household purchases) constitute of only one variable each, so the weights for each of these variables would be 1. However, following (3), I have to calculate the weights for Highest Education Level (HEL) and Literacy level (Lit) constituting the 'Education' indicator as well as the weights for Diabetes (Diab) and Blood Pressure (BP) constituting the 'Health' indicator. Then, applying these weights in equation (4), I calculate the weighted averages for the Education and Health dimensions. For each of the four dimensions, I calculate the weighted averages for the district-level male:female data in the above procedure. Finally, I calculate the Gender Disparity Ratio Index (GDRI) as a simple average of the weighted averages of all the dimensions by the following formula:

$$GDRI = \frac{WA_{Edu} + WA_{Emp} + WA_{Heal} + WA_{HDM}}{4} = \frac{\sum_{x=1}^{4} WA_x}{4} \tag{2.3}$$

where x=1,2,3,4 stands for each of the four dimensions, i.e, education, employment, health and household decision making; and $\mathrm{WA_{Edu}}$, $\mathrm{WA_{Emp}}$, $\mathrm{WA_{Heal}}$ and $\mathrm{WA_{HDM}}$ are the weighted averages of these four dimensions.

2.3.2 Domestic Violence Data and Construction

I use the variables from the NFHS datasets recording women's experiences of domestic violence (DV) as well as both men's and women's opinions on justifying wife-battering. There are four broad kinds of DV inflicted by the husband/spouse considered in the DHS questionnaire: (1) emotional, (2) sexual, (3) severe physical and (4) less severe physical.

I have merged the categories of severe and less severe physical DV into one category of physical DV. Thus, I have three binary variables for DV experienced, 0 for "not experienced" and 1 for "experienced". The men's and women's opinions on wife battering (hereafter referred to as ODV variables) in various scenarios have also been taken into account to account for the lack of reporting of DV experienced. The ODV takes five different forms of variables each for men and women, i.e., whether the men and women are of the opinion that the wives should be beaten up (i) for going out without telling him, (ii) for neglecting the children, (iii) for arguing with him, (iv) for refusing to have sex with him and (v) for not cooking food properly. All of these 10 variables are binary in nature, 1 for "yes, consider beating justified" and 0 for "no, consider beating not justified". All the DV variables, i.e., both experiences and opinions, are at individual-level.

Though the DHS data has been found in previous literature to take into account the specific problem of under-reporting in domestic violence (DV) cases, a certain level of under-reporting still exists in the data. A lot of women don't report being abused by their husbands, from a sense of loyalty or fear of losing shelter (Belur et al. (2014), Dang et al. (2018)). Indeed, in many parts of India, women are conditioned to accept and tolerate chastisement from husbands as a "marital prerogative", which prevents them from identifying themselves as being abused at all (Saravanan (2000), Heise et al. (1994)). This is the reason I also take into account the opinions of men and women on domestic violence (DV), as people's opinions about DV might be reflecting of their actual experiences with DV even if they might be reluctant on revealing those. Although opinions could also be influenced by social desirability bias and true opinions might not be reported, given the increasing laws and campaigning against DV[19].

In order to study gender discrimination at the district-level and treat for the endogeneity concerns in the main specification model to some extent, I aggregate the data for the main predictor independent variables to district level, while keeping the dependent vari-

[19]I acknowledge the sources of possible endogeneity in my models mostly due to measurement errors, or reverse causality. For example, whether people are currently employed or not, there might be a reverse causality with domestic violence (DV) as women might be not working due to the fear of facing more DV at home. Then again, the variable for who has the final say in large household purchases, there might be a measurement error or reporting bias in the original data source. Similarly, for who is suffering from diabetes and high blood pressure, there might again be measurement error and reverse causality, as women who suffer from constant DV might be more prone to suffering from health conditions like high blood pressure. I try to address these problems to some extent by taking the main predictor variable at the district level while keeping the main outcome variable at the individual level. I also control for a number of demographics as well as remove outliers from my data. However, the results in this paper are only associations revealed, and I am not claiming to report any causal-effects.

ables at the individual level. The aggregation is done by averaging each of the women's and men's datasets to the district level for every independent variable. So, by aggregating the independent variables to district-level, it is observed that the association of these district-level variables with the domestic violence experienced by women at individual level[20].

2.3.3 Covariates Data and Construction

I control for the individual's age, religion, wealth index and location type. Age is a numerical variable. Religion is a categorical variable divided into six different individual dummies: Hindus, Muslims, Sikhs, Christians, Buddhists and Others. Wealth Index is a binary variable with two categories of "middle or rich" and "poor", the former taking value 1 and the latter 0. Location Type is also a binary variable with two categories of "urban" and "rural", the former taking value 1 and the latter taking value 0.

I also control for the extent of infrastructural development in a district by its nightlights data. The reasoning is here that the extent of development in a district can be measured by the reach of electricity, which can be gauged by the nightlights, in a district. The nightlights data is obtained from the district level "nightlights composite" variable in the Geographic coordinates recodes (spatial data) provided by the DHS for the same two waves of 2015-16 and 2019-21.

2.4 Methodology and Summary Statistics

2.4.1 Research Methodology

This section discusses the methodologies used for the data analysis in this paper. I run several multivariate Ordinary Least Squares (OLS) regressions with various combinations of variables. In answer to the research question, I use the Gender Disparity Ratio Index (GDRI) as my main predictor variable and the three broad kinds of domestic violence (DV) as individual outcome variables. I also create a fourth DV variable that captures if a woman experiences at least one of the four forms of domestic abuse.

$$DV^{x}_{idt} = \alpha_{idt} + \beta_{dt} GDRI_{dt} + \gamma_{idt} \mathbf{C}_{idt} + \delta_{dt} NL_{dt} + \phi_{d} + \phi_{t} + \epsilon_{idt}, \tag{2.4}$$

[20] For example, while district-level gender disparity in highest education, employment or health is likely to be related to individual-level domestic violence faced by women, through percolated gender norms, the relationship is unlikely to be the other way round, reducing the chances of reverse causality and reducing measurement error to some extent.

where DV^{x}_{idt} is the xth type of domestic violence (DV) experienced by the ith woman from her spouse in the dth district in year t. The three kinds of DV experienced,i.e. physical, sexual and emotional DV are all binary variables measured at individual-level, with 1 recording affirmation of the violence experienced. An additional DV variable is used that takes value 1 if the ith woman suffers any one (atleast) of the three types of DV, else 0. $GDRI_{dt}$ is the Gender Disparity Ratio Index of households for the dth district in year t measured through the gender disparity ratio variables in the four sectors of education, employment, health and household decision making. An increase in the GDRI signifies an increase in the disparity between men and women in the districts, with women being worse-off than men on average. C_{idt} is the set of control variables capturing the cultural and demographic characteristics specific to the ith individual in the dth district in year t. This includes religion, age, location type and wealth index considered at individual level for both men and women responders. NL_{dt} captures the district-level nightlights in year t, representing the infrastructural development in the district. The β_{xdt} coefficient give me the extent to which district-level gender disparity impacts individual-level domestic violence experienced. ϕ_d and ϕ_t are the district and year fixed effects respectively. Because GDRI is constructed at the district level across two waves of NFHS, its variation comes only from differences between NFHS-4 (2015–16) and NFHS-5 (2019–21). Thus, the estimated coefficients reflect how changes in district-level gender norms between these two survey rounds are associated with women's domestic violence outcomes and attitudes, controlling for observed characteristics. The standard errors have been clustered at the district-level[21].

I also run regressions using the GDRI on the opinions of men and women on domestic violence (MODV and FODV) according to the general specification below:

$$ODV_{1idt} = \alpha_{1idt} + \beta_{1dt} GDRI_{dt} + \gamma_{1idt} \mathbf{C}_{1idt} + \delta_{1dt} NL_{dt} + \phi_d + \phi_t + \epsilon_{1idt}, \tag{2.5}$$

where ODV_{1idt} captures the measures for women's and men's opinions on domestic violence in five different scenarios on domestic violence respectively in the ith household and the dth district in year t, i.e., whether wife battering is justified in specific cases. Each of these five ODV variables are binary and at individual-level, taking value 1 if they justify

[21] This model might be looked at as a linear probability model (LPM), given the dependent variables in the main analysis are binary variables. A linear probability model (LPM) has been used here primarily for its interpretability and transparency. The coefficients from an LPM directly represent marginal effects in probability terms, which makes it straightforward to communicate results, especially when working with fixed effects and multiple control variables.

beating in the given scenario, 0 otherwise. I also consider an additional ODV variable that takes the opinion of beating being justified in at least of the five scenarios. All the other variables bear the same meaning as the previous equation.

As robustness checks, I report the results of regressions run on indices created for the DV experienced and the opinions on DV. I also report results from gender disparities in each of the four dimensions individually. In order to emphasise the importance of the district fixed effects, I also report results from a pooled OLS model without the district fixed effects in the section of 'Additional Results' in order to compare the two models.

2.4.2 Summary Statistics

In this section, I discuss the results of the main model used for this paper. Table 2.1 presents the summary statistics for the independent variables in this model used to calculate the gender disparity ratios and thereafter the district-level gender disparity ratio index (GDRI). The gender disparity ratios are calculated for six variables in four different dimensions. As I observe, the number of observations for women are larger than those of men, as not all women who were interviewed for the NFHS surveys had a spouse to match with. Women who were interviewed for domestic violence module included women who were widowed or separated from their husbands. The means of the variables show that a much larger proportion of men are literate and have secondary or higher level of education each at about 75%, compared to proportions of women for these variables at only around 54% each. For employment, the mean values are just reversed for the two genders: while about 75% of men are currently working, around 75% of women are not currently working.

Table 2.1: Summary Statistics of the Independent Variables at Individual level used to create the district-level Gender Disparity Ratio Index (GDRI)

Variable	Obs	Mean	Std. Dev.	Min	Max
Women					
Education:-					
Highest Level of Education	.	.	.	.	.
- Primary or no education	986784	.455	.498	0	1
- Secondary or higher	986784	.545	.498	0	1
Literacy Level	.	.	.	.	.
- Can read partially or not at all	986784	.47	.499	0	1
- Can read	986784	.53	.499	0	1
Employment:-					
Currently Working or not	.	.	.	.	.
- No	156151	.746	.435	0	1
- Yes	156151	.254	.435	0	1
Household Decision Making:-					
Large Household Purchases	.	.	.	.	.
- Wife doesn't have a say	156151	.223	.416	0	1
- Wife has a say	156151	.777	.416	0	1

Table 2.1: Summary Statistics of the Independent Variables at Individual level used to create the district-level Gender Disparity Ratio Index (GDRI)

Variable	Obs	Mean	Std. Dev.	Min	Max
Health:-					
Diabetes Medication	.	.	.	.	.
- No	986784	.981	.135	0	1
- Yes	986784	.019	.135	0	1
Blood Pressure Medication	.	.	.	.	.
- No	964327	.966	.182	0	1
- Yes	964327	.034	.182	0	1
Men					
Education:-					
Highest Level of Education	.	.	.	.	.
- Primary or no education	204647	.246	.431	0	1
- Secondary or higher	204647	.754	.431	0	1
Literacy Level	.	.	.	.	.
- Can read partially or not at all	204647	.253	.435	0	1
- Can read	204647	.747	.435	0	1
Employment:-					
Currently working or not	.	.	.	.	.
- No	204646	.245	.43	0	1
- Yes	204646	.755	.43	0	1
Household Decision-Making:-					
Large Household Purchases	.	.	.	.	.
- Wife doesn't have a say	129507	.075	.264	0	1
- Wife has a say	129507	.925	.264	0	1
Health:-					
Diabetes	.	.	.	.	.
- No	204647	.979	.857	0	1
- Yes	204647	.021	.143	0	1
Blood Pressure	.	.	.	.	.
- No	195925	.975	.844	0	1
- Yes	195925	.025	.156	0	1

Data source: NFHS-4 and NFHS-5, Individual (Women's) and Men's Recodes

As far as wives having a say in large household purchases is concerned, about 92% of men respond that wives have a say, while about 78% of women respond that wives don't have a say. The disparity here is indicative of how men and women perceive equality in decision-making. Gender-biased norms may make it seem for the men that "less is more" in terms of freedom and rights for women, as explained by Eswaran and Malhotra (2011). Less may be more even for the women, used to as they are to generations-long depravity and cultural norms. For the health variables, the proportions of men and women are nearly equal, with slightly more women (about 3.4% than men's 2.5%) reporting to be suffering from blood pressure and slightly more men (about 2% in comparison to women's 1.9%)suffering from diabetes.

In the following figure 2.1, I provide a map of India showing the changing levels of gender disparity measured by GDRI in the Indian districts from 2019-21 to 2015-16[22]. Darker the colour, higher is level of disparity between men and women. The areas shaded in red

[22]This map have been generated using the 2020 shape-files for the districts of India (source: ArcGIS (2020).)

and orange are districts where the GDRI has increased between the span of two waves, while the areas shaded in the two lighter shades of yellow are districts where the GDRI has remained unchanged or has decreased in this span. In the map, the gender disparity seems generally in the middle-high levels in the southern, central, northern India and also parts of western and eastern India. As I can also observe, in the northern regions, the levels of gender disparity have increased from 2015-16 to 2019-21, marked by more darker colours. In the south western region also, the gender disparity seems to have risen by the density of dark colours. In the south eastern region though, the disparity seems to have fallen slightly. The gender disparity in the middle of central India again seems to have risen. However, in the western, southern-eastern and north-eastern tips of the country, the gender disparity may have remained the same or fallen over the years in the districts. I also present the summary statistics for the control variables for this model in the Appendix in Table A1.1.

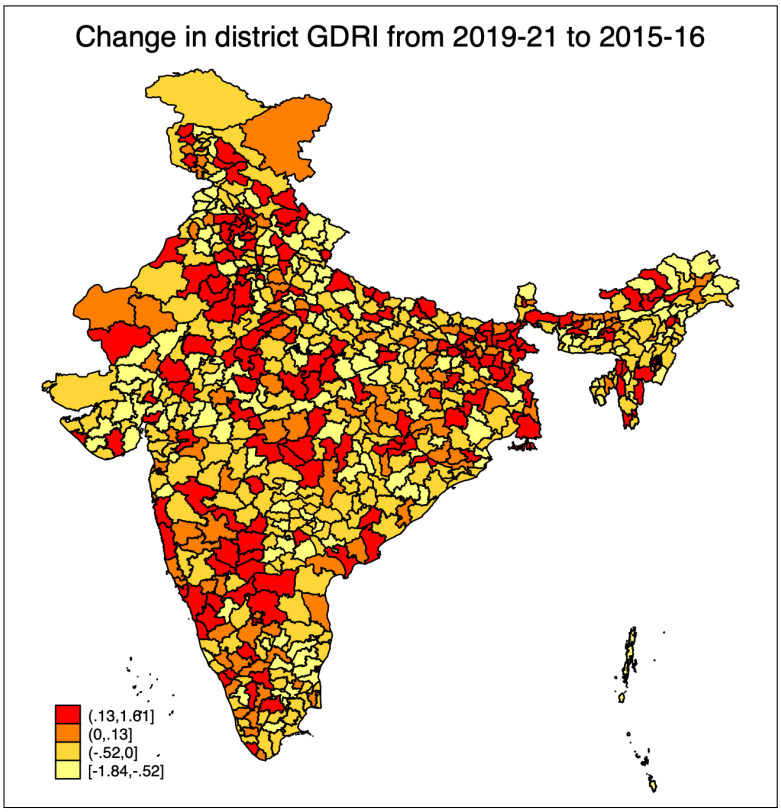

Figure 2.1: Map of India with changes in district GDRI plotted from 2019-21 to 2015-16

In Table 2.2, the summary statistics of the dependent variables capturing experiences and opinions on domestic violence (DV) are given. Because these are binary indicators, the reported means can be interpreted directly as proportions. Of the 117,799 women who responded on the DV modules in the NFHS, most of the women admit to have not experienced one or the other forms of domestic violence. 27%, 11.8% and 5.7% of

the women admit to have experienced physical violence, emotional violence and sexual violence respectively. 69.6% of the women admit to have experienced at least one of the three kinds of DV: physical, emotional, and sexual. This variable captures where the respondent reports experiencing more than one form of domestic violence[23]. For the opinions on domestic violence (ODV) of both the men and women, the proportions indicate that both men and women generally do not justify wife-beating, although women report higher acceptance rates than men across all scenarios.

Table 2.2: Summary Statistics of the Dependent Variables at Individual-level of the GDRI Model

Variable	Obs	Mean	Std. Dev.	Min	Max
Domestic Violence Experienced by Women:-					
Physical DV	.	.	.	.	.
No	117799	.73	.444	0	1
Yes	117799	.27	.444	0	1
Emotional DV	.	.	.	.	.
No	117799	.882	.323	0	1
Yes	117799	.118	.323	0	1
Sexual DV	.	.	.	.	.
No	117799	.943	.231	0	1
Yes	117799	.057	.231	0	1
Any DV	.	.	.	.	.
No	117799	.696	.46	0	1
Yes	117799	.304	.46	0	1
Women's Opinions on Domestic Violence:-					
Beating justified if wife goes out without telling husband	.	.	.	.	.
no	156151	.784	.411	0	1
yes	156151	.216	.411	0	1
Beating justified if wife neglects children	.	.	.	.	.
no	156151	.724	.447	0	1
yes	156151	.276	.447	0	1
Beating justified if wife argues with husband	.	.	.	.	.
no	156151	.756	.43	0	1
yes	156151	.244	.43	0	1
Beating justified if wife refuses to have sex with husband	.	.	.	.	.
no	156151	.878	.328	0	1
yes	156151	.122	.328	0	1
Beating justified if wife doesn't cook food properly	.	.	.	.	.
no	156151	.839	.368	0	1
yes	156151	.161	.368	0	1
Men's Opinions on Domestic Violence:-					
Beating justified if wife goes out without telling husband	.	.	.	.	.
no	204647	.854	.354	0	1
yes	204647	.146	.354	0	1
Beating justified if wife neglects children	.	.	.	.	.
no	204647	.818	.386	0	1
yes	204647	.182	.386	0	1
Beating justified if wife argues with husband	.	.	.	.	.
no	204647	.814	.389	0	1
yes	204647	.186	.389	0	1

[23] As a result, the prevalence of "any DV" (30.4%) is not expected to be the sum of the individual categories. The overlap across categories compresses multiple forms of violence into a single indicator, which is why the individual incidence rates appear to sum to more than the overall incidence of DV. Instead, "any DV" records a value of 1 if a woman experienced at least one of the three forms.

Table 2.2: Summary Statistics of the Dependent Variables at Individual-level of the GDRI Model

Variable	Obs	Mean	Std. Dev.	Min	Max
Beating justified if wife refuses to have sex with husband	.	.	.	.	.
no	204647	.915	.279	0	1
yes	204647	.085	.279	0	1
Beating justified if wife doesn't cook food properly	.	.	.	.	.
no	204647	.904	.294	0	1
yes	204647	.096	.294	0	1

Data source: NFHS-4 and NFHS-5, Individual (Women's) and Men's Recodes

In fact, a larger proportion of the men are of the opinion that beating wife is not justified in any of the scenarios. These statistics are probably reflective of the social-desirability bias in the reports and the pressure created by the law against husbands and in-laws subjecting wives to domestic abuse, which is a punishable offense according to the Protection of Women from Domestic Violence Act, 2005 (Government (2005)). Although the DHS takes many measures to counter under-reporting or false-reporting including special trainings for interviewers and special design for the domestic violence module interview, as explained in Bhalotra et al. (2021).

I also provide the state-wise levels of men's and women's opinions on domestic violence in figures A1.3 and A1.4 in the Appendix. However, I are unable to draw conclusions about opinions on domestic violence from the levels observed in these figures because (1) men are afraid of legal consequences for engaging in domestic violence and therefore might be concealing their true opinions, (2) women by social conditioning might be protecting their husbands or are under threats, and therefore might be concealing their true opinions, (3) as before, the opinions on domestic violence are only reflective of the physical violence experienced by women and not of the emotional or sexual violences.

Table A1.7 reports district-level male-to-female ratios for six GDRI subcomponents by NFHS wave. Between NFHS-4 and NFHS-5 the mean ratios fall for most components: highest-education (HEL) declines from 1.274 to 1.192, literacy from 1.282 to 1.222, employment from 3.991 to 3.559, household-decision-making (HDM) from 1.242 to 1.174, and diabetes medication from 1.752 to 1.705. Blood-pressure medication moves in the opposite direction, from 0.862 to 0.984, indicating that the gender gap in BP medication largely closes by NFHS-5. The results therefore show a modest narrowing of gender gaps on education, literacy, decision-making and diabetes treatment between waves, while a very large employment gap persists (men remain roughly three to four times more likely

to be employed than women). However, it is to be noted that the disparity ratios are still greater than one, indicating that men are relatively advantaged on that margin.

Table A1.8 shows substantial regional heterogeneity. The West and East register the largest HEL and literacy gaps (means 1.29 and 1.30 respectively), while the South exhibits the smallest highest education level and literacy gaps (means 1.14 and 1.17 respectively). Employment disparities are largest in the North (3.99) and remain very large across all regions. Diabetes-medication gaps are particularly pronounced in the East and North-East (1.90), whereas the North shows a notably lower diabetes ratio (1.29). The South is the only region where the BP-medication ratio exceeds one (1.01), consistent with the national movement toward parity on this measure. Both of these tables therefore indicate modest, broad-based improvements in several GDRI subcomponents between waves but persistent and large labour-market gaps and clear regional pockets of disadvantage.

2.5 Main Results

I now report the results of the OLS regressions run on the main model as discussed previously, with GDRI as the main predictor variable and the three individual kinds of domestic violence (DV) variables measured separately. I generate a variable called "Any DV" as well which records whether the women faced at least any one of the different types of DV forms, as explained before. Table 2.3 reports the results of regressions run on individual variables of DV experienced, with GDRI as the main predictor variable. I observe that all the coefficients are negative, which indicate an inverse relationship between GDRI and the DV variables. The association is statistically significant and negative for sexual domestic abuse.

A one-unit increase in the district gender disparity is associated with a 1.61 percentage point decrease in the probability that a woman experiences sexual DV. This estimate also is statistically significant at 1% level. This further means that with rise in gender disparity at the district-level, women experience less DV, especially sexual DV (when the individual categories of DV are measured separately). This might imply that as gender disparity begins to fall, men start to get more threatened of losing their position in the power dynamics and resort to violence as a way of re-establishing their superiority, in line with the theories of male backlash (Eswaran and Malhotra (2011), Bhalotra et al. (2021) and Bandyopadhyay et al. (2020)).

Table 2.3: Regression Results of GDRI on individual categories of Domestic Violence Experienced by Women

	(1)	(2)	(3)	(4)
Variables	**Any DV**	**Physical DV**	**Emotional DV**	**Sexual DV**
GDRI	-0.00306	-0.00115	-0.00518	-0.0161***
	(0.0222)	(0.0205)	(0.0115)	(0.00547)
Observations	36,107	36,107	36,107	36,107
R-squared	0.102	0.103	0.048	0.046
C Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

C is the vector of control variables constituting

religion, age, location type and wealth index taken at individual level.

I also control for district-level infrastructural development using nightlights data.

Table 2.4 below provides the results from my other main model, which uses women's opinions on domestic violence (ODV) as the dependent variable with gender disparity as the independent variable. This table gives the coefficients of the OLS regressions run on this model. Column (1) gives the results of the Gender Disparity Ratio Index (GDRI) run on the dummy variable that takes into consideration beating justified in any of the five scenarios (WODV). I find that all the coefficients in the first row are statistically insignificant. Columns (2), (3), (4), (5) and (6) give the regression results of GDRI on women's opinions on the five scenarios whether the women are of the opinion that the wives should be beaten up (i) for going out without telling him (F_ODVa), (ii) for neglecting the children (F_ODVb), (iii) for arguing with him (F_ODVc), (iv) for refusing to have sex with him (F_ODVd) and (v) for not cooking food properly (F_ODVe).

I find that the coefficients in the first four columns are negative, and the last two columns are positive. The fifth and sixth columns report results on whether beating is justified if wife refuses to have sex with husband and whether beating is justified if she doesn't cook food properly. This implies that women may justify violence if the wife refuses to have sex or if the wife doesn't cook food properly, even if they do not justify DV in other scenarios. For the other four variables, as gender disparity rises, women tend to justify

wife-battering less and with disparity falling, they justify DV more. This indicates that with the rising gender disparity, the women become conditioned into justifying wife battering as a "marital prerogative", as explained in Eswaran and Malhotra (2011) and the "guilt channel" sets in as explained Bandyopadhyay et al. (2020). However, none of these results are statistically significant, although the sign of most of coefficients is similar to my coefficients from the DV model discussed before.

It is interesting to note that in the previous model, GDRI is observed to have significant negative association only with sexual DV, while in this model on women's opinions on DV, GDRI seems to have insignificant positive association with the question on sex. This is intuitive and could be explained by the difference in the nature of the two dependent variables. While in the first model, DV is an actual experience of violence from the spouse or intimate partner; in the second model, justifying DV is merely about the attitudes or opinions of the women responders when it comes to spousal violence. A woman experiencing sexual violence may still reject justifying it, and a woman justifying it might not have ever experienced it, which explain also the unexplained variance of 47% (which is higher than the other variables) in this variable while constructing the PCA index.

Table 2.4: Results of OLS Regression runs of GDRI on Women's Opinions on Domestic Violence, both on individual and index variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Beating justified in any of five scenarios (WODV)	Beating justified if wife goes out without telling husband (F_ODVa)	Beating justified if wife neglects children (F_ODVb)	Beating justified if wife argues with husband (F_ODVc)	Beating justified if wife refuses to have sex with husband (F_ODVd)	Beating justified if wife doesn't cook food properly (F_ODVe)
GDRI	-0.0297	-0.00495	-0.0255	-0.0172	0.00745	0.00370
	(0.0229)	(0.0122)	(0.0169)	(0.0140)	(0.00992)	(0.0147)
Constant	0.483***	0.396***	0.352***	0.420***	0.191***	0.159***
	(0.0469)	(0.0282)	(0.0344)	(0.0310)	(0.0213)	(0.0295)
Observations	47,565	47,565	47,565	47,565	47,565	47,565
R-squared	0.163	0.127	0.161	0.107	0.056	0.077
C Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
C is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

I also report results from the regressions run on the men's justifications of wife-beating. Table 2.5 gives results of the regressions run on opinions of men about wife-beating considered justified in five scenarios. I observe all the coefficients to be positive, though five of these are insignificant. This means that as the disparity between men and women in

the districts rises, men consider beating up their wives to be more justified. Men especially consider wife-beating justified if the wife doesn't cook food properly. I find that a one-unit increase in the district GDRI is associated with a 2.51 percentage point increase in the probability that a man considers beating his wife justified if she fails to cook food properly. This relationship is statistically significant at the 5% level (p ¡ 0.05). However, it is possible that the reported opinions of the male responders could be biased by social desirability owing to increasing awareness created by media about the moral and legal implications of crimes against women (Bhalotra et al. (2021), Erten and Keskin (2018)). This direct relationship of the GDRI with men's opinions on DV is in line with the earlier works like those of Saravanan (2000), Aizer (2010), Duflo (2012) and Jayachandran (2015) who predict women facing more violence with gender discrimination and gender inequality rising in various ways in the society.

While it may apparently seem that this direct relationship of men's opinions on DV with GDRI (Table 2.5) is contradictory to the inverse relationship of DV experience by women as GDRI rises (Table 2.3), it is not so. The patterns are not contradictory once we distinguish actual experiences of violence from normative attitudes surrounding violence. The fall in women's experienced sexual DV as GDRI rises indicates that in more gender-equal contexts, men's behaviour becomes less coercive—even though men remain the primary perpetrators. However, the attitudinal indicators (men's justification for certain forms of DV) do not always move in parallel with behaviour. These justification measures capture lingering social norms, not actual acts. That men's acceptance of sexual DV is statistically insignificant, while justification for "not cooking properly" rises slightly with GDRI, suggests that some traditional norms persist or shift unevenly even as behavioural DV declines. This pattern reflects the well-documented gap between private behaviour and publicly stated attitudes, especially on sensitive topics. In short, men are self-correcting their true attitudes in fear of social desirability and legal consequences when reporting their opinions in a survey, and this is elaborated by the opposite experiences of DV by women in association to gender disparity.

Table 2.5: Regression Results of GDRI on Men's Opinions on Domestic Violence

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**Beating justified in any of five scenarios (MODV)**	**Beating justified if wife goes out without telling husband (M_ODVa)**	**Beating justified if wife neglects children (M_ODVb)**	**Beating justified if wife argues with husband (M_ODVc)**	**Beating justified if wife refuses to have sex with husband (M_ODVd)**	**Beating justified if wife doesn't cook food properly (M_ODVe)**
GDRI	0.0205	0.0231	0.0140	0.0177	0.00987	0.0251**
	(0.0217)	(0.0149)	(0.0166)	(0.0170)	(0.0151)	(0.0126)
Constant	0.459***	0.232***	0.309***	0.339***	0.164***	0.143***
	(0.0375)	(0.0274)	(0.0287)	(0.0319)	(0.0243)	(0.0224)
Observations	47,565	47,565	47,565	47,565	47,565	47,565
R-squared	0.129	0.085	0.125	0.081	0.060	0.070
C Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
C is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

The opposite signs for the regression results for men and women's opinions on DV are entirely consistent with unequal gendered incentives. In districts with higher GDRI (i.e., where women are comparatively worse off), men's justification for wife beating increases. This reflects the persistence of patriarchal norms: greater inequality reinforces male entitlement and acceptance of coercive control. Women, however, respond in the opposite direction. As GDRI rises, women become less likely to justify wife beating in most scenarios. A plausible explanation is that women in high-disparity districts face more frequent or harsh violations of autonomy, leading them to reject such norms despite lacking bargaining power to change them. Their attitudinal rejection therefore does not necessarily translate into lower victimisation, but it appears in their survey responses. Thus, men and women move in opposite directions because they occupy structurally different positions: the group holding power (men) becomes more likely to justify DV as disparity widens, while the group disadvantaged by disparity (women) increasingly rejects it.

2.6 Additional Results

2.6.1 DVZI Construction

While the impacts of three types of DV have been taken into account separately in the main analysis, as a robustness check z-score index for domestic violence has also been created to combine all the three variables into one. Regressions are also run on the Domestic Violence Z-score Index (DVZI). The z-score index for the domestic violence, following the

methodology used by Erten and Keskin (2018) and Bhalotra et al. (2021), is calculated by first estimating the z-scores for each type of DV experienced by women (as done in Erten and Keskin (2018)) and by subtracting the means from them and then dividing by the standard deviations:

$$DVZ_{\text{j}} = \frac{DV_{\text{j}} - mean(DV_{\text{j}})}{SD(DV_{\text{j}})} \tag{2.6}$$

where DVZ_{j} is the z-score of the jth type of DV, DV_{j} is the jth type of DV, $\text{mean}(\text{DV}_{\text{j}})$ is the mean of the jth type of DV and $\text{SD}(\text{DV}_{\text{j}})$ is the standard deviation of the jth type of DV.

Then, for each of the above z-scores, I calculate the mean percentages as follows:

$$meanDVZ_{\text{j}} = \frac{\sum_{j} DVZ_{\text{j}}}{N} \times 100 \tag{2.7}$$

where $\text{meanDVZ}_{\text{j}}$ is the mean percentage of the jth kind of DV and N is the total number of observations, which in this case is 117,799.

Finally, the z-score index is calculated by taking the simple average of all the mean percentages of the z-scores for the three different DV variables (emotional, physical and sexual) as follows:

$$DVZI_{\text{i}} = \frac{\sum_{j=1}^{3} meanDVZ_{\text{j}}}{3} \tag{2.8}$$

where DVZI_{i} is the Domestic Violence Z-score Index of the ith woman that takes into account the 3 types of domestic violence experienced by ith female responder.

In Figure A1.2 in the Appendix, the distribution of the domestic violence z-score index (DVZI) across the Indian states is given. This gives me an idea of the levels of domestic violence experienced by women in various Indian states and union territories. I find that the level is highest for Odisha, and also quite high for the states of Chhattisgarh and Jharkhand. It is the lowest for Dadra and Nagar Haveli, and also observed to be low for states like Haryana and Uttarakhand. However, these low levels may be indicative of unwillingness of the respondents to report rather than actual low number of incidents. This tendency arises from out of loyalty to husband and the in-laws and certain social conditionings that make domestic violence as "normal" experiences to Indian married women

(Farmer and Tiefenthaler (1996)). Also, there might be the underlying threat of more violence, or threats of other kinds of harm like hurting the children or the natal family, that the women experiencing violence may be facing (Saravanan (2000)).

2.6.2 Construction of Opinions on DV Indices using PCA

As further robustness checks, I create indices for women's and men's opinions on domestic violence (WODVI and MODVI) using principal component analysis (PCA). The factor loadings of the PCA indices are provided in Table A1.3. I find that for both women and men, all the factor loadings (the eigenvectors of the first component) are positive and very close in magnitude. This implies that all the opinions are likely to equally influence the PCA index: increasing any one of the constituting variables is going to lead to an increase in the total value of the corresponding PCA indices. The unexplained variances given in the second column too are somewhat close, although for both men and women the fourth variable (which is justifying wife-beating if wife refuses to have sex with husband) has highest variance[24]. However, all the components contribute to the index fairly equally, so the PCA is built using all the opinion variables. I also provide the scree-plots generated from the PCAs carried out for both men and women for the GDRI model in the Appendix in Figure A1.1.

The indices for the women's opinions on domestic violence and the men's opinions on domestic violence are calculated following the Principal Component Analysis (PCA) method (Shlens (2014)). The Kaiser-Meyer-Olkin (KMO) measure estimated gave me above 0.8 KMOs for all the opinion variables for both the men and women's data, as given in Table A1.2, making PCA the appropriate method for the construction of the index. I ran PCAs for the five ODV variables each for the men and women in all the four datasets. For all of them, only the first component, i.e., wife beating justified if wife goes out without telling husband, came out as the principal component, on the basis of the eigenvalues and the proportion of variance explained by the factors. I generate the principal component scores and then calculate the indices for the ith individual by multiplying the weights obtained with the principal component scores.

[24]For women, about 47% of the variance of this variable is not captured by the first component, while for men about 52% of the variance is not captured by the first component.

2.6.3 Additional model specifications

So, using the indices generated, i.e. DVZI, WODVI and MODVI, the model specification now changes to the following, where the dependent variable is no longer a binary variable:

$$DVIndex_{idt} = \alpha_{idt} + \beta_{dt} GDRI_{dt} + \gamma_{idt} \mathbf{C}_{idt} + \delta_{dt} NL_{dt} + \phi_d + \phi_t + \epsilon_{idt}, \tag{2.9}$$

where $\text{Index}_{\text{idt}}$ is one of the indices calculated used as the outcome variable. All other variables stay the same.

I also ran additional regressions with the gender disparities in individual dimensions constituting the GDRI. I wanted to isolate the disparity measure in each dimension of education, employment, health and household decision-making and study their associations with the various variables constructed in this paper to capture domestic violence. Instead of GDRI, I simply use the gender disparity ratios for each dimension (which previously constituted GDRI) as the independent variables. The model specification then changes to:

$$DVmeasure_{idt} = \alpha_{idt} + \beta_{dt} GD^{y}_{dt} + \gamma_{idt} \mathbf{C}_{idt} + \delta_{dt} NL_{dt} + \phi_d + \phi_t + \epsilon_{idt}, \tag{2.10}$$

where $\text{DVmeasure}_{\text{idt}}$ is each variable constructed, including the indices, used as the outcome variables. $\text{GD}_{\text{dt}}{}^{\text{y}}$ is the gender disparity in the dth district and tth year for the yth dimension, y=Education, Employment, Health, Household decision-making. All other variables stay the same.

2.6.4 Relationships of Different Indices of Domestic Violence with GDRI

Table 2.6 provides the results of the regressions run with GDRI on DVZI, WODVI and MODVI. DVZI has positive and statistically significant association with the gender disparity ratio index (GDRI). I observe that a one-unit increase in district-level gender disparity is associated with a 0.0027 standard deviation increase in women's reported DV when compositely measured through a z-score index. While the magnitude appears small, it is statistically significant at the 1% level and should be interpreted in light of the z-score scaling, which may better capture the relationship. I also observe the results of the regressions run on the PCA indices of women's and men's opinions on DV with GDRI in columns (2) and (3). While women's opinions on DV is negatively associated with gender disparity, men's opinions on DV is positively associated with gender disparity, which seems to be meaningful intuitively. In districts with more gender disparity (higher GDRI), wo-

men are less likely to justify domestic violence (a negative association), whereas men are more likely to justify wife battering (a strong positive association). However, these results on the opinions on DV indices are statistically insignificant.

Table 2.6: Association of GDRI with the Domestic Violence Z-score Index (DVZI), Women's Opinions on Domestic Violence Index (WODVI) and Men's Opinions on Domestic Violence Index (MODVI)

	(1)	(2)	(3)
Variables	**DVZI**	**WODVI**	**MODVI**
GDRI	0.00270***	-0.0368	0.119
	(0.000978)	(0.0685)	(0.0916)
Constant	-0.278***	0.554***	0.631***
	(0.00186)	(0.143)	(0.150)
Observations	47,565	47,565	47,565
R-squared	1.000	0.143	0.117
C Controls	Yes	Yes	Yes
District FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

*Notes:- Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
C is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

The DVZI is based on z-scores, so it measures how each DV component compares to its district-level mean after standardisation—not the raw levels reported in Table 2.3. When the sample expands from only ever-married women (Table 2.3) to the full sample used for constructing the DVZI (Table 2.6), both the means and the variances of the DV components shift. Because z-scoring divides by each component's standard deviation and recenters around a new sample mean, the relative ordering of districts can change even when the raw DV levels remain lower in high-GDRI districts. This can produce a positive association in the DVZI even though every individual DV component shows a negative raw relationship. In short, the sign flip reflects the mechanics of standardisation and sample

differences, not a reversal in the underlying substantive relationship.

2.6.5 Associating Domestic Violence Experienced by Women with Gender Disparity Ratios in Individual Dimensions

In Tables A1.4, A1.5, A1.6 and A1.12, I report the results of the regressions run on the various measures of DV experienced by women with the gender disparity measures in the four dimensions used as main predictor variables. I observe in Table A4 that the gender disparity in education has no significant relationship with the DV measures, so I don't analyse these. I observe in Table A5 that the gender disparity in health is negatively and significantly associated with sexual DV. Looking more closely, the gender disparity in diabetes medication use (one of the constituents of the health dimension measure) also is negatively and significantly associated with sexual DV. The gender disparity in blood pressure (BP) medication use also has negative but insignificant association with sexual DV. Most of the other coefficients for health are also negative suggesting that as gender disparity in health rises with women becoming worse-off, sexual DV experienced by them falls. This seems intuitive as if women in a district suffer from more health conditions than men, then that might prevent husbands abusing them further sexually as that automatically helps them feel more powerful. I also see that the gender disparity in diabetes medication use has a small positive significant association with DVZI. Gender disparity in health dimension also has a small positive but insignificant association with DVZI. This might mean that with gender disparity in health rising in the districts, there are chances that women might face more DV overall in the households.

In Table A1.6, I observe that the gender disparity in employment is positively and significantly associated with DVZI but negatively significantly associated with sexual DV. It is positively but insignificantly associated with Any DV and Physical DV variables, while negatively insignificantly associated with Emotional DV. The positive associations show that DV increases overall in the household with increasing gender disparity in employment, in line with Aizer (2010). Then again, sexual DV experienced by women increases as gender disparity in employment falls, typically signalling "male backlash" effects in line with my main model findings. This means that when the disparity between men and women is high in employment status, women tend to experience overall more abuse from their husbands, which means lack of women empowerment makes women more vulnerable, although it also helps them suffer less sexual abuse. Thus my main model findings are

robust.

In Table A1.12, gender disparity in household decision making (HDM GD) has statistically significant but negative association with DVZI. Gender disparity in household decision making (HDM) also has a positive significant association with emotional DV. This indicates that with gender disparity in HDM rising in the districts, DVZI falls but emotional DV rises. This points to the direction that higher the gender disparity in household decision making, lower is the overall domestic violence faced by women, signaling presence of a male backlash effect. Although emotional domestic violence is still positively related to gender disparity in HDM, it might be inferred as less backlash faced by women when they are more agreeable to their partners and play less role in decision making, thereby reducing the disparity. In other words, if women have more equal role in HDM, then they tend to face more emotional abuse from their husbands, although the overall DV experienced falls, in line with Eswaran and Malhotra (2011).

2.6.6 Associating Women's Opinions on Domestic Violence with Gender Disparity Ratios in Individual Dimensions

In Tables A1.13, A1.14, A1.15 and A1.16, I report the results of the regressions run on the various measures of women's opinions on DV with the gender disparity measures in the four dimensions used as main predictor variables. In Table A1.13, I observe that the gender disparity in highest education level (HEL) is positively and significantly (weakly) associated with women justifying wife beating if she neglects the children. The associations with other DV variables with the gender disparity in education measures are insignificant, although overall looking at WODVI, which is the PCA index combining all the opinions, it is positively related with gender disparity in education. This means that with women becoming worse-off in education than men in the districts, women tend to justify wives getting beaten up more in the households. Lack of education also translates to lack of awareness and self-respect, which in turn makes women turn against their own gender.

In Table A1.14, I observe that the gender disparity in diabetes medication use is positively and significantly (weakly) associated with women justifying wife-beating if she refuses to have sex with her husband. For all other opinion variables, the gender disparity in health measures have insignificant positive associations. Again, women tend to justify wife-beating more if gender disparity between men and women are more in health, possibly

a guilt channel for inadequacies might be feeding up through other channels (Bandyopadhyay et al. (2020)). In Table **??**, I observe that the gender disparity in employment is negatively associated, with a weak significance, with women justifying wife-beating if she neglects children and if she argues with her husband. This shows that if women are less economically empowered in comparison to men (higher gender disparity in employment), they tend to justify wife-beating less. For gender disparity in household decision-making in Table A1.16, I observe that none of the coefficients are significant, although most of them are positive including that of the PCA index combining all opinions (WODVI). The general findings suggest that with women tend to justify DV when they lack consciousness or are socially prejudiced to guilt-trip themselves for any lacking in their "wifely duties". Neglecting children is something that goes against the deep-seated feminine notion of being a "good mother", which is why women so often justify wife-beating if they neglect children. This is in line with the previous works of Eswaran and Malhotra (2011), Aizer (2010) and Agarwal (1997).

2.6.7 Associating Men's Opinion's on Domestic Violence with Gender Disparity Ratios in Individual Dimensions

In Tables A1.17, A1.18, A1.19 and A1.20, I report the results of the regressions run on the various measures of men's opinions on DV with the gender disparity measures in the four dimensions used as main predictor variables. In Table A1.17, I observe that the gender disparity measures in education are insignificantly associated with men's opinion on DV variables, with the total education gender disparity having mostly positive but insignificant associations with the men's opinions on DV. Also, in Table A1.18, I observe that the gender disparity in blood pressure (BP) medication use is positively associated with a weak statistical significance with men justifying wife-beating if she goes out without telling her husband and also if she doesn't cook food properly. I also find that although insignificant, the rest of the associations with the health gender disparity measures are overall positive with men's opinions on DV. This means that as gender disparity rises in health and women become worse off in health, men justify beating them up more, especially if they go out without telling them and if they don't cook food properly.

In Table A1.19, I observe that the gender disparity in employment is positively and significantly associated with men justifying wife beating if she doesn't cook food properly. The associations of the gender disparity in employment with all other measures of men's opin-

ions on DV are positive although insignificant. This signals that men justify wife-beating more, especially if she doesn't cook food properly, as gender disparity between men and women rises in the district-level employment, i.e. a lack of financial freedom of women in the districts in comparison to men. Finally, in Table A1.20, I observe that the gender disparity in household decision-making (HDM) is also insignificantly associated with men's opinions on DV, although the relationship is overall negative. This signals that with the gender disparity in HDM rising, which in turn helps them keep their authority within the household, men become more amiable to their partners and tend to justify beating wives up less. The common theme of men justifying beating wives up if they don't cook food properly is positively associated with gender disparity in health and employment. This finding is in line with my main results. Cooking happens to be one of the primary "roles" married Indian women are expected to fit in. Through all these findings, I note the power-struggle in household dynamics that is often studied, especially in the context of domestic violence and intra-household bargaining, coming up. Men justify beating up wives whenever they wish to establish their authority within the household or fear losing their control from the household, in line with the evolutionary theories explained in Eswaran and Malhotra (2011).

2.6.8 Comparison with Pooled OLS Model

The pooled OLS estimates for the regressions run on domestic violence (DV) experienced in Table A1.4 include year fixed effects but omit district fixed effects, display a markedly different pattern from the main fixed-effects results. Once cross-district variation is reintroduced, the coefficient on GDRI becomes negative (as observed from the results in Tables 2.3 and 2.6) across all domestic violence outcomes, with some of these associations reaching statistical significance. These shifts in sign and difference in statistical significance suggest that deep-rooted, time-invariant district characteristics, such as persistent reporting norms, cultural attitudes toward gender, changes in local administration, are jointly correlated with both GDRI and the likelihood of reporting domestic violence (DV). In the absence of district fixed effects, these unobserved factors are absorbed into the error term, and the cross-sectional variation dominates the estimates, pulling the coefficients toward an opposite direction and significance. The contrast with the fixed-effects results therefore highlights the importance of exploiting within-district changes over time to net out these structural differences in under-reporting owing to district-specific local gender norms.

The pooled OLS estimates for men's opinions on domestic violence in Table A1.5 show that, once district fixed effects are removed and cross-sectional variation is allowed to drive identification, GDRI is negatively associated with both the composite MODVI index and several of its constituent items. This contrasts with the sign patterns in the fixed-effects specification presented in the main results in Tables 2.5 and 2.6. The pooled OLS results for women's opinions on domestic violence (WODV) are also given in Table A1.6, which reveal uniformly negative associations between GDRI and both the composite index and individual composite scenarios of violence. While the signs in this case remain the same, the statistical significance and magnitude differs from the main model in Tables 2.4 and 2.6, highlighting how cross-district differences shape raw associations between gender disparity and attitudes toward wife-beating.

These shifts in the pooled OLS results from the main results suggests that unobserved, time-invariant district characteristics, such as district-specific gender norms, local reporting cultures, local political administration and changes in governance, the broader social climate surrounding gender relations, are strongly correlated with both GDRI levels and men's and women's stated attitudes on DV. Districts with higher gender disparities tend to display deeper and more persistent social acceptance of violence, and once district fixed effects are omitted, this structural relationship dominates the estimates. Without district fixed effects, these structural differences are absorbed into the error term, and the coefficients predominantly reflect cross-district differences rather than within-district changes over time. As a result, the pooled OLS estimates likely overstate the associations between GDRI and people's opinions on wife-beating, underscoring the importance of the fixed-effects design, which uses within-district variation over time to net out unobserved cultural and institutional factors that otherwise confound interpretation.

2.7 Conclusions

This paper studies the impacts of gender disparity in various dimensions and of gender biased attitudes against daughters at the district-level on the domestic violence (DV) experienced by women. It builds a gender disparity ratio index (GDRI) for measuring the gender disparity in the four dimensions of education, employment, health and household decision-making. In my construction of the GDRI, a rise in district GDRI signifies a rise in the gender disparity between men and women, i.e. men are better off on average than women in all dimensions combined in the district. In answer to the main research

question, I find negative association of GDRI with individual variables of domestic violence (DV) experienced by women. This signifies that as district-level gender disparity rises, all kinds of DV experienced by individual women fall, signifying that men inflict more violence on their partners when the gender disparity in the society narrows down and women become more empowered. This is in line with the theory of "male backlash" in the previous literature like Eswaran and Malhotra (2011), Bhalotra et al. (2021) and Anukriti et al. (2022). The use of the comprehensive measure of GDRI to study the impact of gender disparity on domestic violence is one of the main contributions of this paper.

These results are robust to the results from the opinions of men and women on domestic violence. It is found that the coefficients of GDRI for women's opinions on DV are negative and statistically significant. That is, as gender disparity falls, women tend to justify wife-battering more. This indicates that with the rising gender disparity, the women become conditioned into justifying wife battering as a "marital prerogative", as explained in Eswaran and Malhotra (2011) and the "guilt channel" sets in as explained Bandyopadhyay et al. (2020).

As robustness checks, I report results of regressions run on a z-score index for DV (DVZI) following Erten and Keskin (2018) and Bhalotra et al. (2018). I find that with GDRI rising, the z-score index for DV increases. This indicates that when I measure DV with a composite index variable like the DVZI, I see a direct positive relationship with the GDRI. DVZI also is found to have a positive relationship with gender disparity in employment and a negative relationship with the gender disparity in household decision-making. While the former indicates that lack of women empowerment makes them vulnerable to more spousal violence, the latter indicates that when women try to have more opinions in household decision making at par with men, they face more domestic abuse. Both of these results suggest the presence of strong patriarchal social gender norms and gender discrimination in the Indian society in connection to domestic violence.

Chapter 3

Associating Violence Against Women with Son Preferences and Sex Ratio at Birth in India

3.1 Introduction

Violence against women is derogatory to the basic human rights of freedom, equality and justice (Duflo (2012)). Violence against women (VAW) is defined as "any act of gender-based violence that results in, or is likely to result in, physical, sexual, or psychological harm or suffering to women, including threats of such acts, coercion, or arbitrary deprivation of liberty, whether occurring in public or private life" (UN (1993)). Approximately one in three women worldwide experiences some form of violence during their lifetime (WHO (2021)). Globally, the cost of VAW can go up to US$1.5 trillion (WHO (2021)). According to Ouedraogo and Stenzel (2021), VAW has led many countries, and especially developing countries, to suffer a significant amount of economic cost: up to 3.7% of a country's GDP, which is over double the funds spent on education (World Bank (2019)). World Health Organisation (WHO) in its annual reports on the problem of VAW has described the heavy negative impacts of violence on the physical and psychological health of the female population (WHO et al. (2012), WHO (1997)). Both the UN and WHO stress the need for suitable policy interventions to control VAW (Bell and Butcher (2015); WHO (1997); Heise et al. (1994)).

While VAW is an issue of concern all over the world, it is especially serious in India. The Global Gender Gap Report (GGGR) by the WEF (2024) report notes that India has

slipped to 129th rank in 2024 from 123rd rank in 2023 in terms of Global Gender Gap, which means gender parity has fallen in certain areas. The country ranks 142nd in terms of health and survival of females in the latest GGGR report. India has always ranked very poorly in the health and survival of women, including to ranking as low as second lowest (Singh (2016)). Moreover, India has one of the highest proportions of people with gender social norm biases, with the second-highest number of women and third-highest number of men exhibiting such biases (HDR (2019)). Majority of the abused women and their families don't even report being assaulted (Jayachandran (2015); Saravanan (2000); UNESCO (1993)) because of the social stigma and heavy social costs involved in a patriarchal society.

India ranks 155th out of 156 countries in terms of health and survival of females; and 151st for economic participation and opportunity in WEF (2024).Coomaraswamy (2005) argued in her paper that the deep-set thinking in the minds of the general Indian populace that men are the superior gender is the main reason behind Violence Against Women(VAW) in India. Rothchild (2014) defines gender biased norms as the scenario when one gender (male in this case) is given preference over the other gender (female) in various aspects in different socio-economic spheres. In most Indian households, the norm is to give preference to male children over female children (Jayachandran (2015), Amaral and Bhalotra (2017)). Earlier theoretical works of Heise et al. (1994), Saravanan (2000) and Coomaraswamy (2005) concur that gender biased cultural norms against women is the primary cause of violence against women in Indian society. More recent empirical works of Amaral and Bhalotra (2017), Bandyopadhyay et al. (2020) and Anukriti et al. (2022) also provide causal-effect evidence regarding how social gender biased attitudes lead to women suffering violence in various ways.

Social awareness regarding VAW has been rising due to increasing media presence since the *"Nirbhaya"*[1] case in Delhi, 2012 (Lodhia (2015), Shandilya (2015)); the *#MeToo* movement that took place globally online, (Mathur et al. (2019)); and very recently the *"Abhaya"*[2] case in 2024 in Kolkata. Mathur et al. (2019) and Ghatak and Chakraborty (2024) discuss that even though there is an apparent increase in the willingness to report

[1] "Nirbhaya" refers to the gruesome incident that occurred in Delhi in 2012, where a young woman was gang-raped by six men on a moving bus and subsequently died from her fatal injuries. The convicted adult men were all sentenced to death and were executed by hanging in 2020. One juvenile convict was sent to a reform facility. Here is a link for more details on this case.

[2] *"Abhaya"* refers to another brutal incident in Kolkata in August 2024, where a young female doctor was gang-raped and murdered while she was on duty at her workplace. This case is still awaiting justice at the time this paper is being written. For further details, visit this page.

VAW in recent years, there have not been improvements in law and order or the judiciary system to prevent such cases. Following the works of Amaral and Bhalotra (2017) and Anukriti et al. (2022), this paper contributes to the literature by taking into account various forms of VAW during the years 2001 to 2019 and studying their associations with the gender biased trends favouring male children in India.

The research question that this paper focuses on is: *how does the gender biased trends favouring male children over female children relate with different forms of violence against women at district-level in the Indian society?* The bias towards male children (and against female children) is measured by district-level sex ratios at birth (SRB) for 2000-2018 and son preference index (SPI) for 2005-2018, estimated from the data collected from household surveys conducted by NFHS-2, IHDS-I, IHDS-II, NFHS-4 and NFHS-5. The data for the crimes against women is obtained from the NCRB for the years 2001-2019 for all the Indian districts. I study the association of the previous year's son preference and sex ratios to the following year's rates of violence against women in order to account for the reverse causality often faced in this area of research. The intuition is here that the preference given to sons over daughters reflects the societal preference given to the male gender in general, while sex ratio at birth (SRB) may reflect the actual gender inequality in births.

I analyse the association of the gender biased preference given to male children in a given year on the various forms of violence against women (VAW) taking place in the following year[3]. These measures indicate the overall belief that "male is the superior gender and female is the inferior gender", and their association, in turn, with the rates of violence against women (VAW). The main findings of my paper are here that with SRB and SPI increasing, women on average face significantly more violence at the district level. With a 1% increase in district SRB, the expected total VAW rate per 100,000 females is found to increase by 3.65% in the districts. Also, with 1% point increase in FSPI in the districts, the expected total VAW rate per 100,000 females increases by 6% in the districts.

These findings are in line with the robustness checks carried out in this paper and also with the previous literature, especially the paper by Amaral and Bhalotra (2017) which established empirically youth sex ratio to be a cause for VAW. Using a panel data from

[3]As discussed more elaborately later, the number of crimes against women occurring in the following year is less likely to have a causal association with the gender biased attitudes in the preceding year, but more likely to be the vice versa. This therefore helps me in taking account the problem of reverse causality.

1971-2011, Amaral and Bhalotra (2017) had found that a rise in youth (ages 20-24) sex ratio is linked to one-third of the increase in gender-based violence since 1995. My findings point to patriarchal norms significantly being related to VAW. A number of additional tests have been carried out to examine the dynamics of this association more closely, including using a cumulative son preference taking into account both men's and women's preferences; testing a model without data interpolation; analysing differences in associations based on regional variations, district economic development and women's education, before and after 2012, the year of "*Nirbhaya*"; and other tests. The results overall point to the direction of gender biased patriarchal norms, as shown by the favoured trends towards male children, being positively associated with VAW. Where negative associations are found, they are interpreted as evidences of some "male backlash" in the society, i.e. VAW increasing when women challenge gender biased norms.

Following this introductory section, this paper is structured as follows. Section 2 reviews the previous literature and the context and background. Section 3 explains the data sources. Section 4 describes the research methodology used in the paper along with the summary statistics. Section 5 analyses the main results as well as the robustness checks. Section 6 looks at additional results generated, further exploring the association. Lastly, section 7 highlights the conclusions drawn.

3.2 Literature and Background

There is wide body of both theoretical and empirical literature that has studied the issue of violence against women (VAW) from various perspectives. A smaller subsection of this body has connected VAW with gender norms in economics and an even smaller one that has done the same in the context of the Indian socio-economy. I begin by discussing the literature explaining the context and background behind some common types of violence against women.

3.2.1 VAW in India

The most disturbing form of non-domestic VAW prevalent in India is what is known as "rape" or sexual molestation outside domestic boundaries[4] (Shandilya (2015), Lodhia (2015)). Rape has been categorised by the WHO (2002) report as the most extreme form

[4]The category of domestic violence (DV) or intimate partner violence (IPV) discussed in the previous category technically includes the cases of marital rapes and sexual abuse within the household, although the reporting is very low by Indian married women.

of sexual violence[5]. Exploring the vulnerable position of Indian women in the scenario of non-domestic violence, Nieder et al. (2019) note that many women adopt avoidance and safety measures as coping strategies.

Another type of VAW faced by women outside domestic boundaries which has been studied in this paper is "assaults and insults". Cases of work-place harassment, eve-teasing[6] and inappropriate touching in public places as described by Talboys et al. (2017) and Akhtar (2013) all come under this category[7]. These assaults are punishable offences and are often causes for women feeling unsafe outdoors (Akhtar (2013)). Nieder et al. (2019) and Talboys et al. (2017) describe how young women mostly skirt around these issues and adopt avoidance strategies to ensure safety for themselves. The assaults and insults reported by the women have increased over the years due to various forces coming into play like wide social media penetration (Mathur et al. (2019)).

VAW also takes the form of "trafficking"[8] or what is known as "modern slavery". India is estimated to have the largest number of persons of around 8 million people trafficked[9] for various reasons, a large proportion of which are women bought and sold every year into sexual slavery and prostitution, while others are bought and sold as domestic help (Zimmerman et al. (2021), Berman (2010), GSI (2023)). A lot of young women and female children who go missing in India, according to the US.Govt.Trafficking.Report (2023) report, are apparently abducted and migrated to foreign nations by traffickers[10].

Lastly, as discussed in my first paper, the most recurring form of VAW across the world is Domestic Violence (DV) or Intimate Partner Violence (IPV) (WHO (2021), WHO (2009)).

[5] Sexual violence according to WHO (2002) is "any sexual act, attempt to obtain a sexual act, unwanted sexual comments or advances, or acts to traffic, or otherwise directed, against a person's sexuality using coercion, by any person regardless of their relationship to the victim, in any setting, including but not limited to home and work."

[6] "Eve-teasing" is an euphemism commonly used in South Asia to refer to public sexual harassment of women by men, as explained in Talboys et al. (2017).

[7] Acid Attacks, which involve throwing acid at a woman or a girl with the intention of permanently deforming them or torturing them or in extreme cases killing them even, are a very disturbing form of assault on women which I do not include in this paper due to unavailability of data in the initial years of my time period. (Aid (2021)). Approximately 1500 acid attacks occur every year all over the world, with the greatest prevalence being in south Asian countries like India, Bangladesh and PakistanAid (2021).

[8] Trafficking has been termed as a modern kind of slavery, where humans are bought and sold illegally for different purposes, starting from forced organ donation, surrogacy to forced prostitution (GSI (2023)).

[9] Around 45000-50000 women are trafficked from all parts of the world to the me every year (Zimmerman et al. (2021)).

[10] A practice increasingly becoming popular among traffickers is to pose as well-settled NRI grooms who marry young women under false premises only to sell them off in foreign lands (US.Govt.Trafficking.Report (2023)), Menon and Bhasin (1998)

A common form of DV suffered and reported by women in India are the dowry-related[11] crimes (Dang et al. (2018), Saravanan (2000), Menon (1999) and Heise et al. (1994),). Dowry deaths seem to have risen over the years as empirically analysed in the paper by Dang et al. (2018). Incidences of non-sexual physical violence by husband or the in-laws also fall under domestic violence (NFHS-5 Report (2020); NFHS-4 Report (2015)).

3.2.2 Literature

Some previous noteworthy studies, such as those by Eswaran and Malhotra (2011), Aizer (2010) and Farmer and Tiefenthaler (1996), have explored domestic violence (DV) and IPV through the lens of the intra-household bargaining model, studying various underlying factors like decision-making power, wage gaps, and access to support services. They generally suggest that women's bargaining power increases with greater empowerment, particularly through education and employment, which helps reduce DV in turn.

However, as already discussed in the literature review for my first Chapter, the literature also suggests the "backlash effect" from men in response to women's growing empowerment. Studying the phenomenon of "male backlash" from decreasing gender gaps in India, Bandyopadhyay et al. (2020) in their paper construct an empirical model where the society consists of two groups: patriarchs[12], and feminists[13]. Both these groups act on their opposing preferences, which results in hostility between them, leading to increased violence against women (VAW). As also explained by Eswaran and Malhotra (2011), this backlash can exacerbate VAW, as men may feel threatened by the shifts in traditional power dynamics on the basis of gender.

Earlier literature (Saravanan (2000), Heise et al. (1994), Coomaraswamy (2005)) also discusses the issue of underreporting by victims due to widespread stigma. Women frequently tend to deflate domestic violence owing to feelings of shame, self-blame, loyalty[14] to the partner, and fear of harm to native family and children (Farmer and Tiefenthaler (1996), Belur et al. (2014)., Niolon et al. (2017)). Even for non-domestic violence, women in Indian society face constant judgment, shaming and backlash, even from law enforce-

[11] Dowry is the practice of giving money, goods or/and jewellery by the bride's family to the groom's family during the wedding Saravanan (2000).

[12] Patriarchs are people who benefit from the status-quo enjoyed by men (Bandyopadhyay et al., 2020).

[13] Feminists are people who want to lower the gender bias against women in the society, and therefore resulting gender discriminating outcomes (Bandyopadhyay et al., 2020).

[14] In many cultures, women are conditioned to accept and tolerate chastisement from husbands as a "marital prerogative", which prevents them from identifying themselves as being abused at all (Coomaraswamy (2005), Farmer and Tiefenthaler (1996)).

ment officers, which often discourages them from reporting violence (Jayachandran (2015), UNESCO (1993)). Women instead usually adopt various avoidance strategies, which, as argued by Nieder et al. (2019), reinforce traditional gender norms. Such strategies contribute to the perpetuation of public violence against women, positioning women as the "weaker sex" in Indian society.

Mathur et al. (2019) examine the surge in reports of violence against women following the widely publicized "Nirbhaya" incident in Delhi in 2012, as well as the subsequent rise of the "MeToo" movement on social media. While media coverage and the growing support for women's rights encouraged many women to come forward, Mathur et al. (2019) suggest that the increase in reports is more a reflection of women's growing willingness to report rather than an actual rise in violence. In a similar vein, Amaral et al. (2021) and Iyer et al. (2012) show that establishment of women police stations and increase of women representation in politics have been found to have a positive impact on the women feeling safer to join the labour force and report incidences of assaults. This provides evidence of the positive ripple effects of women empowerment on VAW reporting.

In the context of safety well-being and empowerment of women lagging behind, earlier theoretical works like Agarwal (1997) and Heise et al. (1994) have been instrumental in showing the adverse effects of gender norms in the society. Studying the topic of gender biased norms specifically in the context of bargaining relations, Agarwal (1997) theoretically examines gender biased norms in four principal institutions: household, market, community and state. While each of these individually impinges a woman's bargaining power in its own way, they are doing this simultaneously so that there are mutual interactions within the arenas[15]. She explains theoretically how the social gender norms are exogeneous in the short term but endogenous in the long term, and how they play a vital role in limiting women's bargaining power, subjecting them to domestic violence.

Social gender biased norms and gender inequality also have important implications for economic development. Duflo (2012) shows that while development drives down gender inequality, gender inequality hinders development [16]. This paper demonstrates that in

[15]For example, a woman's bargaining capacity for higher wages in the labour market is limited by household responsibilities, thereby the institutions of household and market intersecting. In other such decisions, the institutions come into play at once, resulting into the pressure on a woman being a summed up big pressure from all the sources.

[16]Duflo (2012) terms this as a "bidirectional relationship" between economic development and empowerment of women

both developing and developed nations, presence of the "implicit bias" [17] against women automatically ruins any possibility of gender equality through economic development. In similar lines, Ferrant (2015) empirically prove that a vicious circle exists between gender inequality and economic development. Jayachandran (2015) discusses different mechanisms[18] through which gender biased norms are related to economic development[19]. Jayachandran (2015) also observes that in poorer countries, like India and China, social gender biased norms[20] that excessively favour males apparent in the strong preference for a son is the reason behind the male-skewed sex ratios and the related gender inequality.

In the context of son-preference, Jayachandran and Kuziemko (2011) show how mothers in India give preference to sons over daughters when it comes to breastfeeding, using data on fertility preferences and breastfeeding duration. In similar lines, Hossain et al. (2021) in their paper find that even when mothers are empowered, daughters still are discriminated against with regards to food allocation in comparison to sons, signalling biased gender norms are still present in the society[21]. In the context of women empowerment and gender biased norms, Majumder and Mitra (2016) find that there exists a gender bias among guardians in sending daughters to school, on the spending on their education and on their selection of subjects[22].

VAW has been connected to gender biased social and cultural norms[23] in previous literature. Interventions aimed at challenging gender-biased attitudes and reducing VAW have shown promise, as noted by WHO (2009) and UNESCO (1993). For example, it

[17] An implicit bias is explained to be one where the women are usually associated with family and liberal arts; while the men are linked to careers and sciences by both men and women alike.

[18] These mechanisms are: expansion of the services sector, technological advancement in carrying out household chores, and with medical advancement the risk and frequency of childbirth getting reduced.

[19] She uses data from the 2011 Demographic and Health Survey (DHS); World Values Survey (WVS), wave 5 data; and from World Development Indicators (WDI) of the World Bank.

[20] Often driven by factors like patrilocality (i.e., women after marriage having to live with her husbands and in-laws), patrilineality (i.e., sons being the ones to carry forward the family name and property rights), and religious rituals (like only a son can bring salvation to the spirit of the deceased person by lighting the funeral pyre).

[21] Hossain et al. (2021) use agricultural data and a multi-dimensional index capturing women's empowerment known as Women's Empowerment in Agriculture Index (WEAI) from the Bangladesh Integrated Household Survey.

[22] Majumder and Mitra (2016) use data from the 64th round of NSSO data on education expenditure in West Bengal. Indian schooling system here refers to the primary and secondary levels of education, which comprise of 12 class levels, the 10th and the 12th being the most important levels. It is observed here that the girl children are encouraged more to choose arts and commerce streams after Class 10, while the boys are pushed towards science streams irrespective of their interests or skills.

[23] Gender Biased norms can be defined as the expectations from the society which set and define the proper behaviour for men and women based on their gender (Rothchild (2014)). WHO (2009) report defines social gender norms as societal expectations that dictate appropriate behavior for men and women based on their gender.

is common for societies to associate masculinity with being tough and aggressive, while femininity with being soft and gentle. Such gender biased norms lead to inequalities in social status and decision-making power making one gender empowered over the other, in turn making women vulnerable to suffering violence from men (Jayachandran (2015), Singh et al. (2021)).

This bias translates to discrimination among children as well. The preferential treatment towards boys is often termed by psychologists as "stereotype threat" as explained in Duflo (2012). This threat is explained in a study by Spencer et al. (1999), where it was shown that girl students who are as skilled at maths as boy students tend to perform poorly initially due to the internalisation of the bias that "girls are not as good at maths as boys". But once the girls are told that it is not true for that particular test, they perform as good as boys and sometimes even better. Other previous works in the literature have associated one or multiple form(s) of violence against women (VAW) to different variables[24] (Aizer (2010), Garikipati and Kambhampati (2021), Iyer et al. (2012), Card and Dahl (2011)). My hypothesis is here that behind each of these factors lies the inherent social conditioning in the minds of people that "female is the weaker sex" or "male is the superior gender", right from the time a child is born.

This paper attempts to add to this body of literature by exploring whether cultural gender biased trends of male child biases can be connected to various types of VAW in India. Amaral and Bhalotra (2017), Iyer et al. (2012), Amaral et al. (2021) and Anukriti et al. (2022) have made significant contributions to this literature by empirically examining how gender inequalities and increased female empowerment influence VAW through various channels and mechanisms. These studies employ causal-inference methodologies that offer valuable insights into combating VAW. There are also some noteworthy papers which study as causes of VAW son preference and sex ratio but they do this in restricted settings like in a particular age group as causes of VAW (like Amaral and Bhalotra (2017)). Some others which connect son preference with VAW study only a given *form* of violence (like Milazzo (2018), Anukriti et al. (2022), Rawlings and Siddique (2020)).

There is a gap in the literature however in connecting *overall* gender biased preference

[24]Like alcohol and drug consumption by males, income differences between men and women, lack of women empowerment, wars and civil unrests, upsets in recreational settings like losses in football matches, lack of women in positions of power etc.

for male children with *various* major forms of violence against women in the context of the Indian socio-economy. This paper addresses this gap. My research builds upon the work of Amaral and Bhalotra (2017) and Mathur et al. (2019), exploring the relationship between gender-biased behavior, particularly the male child bias, and the prevalence of violence against women (VAW) over a span of 18 years. This paper uses the preference given to boys over girls through measures of son preference and sex ratio as proxies for gender biased norms, as suggested by Jayachandran (2015). This research aims to contribute to the literature by providing further understanding whether male children biased trends contribute to the perpetuation of VAW in India.

3.3 Data

3.3.1 Violence Against Women

We use district-level data on various different forms of violence against women (VAW) from National Crime Records Bureau (NCRB) for the years 2001-2019. I then divide the number of crimes against women cases by the population estimates obtained from the Census of India (2001 and 2011). NCRB is a government organisation working under the Ministry of Home Affairs, central government of India. The NCRB website provides information on crimes and criminals reported in police stations and higher police offices from all over the country. The NCRB also has records of various kinds of crimes against women, with the categories increasing over the years. Keeping at par with the initial years of crimes recorded by the NCRB, and following Amaral and Bhalotra (2017), I have categorised[25] VAW into the four broad categories: domestic violence, rapes (non-domestic), trafficking, and assaults and insults. I discuss each of these variables more elaborately below.

The first kind of VAW variable I use is domestic violence as it's the most common occurrence in this context. I add the cases of "dowry deaths" and "torture by husband and in-laws" from the NCRB dataset and generate one variable accounting for all domestic violences. The second kind of VAW this paper refers to is the category of "rapes" defined as sexual abuse and violence outside domestic boundaries. The category of rapes is built from the cases recorded by the NCRB, which doesn't include marital rapes (NCRB (2019)). In this paper, I add the cases of rapes and "murder by rapes" into a single variable as recorded

[25]Early works in the literature like Coomaraswamy (2005), Saravanan (2000) and Heise et al. (1994) discuss a wide range of scenarios under violence against women (VAW), including acid attacks, rape during dating or courtship, forced prostitution, trafficking, sexual harassment in the workplace, marital rapes, intimate partner violence, public assaults, and psychological abuse.

by the NCRB (2019). The third category of VAW used in this paper is trafficking. NCRB records the data of women who have been kidnapped or abducted and also on importation of girls and women. I have added these two variables and have generated a new variable called "trafficking" which includes both the kidnapped women and the imported women. Assaults and Insults[26] here is the fourth and final category that sums up the number of cases reported under "assaults with intent to outrage modesty of women" and "insults to modesty of women" recorded by the NCRB (2019).

We first generate the above four variables on the basis of the number of criminal cases reported by a given district for each kind of violence against women (VAW) in a district from 2001-2019. I then calculate the rates of these crimes per 100,000 population and taking logarithms, following the methodology used in Amaral et al. (2021), by dividing the number of these cases in each district by the district population estimates obtained from the Census[27]. I had only the population data of 2001 and 2011 from the Census available so far. For the missing population data of the remaining years I projected the population from these two years, using the cubic spine interpolation method[28] as used in Amaral et al. (2021).

3.3.2 Gender Biased Norms

For the gender biased norms on desire for a son, I use data from four waves of the household surveys National Family Health Survey (NFHS) and India Human Development Survey (IHDS) from 1998 to 2018. Both of these are all-India household surveys done with a sample of representative households from every district in India. To make the sample representative of the entire population, both the household surveys use sample weights. The social gender biased norms are measured by two measures: son preference and sex ratio at birth. The main independent variables are therefore the preference for sons over daughters and the male-to-female-born ratio from the previous year. So, the gender biased

[26] Actions classified as "assaults and insults" include "inappropriate touching, forcible disrobing, indecent gestures or remarks with the intent to insult modesty", as described by Section 354 of IPC (BPRD (2023)). These also include passing any sexually offensive remarks or suggestions.

[27] We calculate the crime rates for the total district population as well as male and female district population separately to compare the different effects.

[28] Before trying the cubic spine method, I also tried other methods of data projection like the linear inter/extrapolation and multiple imputation. Linear inter/extrapolation doesn't take into account the non-linear trends in the population growth, leading to erroneous values. Multiple imputation, on the other hand, is found to be most suitable for random missing data and is not suitable for non-random missing data like ours. The missing data I had was simply due to the population data not having been collected in the given years (Royston (2005)).

attitudes which prevail at the time of conception and birth is reflected in that year's son preference and sex ratio. In our main empirical model, we are studying the association of a year's son preference and sex ratio with the following year's rates of violence against women (VAW)[29]. As explained before, the rationale behind using these measures as my main predictor variables is that by capturing the gender biased preference for male child, these measures reflect the general societal preference given to the male gender (Jayachandran (2015), Amaral and Bhalotra (2017) and Coomaraswamy (2005)). Also as explained in the previous section, the reasons for using the independent variables from the previous year to study the relationship with the following year's VAW rates is (1) gender norms can be expected to take some time to percolate into society before transpiring into actions, and (2) to account for the reverse causality.

The variables for these measures are collected from NFHS-2 (1998-99), IHDS-I (2005-06), IHDS-II (2011-12), NFHS-4 (2015-16) and NFHS-5 (2019-21). These variables include the birth data of the children women give birth to and women's responses on the number and gender of children they desire are initially aggregated to district-level from individual-level. I use data from these household surveys to calculate sex ratio at birth (SRB) at the district-level. SRB is the ratio of the male born children to the female born children and it can be used to measure how much the population trends are practically biased towards the male child (Jayachandran (2015), Amaral and Bhalotra (2017) and Singh et al. (2021)). I therefore considered it suitable as a practical measure of the social gender biased attitudes favouring male children. The SRB is calculated from 2000 to 2018 using the birth data from the NFHS waves.

Sex Ratio at Birth

Sex ratio at birth is defined as the number of male births per 100 female births in a given region at a given period of time (Jayachandran (2015)). In order to calculate the sex ratio at birth (SRB) for a given year (i.e. any year between 2000 to 2018), I compute the average number of children birthed by women in that specific year (which is obtainable from the

[29]It is possible that son preference and sex ratio from 20-30 years ago could also be associated with the VAW of a given year. In that case, the channel would be here that the male child preference (and therefore the patriarchal mindset) prevailing in the Indian households from all those years ago is transferred to the males born at that time, who as adults in turn become perpetrators of violence in the present year. But in order to do that, there are substantial problems in relevance of the data, data matching and data availability. Indeed, I had run a model with lags of longer time periods initially but didn't find any meaningful results. This is the reason, I stuck to just one year lag.

birth data of the NFHS waves) and then aggregate it to the district-level. This automatically gives me the annual average male and female births required for the calculation of annual SRB for all the years starting from 2000 to 2018 for every district of India. I then denormalise the DHS weights for the average births using the sample size of households from the NFHS waves and the population size of households from the Census of India, following the instruction manual provided by the DHS[30]. These denormalised weights are then applied to the average male children and female children at the district level from a given year. The weighted SRB for a given year is then calculated by taking the ratio of the weighted average male children to the weighted average female children born to the women in that specific year in the given district.

This weighted SRB data from 2000-2018 is then merged with the NCRB data for 2001-2019, with SRB from each year of the household survey being matched with the following year's crime rates. SRB_{dt} is the sex ratio at birth in the dth district in year t, calculated using the following formula:-

$$SRB_{dt} = \frac{Average\ no.\ of\ Male\ Births_{\text{dt}}}{Average\ no.\ of\ Female\ Births_{\text{dt}}} * 100, where \tag{3.1}$$

Average no. of Male Births$_{dt}$ refer to average number of male births in district d and year t; and *Average no. of Female Births*$_{dt}$ refer to average number of female births in district d and year t. So, the SRB is expressed as a percentage.

Son Preference

In order to calculate the district-level female son preference index (FSPI), I take into account the ideal number of sons desired over the ideal number of daughters, divided by the ideal total number of children desired, according to Gaudin (2011) and Singh et al. (2021). Both the NFHS and IHDS ask female responders the ideal number of sons, ideal number of daughters and ideal total number of children that they desire. The ideal number of children desired are averaged at the district level for the four household survey waves. For the years the data is missing, the ideal numbers of sons, daughters and children desired are interpolated. For each of the waves, I then denormalise the sample weights and apply these denormalised weights to the interpolated district averages calculated earlier. Using

[30]Denormalisation of weights is considered an important step in case of pooling data from different surveys. The weights for the variables are usually normalised by the DHS to reflect the population, so the weights have to be denormalised when pooling from different datasets.

these, the weighted FSPI is in turn calculated for each year from 2005 to 2018. I dropped the years before 2005 as son preference data for all districts were not available before 2005. The NFHS-2 (1998-99) wave collected son preference data only from the districts of West Bengal. Even though I use interpolation[31], to increase accuracy, I decided not to interpolate backwards for upto 6 years for the districts with missing data. I therefore calculate the estimates of FSPI for the following years till 2018, with the data for intermittent missing years between the waves, being interpolated.

The cubic spine interpolation method is used to interpolate the FSPI variables following Amaral and Bhalotra (2017). I denormalise the weights before pooling the FSPI data from different waves and use these denormalised weights to calculate the FSPI. In the main model, this data is then merged with the NCRB data for 2006-2019, interpolated FSPI from each year of the household survey matched with the following year's crime rates. Also, I use only women's son preference in my main model and can't take into account men's son preference, as the data for calculating FSPI was available in all the waves, while the data required for calculating the men's son preference was not available in most of the waves before 2014. Following the methodology used in Gaudin (2011), FSPI is calculated by subtracting the weighted interpolated ideal number of daughters desired from the weighted interpolated ideal number of sons desired divided by the weighted interpolated ideal total number of children desired by the responders as follows. I then aggregate these individual-level variables to the district-level averages:

$$FSPI_{\mathrm{dt}} = \frac{Ideal\ no.\ of\ sons_{\mathrm{dt}} - Ideal\ no.\ of\ daughters_{\mathrm{dt}}}{Ideal\ total\ no.\ of\ children_{\mathrm{dt}}} \tag{3.2}$$

Here, $Ideal\ no.\ of\ sons_{dt}$ is the average ideal number of sons desired by women in district d and year t, $Ideal\ no.\ of\ daughters_{dt}$ is the average ideal number of daughters desired by women in district d and year t, and $Ideal\ no.\ of\ children_{dt}$ is the average ideal number of total children desired by the women in district d and year t.

3.3.3 District level controls

In this paper, the analysis draws covariates from two secondary datasets: the National Family Health Survey (NFHS) and the India Human Development Survey (IHDS). I control for the district-level demographics of the household survey responders by including

[31]It is to be noted here that I do not use interpolation to generate estimates of SRB for all the years relevant to my study, using the four household waves, unlike FSPI. This is the reason I can use a greater range of years (from 2000 to 2018) for SRB in comparison to what I can use for FSPI.

their age, religion, literacy level, employment status, highest education level and location type of residence. For all my models, both main and additional, the control variables are always interpolated for the years missing data. Some variables considered otherwise important as demographic characteristics, like income and caste, could not be controlled for owing to inconsistencies across the two datasets[32]. To avoid adding noisy and inconsistently defined covariates that could distort the merged dataset, caste and income were excluded from the vector of controls.

Age is a numerical variable capturing the ages of the respondents in the given years in whole numbers. The ages of both male and female respondents in the household surveys are taken into account here. I also include district-level nightlights data from Development Data-lab's Socioeconomic High-resolution Rural-Urban Geographic Platform for India (SHRUG) to account for the infrastructural development in the districts. The district nightlights capture all economic development happening in the districts over the time period.

I control for religion which is measured as a categorical variable in the household surveys divided into six different categories: Hindus, Muslims, Sikhs, Christians, Buddhists and Others. However, I divide religion into three dummies: Hindus, Muslims and Others. Each of these dummy variables capture whether a person is of a particular religion (1) or not (0). Location Type is also a binary variable with two categories of "urban" and "rural", the former taking value 1 and the latter taking value 0. I also use the dummy variables capturing highest education level. Religion and Location Type are treated as household demographics.

If a person has "no education", I record it in a dummy variable as taking the value 1, otherwise 0. If the person's highest education level is "primary education" education, I create another dummy variable that takes value 1, otherwise 0. I create similar dummies for secondary and higher education levels also. For each of these dummies, I then cal-

[32]IHDS provides relatively detailed caste and income, but NFHS does not provide comprehensibly coded variables for these two. For castes, NFHS only categorises respondents into Scheduled Castes (SC), Scheduled Tribes (ST), and Other Backward Classes (OBC). It does not identify General-caste households in a clean or consistent way; instead, the residual responses are coded as "none of them" or "don't know," which makes the General category impossible to isolate reliably. Because the two datasets classify caste on different scales, including caste would introduce non-comparable measurements and substantial coding ambiguity, especially problematic given that I interpolate the control variables across missing years. Similarly for income, NFHS does not collect any information on the earnings or salary or even the income group, which IHDS does collect on the other hand. NFHS only provides information on type of earnings and who earns more in the household.

culate the district level averages which are again interpolated for the missing years. Age and highest level of education are treated as demographics of the men and women in the districts.

3.4 Research Methodology

In order to study the association of violence against women (VAW) with sex ratio at birth (SRB) and female son preference index (FSPI), I run multivariate Poisson regressions on the variables averaged at the district-level. my main model comprises of weighted SRB (for 2000-2018) and weighted interpolated FSPI (for 2005-2018) averaged at the district-level:

$$VAW_{\mathrm{dt+1}} = \alpha_{dt} + \beta_{dt} S_{dt} + \gamma_{dt} \mathbf{X}_{dt} + \delta_{dt} NL_{dt} + \phi_d + \phi_t + trend_{d*t} + \mu_{dt}, \tag{3.3}$$

where $VAW_{\mathrm{dt+1}}$ is the log of violence against women rates per 100,000 females (following the methodology Amaral and Bhalotra (2017)) in the dth district in (t+1)th year. S_{dt} stands for female son preference index, $FSPI_{\mathrm{dt}}$, and sex ratio at birth, SRB_{dt} measured for dth district in year t. $\boldsymbol{X}_{\mathrm{dt}}$ is the vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion in the dth district and tth year. NL_{dt} stands for nightlights in dth district and tth year used to control for district level economic development. I account for the district fixed effects and year fixed effects as captured by ϕ_{d} and ϕ_{t} respectively. For the district specific time trends across the years (that takes into account changes in the districts over the years), I take district-specific year trends captured by the term $trend_{\mathrm{d*t}}$. β_{dt} is the coefficient of interest in this model. The last term in this equation is the stochastic error term represented by μ_{dt} capturing any remaining unexplained parts of VAW that isn't accounted for by the main predictor variables, controls and the fixed effects.

We run Poisson regressions because the dependent variable is a count/ rate variable with most of the independent variables being categorical in nature (the distribution in this case is unlikely to be a normal one). $VAW_{\mathrm{dt+1}}$ stands for the total rate of violence against women in a district in a given year as well as for the four individual kinds of crime rates that I study in this paper: domestic violence (DV) rates, rape rates, trafficking rates and rates of assaults and insults. my main model specification uses the logarithm of VAW rates calculated per 100,000 females per district, but I also present results from the specification that uses logarithm of VAW rates calculated per 100,000 people (both males and females) in a

district. The reason why I use the model with VAW rates per 100,000 females as my main model is that the VAW counts are basically incidences as experienced by women, so when calculating the rates, it makes more sense to divide the count by total number of women in the district rather than people in the district. I also use VAW percentages calculated per woman and per person in the district and report my results from this variation as well.

The district fixed effects (ϕ_{d}) take into account the unobserved district level factors influencing the VAW rates, like cultural differences, as highlighted previously by Rahman and Rao (2004) and Agarwal (1997). The year fixed effects (ϕ_{t}) on the other hand take into account any year specific socio-political, economic, or cultural shocks commonly experienced in all the Indian districts. Furthermore, I control for the liner trends in the districts over the years ($trend_{\mathrm{d*t}}$) to account for changes like government changes, or specific socio-political events[33]. I use robust standard errors[34] to estimate my models.

The interpolated son preferences and sex ratios from a given year are merged with the VAW rates from the following year, following the lagged year methodology used in Angrist and Pischke (2009). This is done to gain an idea of whether any change in the rates of violence against women (VAW) occurs as a consequence of the male child social biases occurring in the previous year. The rationale is that any fluctuations in gender biased trends take time to be absorbed and the aftermath to be reflected through violence. Additionally, it also takes care of the problem of reverse causality (of VAW having any effects on gender discrimination and gender norms) to some extent as done in Onaran et al. (2022). As the gender biased variables are taken from a year earlier, they are more likely to be leading to the VAW occurring in the following year; and not the other way round.

Table 3.1: Table showing how the dependent variables from NCRB are matched with the main predictor variables from the household surveys in the model without interpolation

[33] In a separate robustness check that I don't report in this paper, I also ran a model with state-year fixed effects as has been done in Amaral and Bhalotra (2017). But as district trends take into account the state-year effects in a greater detail, I decided to stick only with the district trends model.

[34] The model includes high-dimensional fixed effects for the interaction of district and year, which absorb all district-specific shocks in each year. In addition, robust standard errors are used to account for potential heteroskedasticity. Because the fixed effects control for both district- and year-level variation, the residuals are largely uncorrelated within districts, so clustering at the district level is unlikely to substantially affect the results. In practice, the robust standard errors reported in the main model are well-behaved and reasonably small, which further suggests that the inference is reliable without explicit clustering.

Violence Against Women (Outcome variable in year t+i)	**Gender Biased Desire for Son (Predictor variable in year t)**
National Crime Records Bureau (NCRB), year 2001	National Family Household Servey (NFHS-2), 1998-99
NCRB, year 2007	India Human Development Survey (IHDS-1), 2005-06
NCRB, year 2013	IHDS-2, 2011-12
NCRB, year 2017	NFHS-4, 2015-16

In another set of robustness checks, I run a model which doesn't interpolate son preference measures for the missing years. The crime data from the NCRB for one year is matched with the previous year's gender biased measures from the household surveys (with a year lag) as shown in Table 3.1.

3.4.1 Summary Statistics

In table 3.2, in the topmost segment, the summary statistics of the various rates of VAW are given per 100,000 female persons of the district for the FSPI model from 2005-2018. I had also generated the rates per person in total population as well as male population. The rates per person in total population are less than the rates per person in female or male population. This is because the former rates are divided by the total population which is greater than the female or male district population in the later rates[35]. Since the VAW counts are crimes experienced by women, it seemed justified to use only the VAW rates calculated per 100,000 women in a given district. From the topmost segment giving the outcome variables statistics, I find that the rate of total violence has the highest average, closely followed by domestic violence rate and rate of assaults and insults.

Table 3.2 also provides the summary statistics for the weighted and interpolated district FSPI, which is the main predictor variable in this model, in the second segment of the table. As the FSPI includes a difference between ideal number of sons and daughters, it also tends to take negative values for the cases where women reveal a preference for more number of daughters over number of sons. A positive son preference would be indicated by a positive FSPI, i.e. if the number of sons desired are greater than the number of

[35] In each of the cases, the rates of domestic violence (DV) are the highest followed by the rates of assaults and insults.

daughters. Since the difference in the numerator of FSPI cannot be greater than the total number of children desired in the denominator, the largest value that FSPI can take is 1. I note that around 43% of the women reveal to prefer sons over daughters.

Table 3.2: Summary Statistics of the FSPI Model: Outcome, Predictor and Control Variables

Variable (District Averages)	**FSPI model**		**SRB model**	
	Obs	**Mean**	**Obs**	**Mean**
Outcome Variables:				
- Rate of Total VAW	2662	3.322	8587	3.173
- Rape rate	2666	1.177	8656	1.114
- DV rate	2666	2.215	8656	2.047
- Trafficking rate	2666	1.438	8656	1.201
- Rate of assaults and insults	2666	1.96	8656	1.765
Main Predictor Variables:				
- Weighted FSPI (interpolated)	3085	.433	-	-
- Weighted SRB	-	-	8656	108.768
Control Variables:				
Household Demographics (interpolated):				
Location Type	3085	.347	6149	.326
Religions:-				
- Hindu	3085	.803	6149	.746
- Muslim	3085	.132	6149	.146
- Other Religion	3085	.065	6149	.108
Women's Controls (interpolated):				
Age	3247	34.457	6149	35.405
Highest Education Level :-				
- None	3085	.335	6149	.468
- Primary	3085	.37	6149	.228
- Secondary	3085	.215	6149	.288
- Higher	3085	.086	6149	.069
Men's Controls (interpolated):				
Age	3176	28.934	6149	29.565
Highest Education Level				
- None	3085	.144	6149	.164
- Primary	3085	.131	6149	.14
- Secondary	3085	.481	6149	.494
- Higher	3085	.245	6149	.212
District Economic Development:				
District Nightlights	3085	7.24	8656	5.777

Notes: The category of rapes constitute of both the incidences of rape as well as murders by rape. Domestic Violence (DV) constitutes of two categories: cruelty by husbands and in-laws and dowry deaths. Trafficking includes two categories again: kidnapping and abduction of females and importation of girls and women. Location Type refers to the type of place the household is located in, with two categories: Urban and Rural.

In the bottommost segment of the table, the summary statistics for the control variables are given, which are also interpolated for the missing data years from the household

survey waves. In all my models, I control for household demographics like location type and religion followed, along with district economic development measured by average district nightlights. Furthermore, I also control for women's and men's ages and highest education levels in my empirical models. These set of controls remain the same for all my maodels, including the main model and all the other regression models. In the FSPI model from Table 3.2, I find that my sample consists of 80% Hindus, 34.7% urban population, 37% of females having received primary education while 48.1% of males received secondary education. The mean district nightlights in this model is 7.24, with lowest being 0.02 and the highest being 63. The mean age of the females in this sample is 34.457 years, with minimum age being around 18 years and maximum around 42 years, while the mean age of the males in this sample is 28.934 years, with the minimum age being around 20 years and maximum being around 39 years.

In the second column of Table 3.2, I find that for the SRB model for the years 2000 to 2018, the mean rate of total VAW at the district level is the highest of course, followed by DV rate and rates of assaults and insults. The average district weighted sex ratio at birth (SRB) is 108.768. Also, from Table 3.2, I find that for the SRB model, my sample consists of 75% Hindus, 32.6% urban population, 23% of females having received primary education while 49.4% of males received secondary education. The mean district nightlights in this model is 5.777, with lowest being 0 and the highest being 63. The mean age of the female population in my sample taken from the household surveys is around 34 years, with the range from around 18 to around 42. The mean age of the male population from these household surveys is around 28 years, with a range from around 20 years to 39 years. Most of the independent variables are categorical or binary variables originally, for each of which district averages have been taken before interpolating each variable for all the missing years.

The difference between the FSPI and the SRB models is because the FSPI model is from 2005-2018, while the SRB model is from 2000-2018. The highest education level is higher in the FSPI model because with time, the levels of education attained have increased in general. The proportion of Hindus and other religions are also different between the two datasets because while FSPI uses both NFHS and IHDS datasets, SRB only uses NFHS data. The household samples can be expected to be different between NFHS and IHDS by demographical characteristics. So, while the FSPI model is picking up the demographics

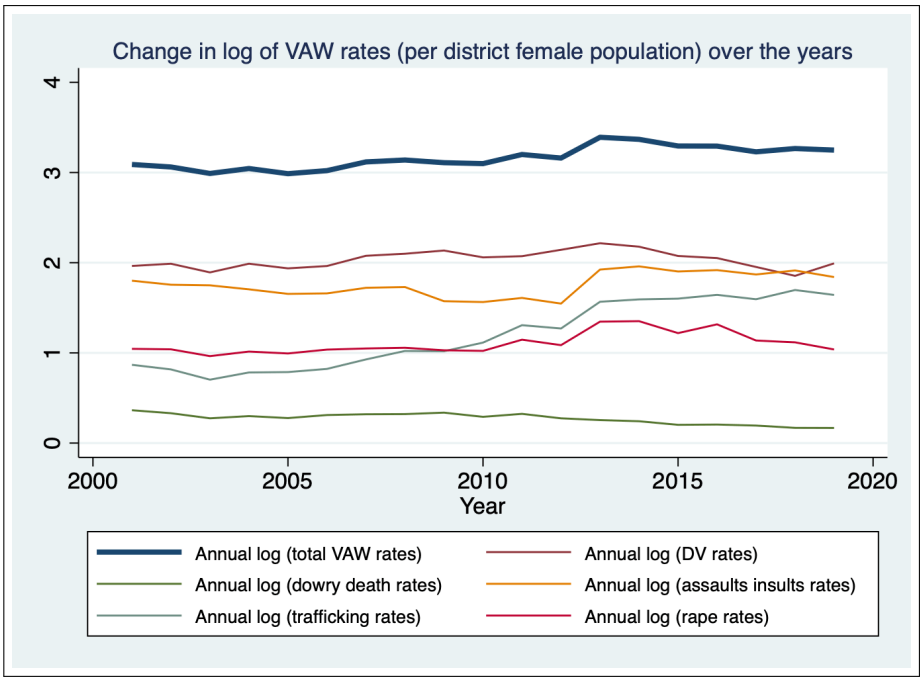

Figure 3.1: Average VAW annual rates (log of VAW per 100,000 females per district) changing over the years

of both the NFHS and IHDS models, the SRB model is just picking up the demographics of the NFHS datasets, which is why the difference.

In Figure 3.1, the rate of changes of annual VAW over the time period 2001-2019 are given. As can be observed in Figure 3.1 that the VAW rates have remained more or less unchanged over the years, increasing slightly in the years 2013, 2014 for all forms, and in total. Again, I use VAW rates per 100,000 female population in my main model as the violence is experienced by women. It is to be noted that the widely publicised case of *"Nirbhaya"* occurred in 2012, possibly leading to an increase in the reports of crimes soon after as also observed by Mathur et al. (2019). All mentions of VAW and its various forms henceforth in the analysis of this paper refer to the incidences of VAW as *reported* (and recorded by the NCRB). Specifically, these do not include those experiences of violence by women which were not reported.

Furthermore, it is noteworthy that this increase is in the cases of rape rates (non-domestic), trafficking rates, rates of assaults and insults, and the total VAW rates. The rates of dowry deaths, which is an important component of the rates of domestic violence (DV), seem to be declining in comparison. The trend of the DV rates curve also seem to sloping downwards after 2012, while the curves for the other trends are observed to be

upward sloping.

In Figure 3.2, areas in darker shades of red[36] show the districts where total number of VAW rates have increased to various degrees from 2001 to 2019. Areas in lighter shades of red show the districts where the rates have decreased or remained the same from 2001 to 2019. The areas in white are the regions with missing data. Darker the shade, higher the increase in VAW rates, while lighter the shade, lighter the decrease in VAW rates. The difference in the rates of total VAW from 2001 to 2019 have increased quite a bit in the north western, north eastern, south eastern and south western districts. On the other hand, the total VAW rates seem to have decreased in northern, central and southern parts. As additional results, I carry out some heterogeneity tests on the basis of districts divided into different regions.

Similarly, the panel of the four smaller maps given in Figure A2.1 in the Appendix show the distribution of changes in rape rates, DV rates, trafficking rates and rate of assaults and insults. Again, in each of these maps, areas in the darker shades of colour in the given maps show the districts where total number of VAW rates have increased while areas in lighter shades of colour show the districts where the rates have decreased or remained the same from 2001 to 2019. The difference in the rape rates from 2001 to 2019 have increased quite a bit in the north western and south western districts of India, and parts of south eastern and north eastern regions as well. The rape rates seem to have reduced in the central, south and western parts of India.

The DV rates in Figure A2.1 seem to have increased in north-western, south-eastern and parts of north-eastern India, while the rates have decreased in other regions. The trafficking rates have increased or remained the same in the central, south western, north western, eastern and south eastern regions of India, with decreases in other areas. The rates of assaults and insults have increased or remained the same in north western, south western, south eastern and parts of north eastern districts of India, whereas these rates have reduced in central, northern and southern most regions of India.

[36] In all the maps in this paper, the differences between the violence rates in 2019 and rates in 2001 have been plotted district-wise. For the range of difference values greater than 0, the violence rates increased from 2001 to 2019. For the range of values less than 0, the rates decreased from 2001 to 2019. And for the difference values equal to 0, the rates remained unchanged between 2001 and 2019. The top two dark colours represent the increases in the maps and the bottom two lighter colours represent no changes or decreases.

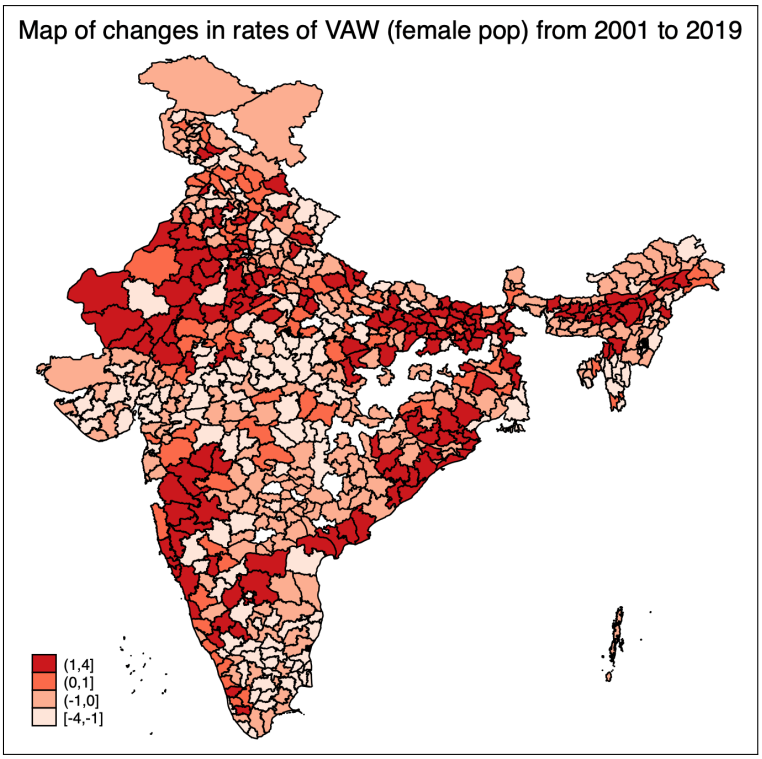

Figure 3.2: Map of India showing Changes in Total VAW Rates from 2001 to 2019 in Indian Districts

In Figure 3.3, I provide the smoothed graphs of SRB and FSPI changing over the years. The annual weighted FSPI in the right figure of Figure 3.3 appears to have increased initially from 2005 to 2008 and then starts decreasing and reach a dip in 2017 and then increases again to the initial level of son preference. The annual SRB shown in the left figure can be seen to be almost constant at 108.8 over the years from 2000 to 2018. If at all any change is observed in the weighted SRB over the years, they showed very minute increases ranging from 108.77 to 108.79, mainly increasing in the last three years of 2016, 2017 and 2018. The year-wise variation of SRB has been presented in Table A2.2 in the Appendix. Table A2.2 also shows the variation of SRB according to regions. The SRB can be observed to be highest in the northern India, followed by western India, while SRB is slightly lower and almost in the same range in eastern, south-eastern and southern India.

However, it is to be noted for Figure 3.3 that the scale of values on the basis of which these trends are observed is small. The country's annual weighted FSPI has remained more or less within the range of 0.44 to 0.47, with the observed cyclical trend.

We also run a number of heterogeneity tests around the means of various demographics, including district economic development (nightlights data) and women empowerment (education) for a closer study. These results have been discussed further in the section of 'Additional Results'. As a set of additional results for a closer analysis, I run a heterogen-

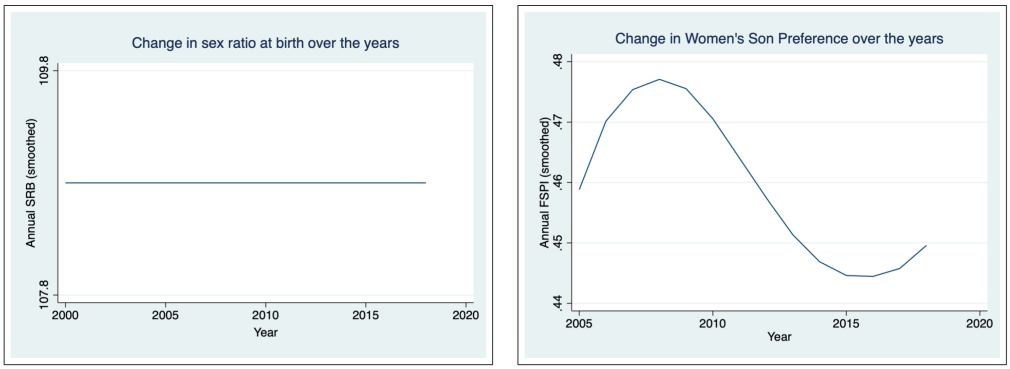

Figure 3.3: Change of SRB and FSPI over the years

eity test around the year of 2012, which is the year when the incident of *Nirbhaya* took place in Delhi. I look at the sample before 2012 and after 2012 to see if there are any marked changes in the associations of the VAW rates with SRB and FSPI following the incident.

Additionally, I ran a set of heterogeneity tests with the datasets divided on the basis of regions. I grouped the different districts into North, South, East, West and North-East regions based on their locations on the map. This was done in order to isolate the associations of the VAW rates with SRB and FSPI on the basis of socio-political and cultural differences occurring across regions. To be specific, it might have important implications for cultural and social norms, including gender norms.

3.5 Main Results

In this section, I discuss the results from the Poisson regression analysis of my main empirical models. Following this, I also discuss the robustness checks.

3.5.1 Regression Results

Table 3.3 shows the Poisson regression results for my main sex ratio at birth (SRB) model. With the different types of VAW measures (log per 100,000 females) being the dependent variables, SRB[37] is the main predictor variable. Since the victims of the crimes are women, I treat the model with the VAW rates calculated per 100,000 females (and not

[37]The SRB naturally exhibits a small biological male bias, but this baseline is highly stable across populations. In the Indian context, shifts beyond this narrow range are well-established to arise from social behaviours shaped by patriarchal norms, not biological factors. The 'evolution' here therefore is owing to socio-economic adaptation, consistent with Eswaran and Malhotra (2011), rather than biological evolution.

per 100,000 persons) as the main model. I report the results for the model with VAW rates per person and VAW percentages as robustness checks in the following subsection of "Robustness Checks".

From the Poisson regression coefficients in Table 3.3, I find that the weighted SRB has a significant positive association with the total VAW rate. It is observed that if the weighted sex ratio at birth (SRB) increases by 1% in the district, the expected rate of VAW per 100,000 women in the districts increases by [100*(exp(0.0359) - 1)]% = 3.65%[38]. SRB also has a positive significant association with rate of assaults and insults and trafficking rate, while a positive insignificant relationship with rates of domestic violence (DV) and rape. Similarly, with the weighted SRB rising by 1%, the rate of trafficking in the districts increases by 15.95% and the rate of assaults and insults increases by 6.2%. This implies that with the proportion of male children to female children rising in the districts, women experience more violence on average. This result is in line with previous works in the literature like that of Amaral and Bhalotra (2017) and Anukriti et al. (2022), who also find evidence of a direct relationship of SRB with DV.

In Table 3.4, the significant Poisson regression results of the main FSPI model are given[39] I observe from the coefficients that the weighted and interpolated women's revealed son preference (FSPI) of a given year has a positive significant association with the logarithm of rate of domestic violence (DV) rate and also a significant strong positive association with total VAW rate of the following year. While the main predictor variable is FSPI which is a ratio with values in the range [-1, 1], the outcome variable is logarithm of VAW rates per 100,000 females with values in the range of [0,10].

Given the range of FSPI is [-1,1], in order to interpret the coefficient for the Poisson regression run of VAW rates in Table 3.4, since a 1-unit increase in FSPI is an unrealistic measure[40], I need to scale down the coefficient for a more sensible interpretation. I scale

[38]It is to be noted that Poisson regression coefficients are interpreted differently than Linear regression coefficients. If the dependent variable is measured as a logarithm of a rate and say if the coefficient is x, then it means that if the predictor variable increases by 1, then the log of outcome variable rate goes up by [100*(exp(x) - 1)]%.

[39]Other VAW subcategories (rape, trafficking, and assault/insult) are not presented in Table 3.4 because the Poisson specification with district fixed effects, year fixed effects, and district-specific trends produced non-estimable coefficients for these outcomes. These crime types are relatively low-frequency and highly persistent within districts, leaving very little within-district temporal variation once the high-dimensional fixed effects are absorbed. Given this lack of identifiable variation, the model cannot recover meaningful estimates for these subcategories, so they are omitted from the table for clarity.

[40]We check this by initially calculating exp(5.869) = 353.89, which means that 1 unit increase in the (FSPI) is associated with a 353.89 fold increase in the expected total VAW rate, which is huge and not

down the coefficient and calculate [exp(5.869 x 0.01)-1] = 0.06, which would mean that a 0.01 (1%) point increase in the FSPI is associated with the expected VAW rate increasing by 6%. Similarly, an increase in the weighted interpolated FSPI in the districts by 0.01 point or 1% point is associated with the expected rate of domestic violence (DV rate) in the districts increasing by about 11.5% (since [exp(10.89 x 0.01) - 1] = 0.115).

Table 3.3: Poisson Regression Results of Interpolated Sex Ratio at Birth (SRB) (2000-2018) on different VAW rates (log calculated per 100,000 females)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
District Average Variables	**VAW rate**	**DV rate**	**Rape rate**	**Trafficking rate**	**Rate of assaults & insults**
Weighted SRB	0.0359*	0.0309	0.00741	0.148***	0.0602*
	(0.0183)	(0.0214)	(0.00647)	(0.0279)	(0.0333)
Constant	-0.308***	-0.0980***	-0.203***	0.425***	-0.0284
	(0.0112)	(0.0236)	(0.0425)	(0.0575)	(0.0277)
Observations	4,501	4,446	4,472	4,421	4,462
X Controls	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
District Trends	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including men's and women's ages and highest education levels, along with household demographics like location type and religion. I also control for district-level infrastructural development using nightlights data.

Both of the significant results found in this model indicate that with women's son preference increasing in the districts, women's experiences of violence also increase in the districts on average. The weighted FSPI doesn't appear to have any notable association with the other VAW rate variables like rape rate, trafficking and assaults and insults rates,

meaningful. Given the range of values that FSPI can take, which is within [-1,1], a unit increase in FSPI would mean something like it changing from 0 to 1 which would be a huge and unrealistic increase. As I can see from the summary statistics, the FSPI can increase at best by 0.01 units (say, when it increases from 0.43 to 0.44).

which is why those variables have been omitted from the table here.

As stated before, for both the SRB and FSPI models, I control for the men's and women's ages and highest education levels, household demographics like location type and religion and district nightlights capturing the district economic development. I also take district and year fixed effects separately to account for the district-specific changes and year-specific changes. Furthermore, I take into account the district by year trends in order to include the trend changes over the years.

From the observed coefficients from my main models of the weighted SRB and weighted interpolated FSPI, I find that both of these predictor variables are positively and significantly associated with VAW rates. This points to the direction that with gender bias increasing in the districts, VAW also increases in the districts. This might further indicate that the bias in favour of sons over daughters increasing at the district level might signal the presence of a cultural gender bias occurring at some broader social level percolating to the violent experiences of the adult population. This result is as expected and is in line with previous works like Amaral and Bhalotra (2017).

Table 3.4: Poisson Regression Results of weighted interpolated Female Son Preference (FSPI) (2005-2018) on different VAW rates (log calculated per 100,000 females)

	(1)	(2)
District Average Variables	**VAW rate**	**DV rate**
Weighted FSPI (interpolated)	5.869*	10.89***
	(3.064)	(3.282)
Constant	-0.277***	-0.00588
	(0.0343)	(0.0689)
Observations	2,468	2,460
X Controls	Yes	Yes
District FE	Yes	Yes
Year FE	Yes	Yes
District Trends	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including men's and women's ages and highest education levels, along with household demographics like location type and religion. I also control for district-level infrastructural development using nightlights data.

3.5.2 Robustness Checks

VAW percentage model and VAW rates per person model

As mentioned above, I carry out robustness checks with regressions run on VAW percentages and VAW rates calculated per 100,000 persons. The summary statistics for the various VAW measures are given in the Appendix in Table A2.1. As expected, the percentages are lower than the rates per person (as percentages are calculated per 100 heads while rates are calculated per 100,000 heads). In Table A2.4, the results for the Poisson regressions run on VAW rates (log of rates per 100,000 total population in districts) with the weighted SRB (top panel) and weighted and interpolated FSPI (bottom panel) as predictor variables are given. I observe from the top panel that SRB is positively and significantly related with total VAW rate, rate of assaults and insults and with trafficking rate. If the weighted sex ratios at birth in the districts increases by 1, the expected rate of total VAW per 100,000 persons in the districts increases by [100*(exp(0.0435) - 1)]% = 4.44%. Similarly, the rates per person of assaults and insults and trafficking increase

by 41.34% and 8.53% respectively, with a unit increase in SRB. It is observed that SRB here is positively but insignificantly related with the rest of the VAW rates per person, i.e. with DV rate and Rape rate.

Again, from the bottom panel of Table A2.4, I find that the weighted interpolated FSPI is positively and significantly associated with total VAW rate and DV rate, while insignificantly and positively related to the other VAW rate variables. With a 0.01 increase in FSPI at the district level, expected total VAW rate per 100,000 persons increases by 7.67% (since exp(7.383 x 0.01) = 1.0767). The expected rate of domestic violence (DV) per 100,000 persons increases by 14.85% with a 10% increase in FSPI. On the rest of the VAW measures, weighted and interpolated FSPI has positive but insignificant associations. I can infer from the results in this table that with both SRB and FSPI rising in the districts, women face more violence on average. This finding is in line with my main model and also with what is observed in the previous literature.

In Tables A2.3 and A2.5 in the Appendix, the results for the Poisson regressions run on VAW percentages with weighted interpolated FSPI and weighted SRB as predictor variables are given. As I can observe, FSPI again has a positive association with all VAW measures except trafficking. FSPI is positively and significantly related to DV percentage. Also, SRB has positive significant association with total VAW percentage and trafficking percentage. SRB is positively and insignificantly associated with the percentage of assaults and insults. The statistically significant relationships are in line with the findings of my main model above.

Model with Uninterpolated FSPI

Another set of robustness checks that I present in this section is the model for the four waves of household surveys without interpolating FSPI for the intermittent missing years (we call this the uninterpolated model). I do not report the results of SRB here as SRB was not interpolated. The summary statistics for FSPI for this model are given in the top segment of Table A2.6. As in all the models, I observe that the weighted FSPI has positive insignificant associations with most of the VAW variables, from Table A2.8.

In Table A2.8, the results of the Poisson regressions run on logarithm of VAW rates

per 100,000 females with uninterpolated district FSPI as independent variable are given, all of which are statistically insignificant. Total VAW rate, DV rate, rape rate and trafficking rate are positively but insignificantly related to the uninterpolated weighted FSPI. But rate of assaults and insults is seen to be negatively although insignificantly related to the uninterpolated weighted FSPI. These findings suggest that gender biased norms are positively related to crimes against women, even when the FSPI is not interpolated for the missing years. This finding is in line with my main results.

3.6 Additional Results

As additional results, I also run a set of regressions with men's son preference index (MSPI) and generating a cumulative son preference index (CSPI) that takes into account both MSPI and FSPI, once again designed following Gaudin (2011). I use men's data from NFHS waves 4 and 5 for the years 2014-15 and 2019-21, where the data is available, and use this to extrapolate backwards until the year 2000 for the preceding years where men's data is missing. I calculate the CSPI_{dt} as a ratio of men's son preference index (MSPI_{dt}) to women's son preference index (WSPI_{dt}) in district d and year t:

$$CSPI_{\text{dt}} = \frac{MSPI_{\text{dt}}}{WSPI_{\text{dt}}} \tag{3.4}$$

We then use the $\text{CSPI}_{\text{dt-1}}$ for the (t-1)th year to run regressions on the rates of VAW variables for the years 2001-2019. This is so as to assess the combined effect of both men's and women's son-preferences on the violence against women (VAW).

3.6.1 Cumulative Son Preference (CSPI) Model

The first set of additional results that I would like to report is from the model where men's son preference has also been taken into account. This follows from the natural question that the association of the violence inflicted on women by men can be better explained by men's son preference. Although NCRB does not give me access to the perpetrators' and the victims' demographics like age, religion, education level etc. But I do know from the NCRB (2019) report that 94% of these crimes are committed by men. There's also evidence that most of the crimes against women in India are committed by men (Amaral and Bhalotra (2017)). Previous literature also suggests that in the case of gender based crimes, men are more crime prone. This finding is also consistent with comparative studies with non-gender based crimes, economic and property crimes as carried out by Amaral

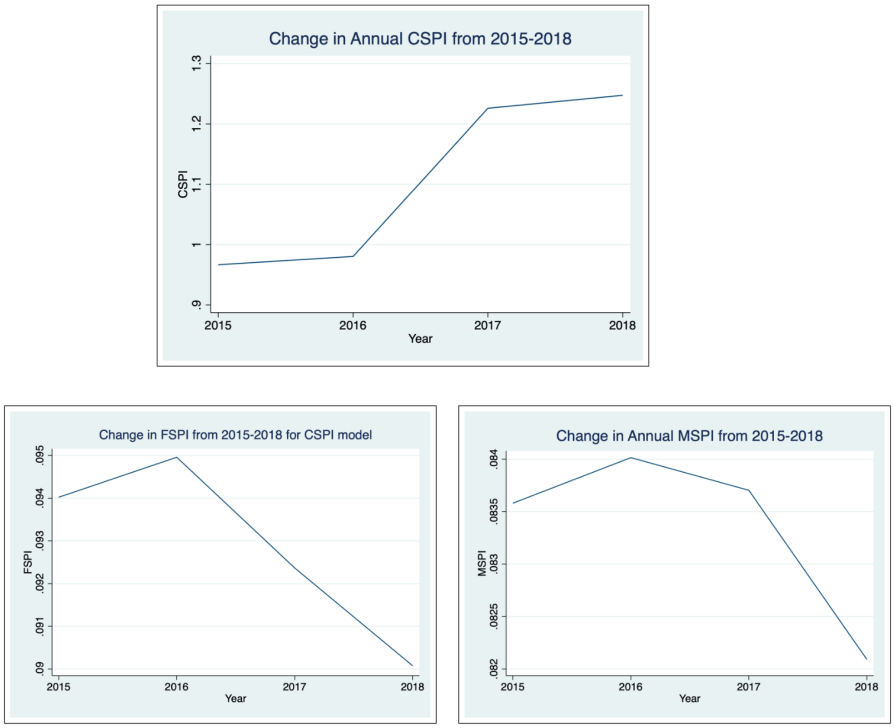

Figure 3.4: Change of FSPI, MSPI and CSPI from 2015-2018 in the CSPI model

and Bhalotra (2017).

However, I didn't have data on men's preferences for all the household survey waves of my study, except for the last two household survey waves, i.e. NFHS-4 and NFHS-5, which is why I do not report this model in my main results. The summary statistics for the MSPI, CSPI and the FSPI in this model are given in the lower segment of Table A2.6 in the Appendix. I see that the weighted MSPI has a lower mean than the weighted FSPI, and the weighted cumulative son preference (CSPI) is a ratio of the two.

We note that CSPI, being a ratio of the two ratio variables MSPI and FSPI, has a larger mean magnitude and also takes a much larger range of values [-66.35,29.19]. In this model, the weighted MSPI has a mean of 0.084 while the weighted FSPI has a mean of 0.094. The weighted CSPI has a mean of 1.029. As explained earlier MSPI is constructed out of interpolated values of son preference for men for the years 2015-2018, which is the main reason why these results were not reported as main results.

In Figure 3.4, I present the change in the FSPI and MSPI from 2015-2018, both of which have individually gone down over the years after increasing slightly in 2016. But if I look at the curve of CSPI, I can see that the MSPI to FSPI ratio has gone up over

these four years. This leads me to infer that over these four years when I consider the ratio of men's to women's son preferences, there has been an increase over the four years. In Table A2.7, the Poisson regression results of the weighted cumulative son preference index (CSPI) taking into account both men's[41] and women's son preferences are given. I find that CSPI has a positive but insignificant association with almost all the rates of VAW variables, except rape rate. The positive association of the cumulative son preference with VAW rates is in line with the findings of previous papers like Anukriti et al. (2022) and Amaral and Bhalotra (2017). It is noteworthy that for rape rates, CSPI has a large negative insignificant association. With a 10% increase in CSPI, the expected rape rates decrease by 49%. FSPI is evidently driving the CSPI results.

3.6.2 Heterogeneity Test Results

In my main model, I also observe that women's employment status and education levels have improved over this span of time period in India, indicating a positive trend of women empowerment. Notable papers like Jayachandran (2015), Iyer et al. (2012), Duflo (2012) and Agarwal (1997) have stressed that women empowerment is a vital channel through which patriarchal norms can be challenged, and in turn have important implications for VAW. In that vein, I carry out a number of heterogeneity tests around the median of district nightlights (since economic development is directly related with women empowerment) and women's education level. I also report results from heterogeneity tests carried out around the year 2012 and across various regions of India.

In Tables 3.5 and 3.6, I provide the results of the regressions run on each of the datasets split into two, less than the median and more than median district nightlights. Nightlights are supposed to be giving me a measure of district infrastructural/ economic development, and I aim to see how the districts less developed (nightlight less than median) may be differing from the districts more developed (nightlight more than median). In Table 3.5, the results for the weighted SRB are given, while in Table 3.6, the results for the weighted interpolated FSPI are given. For the datasets with districts having less than the median level of nightlights, i.e. less economically developed, I find that weighted SRB and FSPI

[41] We do not report the results of the MSPI model alone as it didn't seem meaningful to isolate the association of VAW rates with MSPI owing to data and population mismatch. I intend to study the association of men's son preferences relative to women's son preferences which is what is done in the measure of the cumulative son preference (CSPI). Intuitively, this also helps to take into account the attitudes of women (the victims) along with the attitudes of men (the perpetrators).]

have positive significant associations with the VAW rates, except one.

Table 3.5: Heterogeneous Tests Results around the median of District Nightlights for weighted SRB

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
District Variables (Nightlights)	**VAW rate (≤ median)**	**VAW rate (> median)**	**DV rate (≤ median)**	**DV rate (> median)**	**Assaults and insults (≤ median)**	**Assaults and insults (> median)**
weighted SRB	0.155***	-0.00369	0.144***	-0.00983	0.320***	-0.0166*
	(0.0318)	(0)	(0.0397)	(0)	(0.0578)	(0.00919)
Constant	-0.272***	-0.342	0.000371	-0.219	0.00521	-0.0877**
	(0.0187)	(0)	(0.0501)	(0)	(0.0481)	(0.0390)
Observations	1,837	2,641	1,788	2,632	1,819	2,567
X Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
District Trends	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. ***p<0.01, **p<0.05, *p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

Table 3.6: Heterogeneous Tests Results around the median of District Nightlights for weighted FSPI

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
District Variables (Nightlights)	**VAW rate (≤median)**	**VAW rate (>median)**	**DV rate (≤ median)**	**DV rate (>median)**	**Rape rate (≤median)**	**Rape rate (>median)**	**Traffic rate (≤median)**	**Traffic rate (>median)**
FSPI (weighted & interpolated)	21.04***	5.721**	31.61***	8.836***	-83.89**	10.19	55.55***	39.46***
	(4.624)	(2.489)	(8.978)	(2.586)	(34.75)	(6.876)	(16.78)	(5.111)
Constant	-0.290***	-0.293***	0.0379	0.124	-0.300	0.0615	0.636**	0.295
	(0.0913)	(0.0584)	(0.164)	(0.130)	(0.302)	(0.213)	(0.273)	(0.378)
Observations	1,216	1,216	1,216	1,203	1,192	1,189	1,190	1,159
X Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dist Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, **p<0.05, *p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

We note that FSPI is negatively and significantly associated with rape rates for districts with less than median nightlights. On the other hand, for the datasets with districts having more than the median level of nightlights, i.e. more economically developed, I find that weighted SRB has negative significant associations with total VAW, DV rate and

rate of assaults and insults, while weighted FSPI still has strong positive significant associations with the VAW measures except one. Again, with rape rates, FSPI is positively but insignificantly associated for districts with more than median nightlights. So, regardless of the level of development, weighted FSPI mostly seems to have positive associations with VAW. While for SRB, for the more developed districts, with rising SRB, VAW rates reduce. Although rate of assaults and insults is negatively related with SRB with a weak statistical significance. This in turn signals a possible progressive mindset breaking gender norms in the districts more economically developed.

We also run heterogeneity tests around the year 2012 for both weighted SRB and weighted FSPI. I didn't find any significant results for FSPI, but I did for the rate of domestic violence for the SRB model. I find from Table A2.9 that for SRB, there is somewhat a reversal in the signs of associations with VAW rate variables, although most of these are statistically insignificant[42]. Separate heterogeneity tests are run for women's different education levels. For districts with less than the median level of female population with primary education, as shown in Table A2.13, SRB has a positive significant relationship with the total VAW rate. For the sample of districts where women have more than the median level of primary education, the association is statistically insignificant and less in magnitude. With SRB increasing by 1%, the VAW rate increases by 3.11% in the districts where women have less than the median level of primary education.

FSPI can also be seen to have a positive significant association with total VAW rate in Table A2.11 for the districts where less than the median level of women have primary education. With a 10% increase in FSPI, the expected VAW rate increases by about 6.4% in these districts. On the other hand, FSPI has a negative insignificant relationship with the total VAW rate in the districts where more than the median level of women have primary education. The associations of both SRB and FSPI with total VAW rates are significantly positive for districts with less than the median level of female population having primary education, which makes sense intuitively and in line with the previous

[42] After 2012, the coefficients of associations with SRB seem have increased in magnitude for total VAW and trafficking the relationship and has become positive from negative. So, while before 2012, with SRB, VAW was falling, after 2012, it seems to suggest that with SRB rising, VAW rate is also rising, especially rate of DV the rise of which has statistical significance. With SRB rising by 1%, the DV rate is observed to rise by 13.09% with statistical significance after the year 2012. It is not within the scope of this paper to exactly comment on the cause for this increase after 2012 to be the increase in actual incidences of VAW or an increase in reporting. But Mathur et al. (2019) in their paper have analysed this change and explain this change to be due to an increase in the willingness to report VAW incidences after 2012 due to increased awareness.

literature, as it signals that in districts with more number of women with less education, gender bias towards sons is more likely to be associated with women facing higher violence on average[43].

We also carried out a set of heterogeneity tests by dividing the datasets on the basis of regions, in order to isolate the effects of differing socio-political and cultural norms across different regions. Table A2.12 shows the results of Poisson regression runs on VAW rates with weighted sex ration at birth (SRB) as the predictor variables. I observe that in western India, SRB is observed to be positively and significantly associated with total VAW rate, DV rate, trafficking rate and rate of assaults and insults. In southern India, SRB is observed to be positively (but less in magnitude than western region) and significantly associated with total VAW rate and DV rate. In eastern India, I note that SRB is estimated to have significant positive association with only total VAW rate, the magnitude of which is higher than the southern region but lower than the western region. However, in the northern region, SRB has negative significant associations with total VAW rate, trafficking rate and rate of assaults and insults. Also, in the north-eastern region of India, I observed SRB to be negatively and significantly associated with total VAW rate, rape rate, trafficking rate and rate of assaults and insults. Although SRB is positively associated with DV rate in the north-east with a weak statistical significance.

Table A2.13 presents the results results of Poisson regression runs on VAW rates with weighted and interpolated women's son preference (FSPI) as the main predictor variable. I observe that in western India, FSPI is observed to be positively and significantly associated only with rape rate. In southern India, FSPI is observed to be positively and significantly associated with total VAW rate and DV rate. In eastern India, I note that FSPI doesn't seem to have significant associations with any of the VAW rate variables. However, similar to the case of SRB results, in the northern region, FSPI has negative significant associations with total VAW rate, rape rate, trafficking rate and rate of assaults and insults. Also, in the north-eastern region of India, it is observed that FSPI is negatively and significantly associated with rape rate, trafficking rate and rate of assaults

[43] On the other hand, in the districts where more than the median level of women have primary education, both SRB and FSPI is negatively associated with VAW albeit insignificantly, signalling that in these districts with more women having primary education might be leading them to face less violence. This is also in line with empowered women facing more backlash in the districts, as VAW seems to increase as sex ratio and women's son preference decreases for the districts with more than median level of women with education. This finding is again in line with previous works of Bandyopadhyay et al. (2020) and Eswaran and Malhotra (2011), where "male backlash" is the phenomenon of men using violence to dominate economically empowered women.

and insults. To summarise, while in the western, southern and eastern region, the VAW rates seem have more or less a direct relationship with SRB and FSPI, in the northern and north-east regions there is an inverse relationship implying a possible backlash effect in the northern and north-eastern regions. This regional variation might be explained to some extent by the original Dyson and Moore theory[44] (Dyson and Moore (1983)) on the gender equity differences between North and South India.

While the positive associations indicate that increasing SRB and FSPI can directly lead to increases in VAW, the negative associations imply that increasing SRB and FSPI lead to women facing less violence. The former scenario signals that the VAW rates can be brought down by lowering down gender biased measures like the SRB and FSPI through various channels like education, economic development, media awareness and addressing cultural norms. The latter scenario of negative associations, on the other hand, indicate that women revealing a preference for daughters over sons might be challenging the patriarchal mindset that "women are the weaker sex". This in turn leads to a backlash effect from the men, that is observed in the increasing rates of violence against women when women don't conform to the cultural gender biased norms measured here by SRB and FSPI. It could therefore be argued that women in general face significantly more violence when they seem to oppose common patriarchal norms, in line with the "male backlash" theory explored in the previous works of Amaral and Bhalotra (2017), Bandyopadhyay et al. (2020) and Eswaran and Malhotra (2011).

3.6.3 Dowry Death Results

Owing to the positive relationship of DV with FSPI and SRB, I considered running the Poisson regressions for dowry deaths only as the reports for dowry deaths are less likely to be affected by reporting bias, if any, in comparison to cruelty inflicted by husbands and in-laws. In Table A2.14, I report some noteworthy results from the model with results for the Poisson regressions run on Dowry Deaths, which is mainly the son preference (FSPI) model[45] I observe that weighted FSPI is negatively and significantly associated with dowry

[44]The 1983 Dyson and Moore theory (Dyson and Moore (1983)) proposed that the women of South India exercising more autonomy than those of North India, suggesting that south Indian women suffer from less social GB norms than North Indian women. One approach is used by demographers and anthropologists; the second is used by economists who contradict the cultural norm theory and explain the gender-inequity pattern by factors like more labour-intensive crops in South; the third is used by researchers like Jeffrey (1993) and Das Gupta (2004) who explain the gender-inequity pattern by more pro-women legal policies in the South.

[45]We drop the SRB model results for the dowry deaths as very weak insignificant associations to no associations at all were observed for this model.

deaths when the VAW rates are calculated per 100,000 persons. It is also negatively related with the dowry deaths in the main model when the VAW rates are calculated per 100,000 females as well as for the uninterpolated model. FSPI has an insignificant but positive associations with dowry deaths when the men's son preference data is included. The coefficients are positive for both MSPI and CSPI models, although they are statistically insignificant.

The other component constituting DV is the variable recording "cruelty by husband and in-laws" reports. In the main model, where the VAW rates are calculated per female person, FSPI has a positive significant association with DV while a negative significant association with dowry deaths, which point to the fact that the source of the total positive relationship must be cruelty by husband and in-laws, which is outweighing the negative effect of dowry deaths enough to cast a overall positive association with DV. So, even if dowry deaths decrease with more women preferring sons over daughters, total DV experienced increases in the main models. The opposite seems to be happening in the MSPI and CSPI models. However, in the models where on FSPI is considered the association between dowry deaths and the gender biased measures in negative, i.e. with male children being favoured more in the districts, women experience deaths owing to dowry related reasons less. While in the models where MSPI is considered, women experience more deaths owing to dowry related reasons when male children are favoured more, signalling men's son preferences to be the main source of gender norms in these models.

3.7 Conclusions

The main findings of this paper are here that weighted interpolated female son preference index (FSPI) in the main models has positive significant associations with rates of total VAW and domestic violence (DV). With 1% point increase in FSPI in the districts, the expected rate of total VAW per 100,000 women in the districts increases by 6%, while the expected DV rate increases by 11.5%. This result is found to be robust to the findings of "VAW percentages" model, "VAW rates per person (total population)" model. This positive relationship between FSPI and VAW might indicate that in districts where women in general reveal a preference for sons over daughters, patriarchal gender norms are in prevalence, and therefore face more violence from men, in lines with previous works like Amaral and Bhalotra (2017).

Women's son preference is observed to have strong negative association with dowry death rates in the main model, and positive association in the cumulative son preference (CSPI) model, in line with Belur et al. (2014) and Dang et al. (2018). I also find that CSPI has positive associations with total VAW, DV, assaults and insults and trafficking, indicating that when men's son preference is taken into account along with women's (albeit interpolated) son preference, the association can be expected to be positive, which only further corroborates our inference from FSPI results. If the ratio of men's to women's preferences for sons over daughters increases, an indication of persisting patriarchal norms, men might inflict violence more on women, which is basically the same inference that is drawn from the FSPI model.

Weighted sex ratio at birth (SRB) is also found to have positive associations with most of the VAW measures in both the main model of VAW rates per female and VAW rates per person. With a 1% increase in SRB in the districts, the expected total VAW per 100,000 women increases by 3.65% in the districts. On the other hand, with a 1% increase in SRB in the districts, the expected rate of trafficking increases by 15.95% and rate of assaults and insults increases by 6.2%. SRB being positively associated with VAW measures indicates that with the ratio of male births to female births in the districts rising, women face more violence. This in turn signals that with rising prevalence of son biased gender norms, VAW increases in the districts. This result is in line with robustness checks and also in line with the findings of Amaral and Bhalotra (2017) and Anukriti et al. (2022). All the above findings seem to point to the direction that patriarchal norms, as shown by the favoured trends towards male children, are positively associated with violent crimes against women.

I also carry out a number of additional tests and draw similar conclusions. The heterogeneity tests show that in districts where women have less than the median level of education, they tend to suffer more violence with rising gender biased norms in line with the works of Amaral and Bhalotra (2017). Also, in the districts with less than median economic development, the associations of the VAW rates with FSPI are positive and larger in magnitude, while the associations with SRB tend to be negative. This points to the direction that in districts with low infrastructural development, if male births outnumber female births, crimes against women is likely to increase. If women conform to patriarchal norms and reveal a preference for sons over daughters, they continue to face increased violence. The difference between the two measures is that while SRB is a measure of what

is actually happening, FSPI is a measure of the revealed attitudes of women. I also find that VAW is positively related with FSPI and SRB in the western, southern and eastern regions, but inversely related in the northern and north-eastern regions, possibly signalling a backlash effect in these two regions. I also carry out heterogeneity tests to study the differences in associations before and after 2012, which was the year of the incident of "Nirbhaya", widely publicised all across the world. The only significant result observed was that after 2012, the association of DV rate with SRB increased and became statistically significant.

This paper also constructs a cumulative son preference index (CSPI) and used it to run regressions on the VAW rates, but the results aren't significant. I further found that FSPI is inversely and significantly related with rate of dowry deaths when it is measured with respect to total population, when I isolate dowry deaths from the domestic violence variable. The findings suggest that with women's son preference decreasing on average in the districts, the extreme abuse faced by them within domestic boundaries especially owing to dowry related reasons increases, suggesting a strong presence of male backlash, in line with previous works in the literature Eswaran and Malhotra (2011).

Across all specifications, the results consistently point to one underlying mechanism: districts with stronger bias for male children, captured through revealed son preference, and actual sex ratio at birth (SRB), exhibit higher levels of violence against women. When attitudes favouring sons intensify, patriarchal norms become more entrenched, and women face a higher risk of DV, total VAW, assaults and insults, and trafficking. The few inversions likely signal backlash dynamics in which shifts away from the traditional norms provoke retaliatory behaviour within the households. Heterogeneity tests further support this interpretation: the associations are stronger in districts with lower female education or weaker economic development, where women have less bargaining power and patriarchal norms tend to be more rigid. Overall, the evidence indicates that gender-biased norms favouring male children, whether expressed through attitudes or revealed through demographic behaviour, reinforce gender hierarchies that heighten women's exposure to violence.

The main policy implications in this context therefore would be to design interventions and strategies that can address these social gender norms at the root. Programmes could

be designed to reverse the gender discriminatory practices across children and correct the biased attitudes against daughters. Spreading gender awareness and sensitisation might be helpful, especially for the adult population, who tend to grow more rigid attitudinally and revert back to orthodox cultural schools of thought. However, this suggestion is only speculative, as presenting evidence in favour of the effectiveness of this strategy is beyond the scope of this paper.

Chapter 4

Effects of Edutainment on Revealing Attitudes towards Gender Norms and Violence Against Women: Evidence from a Field Experiment in India

4.1 Introduction

Gender biased norms and related gender disparities in the Indian society are closely associated with various forms of violence against women (VAW), as evidenced by Aizer (2010), Eswaran and Malhotra (2011) and WHO (2009) as well as the findings of my previous two papers. Some research works have depicted that programmes designed to reduce gender inequality and biased norms have actually resulted in reduced violence against women (Banerjee et al. (2019), WHO (2009), Chakraborty et al. (2020), Steinmetz et al. (2019)). Indian women continue to feel unsafe and vulnerable in many situations, both within the household and outside, on a daily basis (Talboys et al. (2017), Nieder et al. (2019)). Certain cases of crimes against women in the last decade have exacerbated the vulnerability that girls and young women face(NCRB (2019)).

In this paper, I am interested to study this problem specifically in the context of the non-rural economy. Women in the urban and suburban India are increasingly becoming

empowered and aware of their rights to freedom and expression. This empowerment might be in turn leading to an increase in the problem of male backlash (Eswaran and Malhotra (2011) and Bandyopadhyay et al. (2020)) among the general male population of the Indian cities. The problem is also graver here because social stigma and loss of reputation upon reporting have larger opportunity costs for the urban and sub-urban middle-class (Coomaraswamy (2005)).

I choose Kolkata and its surrounding suburban areas for my study because Kolkata is one of the four major metropolies of India where some recent VAW cases like that of *Abhaya*[1] and the law college incident[2] have left women and their families feeling unsafe in general (Roy and Bailey (2021)). Despite NCRB reports suggesting Kolkata to be a relatively safe city, West Bengal ranks 19th out of 31 states in terms of rapes per capita and 24th in terms of capital murder crimes (Ghatak and Chakraborty (2024). Evidently, a comparative study of official reports by Ghatak and Chakraborty (2024) reveals that West Bengal has a high reporting bias that's increasing over time when it comes to VAW.

The research question that I seek to answer through this study therefore is: *How does education through entertainment (edutainment) affect gender biased attitudes and opinions on violence against women in and around Kolkata?* The study consists of socio-economic, demographic and preference revealing surveys. The demographic surveys are in the form of general questionnaire aimed at collection of socio-economic data about the participants. On the other hand, the preference revealing surveys are in the form of list experiments designed to reveal the attitudes and beliefs of participants about gender biased norms and violence faced by women (Imai (2011), Bulte and Lensink (2019), Lépine et al. (2020)). The questionnaires were constructed keeping the sensitivity of the issues in mind, taking the necessary ethical considerations into account. The participation in these surveys is anonymous, voluntary and economically incentivised. Required ethical approval had been obtained from the School of Politics, Economics and International Relations (SPEIR) at the University of Reading.

[1] *Abhaya* refers to a gruesome case of gang rape and murder of a 31 year old postgraduate trainee doctor on duty in R.G.Kar Medical College and Hospital in Kolkata on 9th August 2024. The incident saw widespread outrage all over the world demanding justice for the victim and sparking debates about the safety of women in India. This case is still facing trial in court and is awaiting final verdict (Wikipedia (2024)).

[2] On 25th June 2025, a 24 year old female law college student in Kolkata was allegedly gang-raped by a former student and two other current students. The young woman fortunately survived to report the incident to the police, following which medical and police investigation have led to the arrests of the alleged perpetrators. This too has shocked the citizens of Kolkata and have sparked political debates (Times (2025)).

In this paper, I report the findings from two treatment arms: (1) a Randomised Controlled Trial (RCT) carried out in a few small-scale local organisations in and around Kolkata, and (2) a List survey experiment to reveal the attitudes of people towards gender biased norms and violence against women (VAW). I study the effects of the education offered through entertainment (otherwise referred to as "edutainment" in the literature) in my RCT design, in line with the previous works of Banerjee et al. (2019), Kearney and Levine (2015) and Singhal and Rogers (2012). The treatment group is shown films designed to create gender sensitisation or awareness regarding violence against women, while the control group is shown movies irrelevant to such context. The field work was carried out from 16th November 2023 to 13th January 2024. I gave a month long gap after the treatment ended in December; and then carried out my end surveys in January. 183 people out of 305 volunteers attended the end survey, out of which 123 people completed the whole programme, i.e. attended all four weekends of movie screening along with the end survey[3].

To reveal the attitudes of the treated and the control group participants regarding gender biased norms and violence against women (VAW), the list survey method is used, following the methodology of Bulte and Lensink (2019). A list survey is an indirect method of questioning that involves showing a list of statements to the participants and asking them how many of those statements do they endorse, i.e. either agree with or are upset about (Imai (2011)). They are explicitly asked not to reveal which statements they endorse, which maintains anonymity and gives them confidence to respond more truthfully. This is done as people are usually reluctant to report incidences and even attitudes regarding VAW owing to factors like social desirability bias, laws, stigma etc. This study included two list survey questions: one for gender biased attitudes and one for VAW attitudes. The list survey is used here, as people often tend to not report when asked directly for questions on both of these attitudes, following Bulte and Lensink (2019) and Imai (2011).

To estimate the probability that a respondent endorses the sensitive item in a list experiment, I use a maximum likelihood (ML) framework inspired by Blair and Imai (2012), Tsai (2019), and Zampetakis (2024). The ML model helps me to isolate the causal effect of the edutainment intervention on the probability of endorsing the sensitive item (pertaining to the sensitive attitudes regarding gender biased norms and VAW), controlling

[3]This study might be considered as a pilot-run for a longer run research work with a larger sample size to be carried out at a later stage.

for covariates.

For both list the survey questions on gender biased attitudes and on attitudes regarding violence against women (VAW), I find that, on average, respondents in the treatment group endorsed more items than those in the control group. This pattern suggests that exposure to the sensitive item after the edutainment intervention may have created some degree of awareness, reducing the likelihood of endorsing the sensitive behaviour even after accounting for individual-level covariates. This is consistent with existing evidence such as Heise et al. (1994), Saravanan (2000), and the UNESCO (1993) report, all of which document the strong social stigma and high social costs that discourage open acknowledgment of gender-based violence in patriarchal settings. While the list experiment reduces social desirability bias relative to direct questioning, the results indicate that it does not eliminate it entirely.

A second key finding emerges from reverse-coding the gender norms list question (Q1), which is negatively framed ("upset") and therefore captures gender-regressive attitudes when interpreted directly. After reverse-coding, respondents in the edutainment group reveal a more gender progressive attitude: the strongly negative estimate of ψ_1 in the ML model indicates a reduced probability of endorsing the regressive statement. In contrast, for the positively framed VAW attitude question (Q2), respondents reveal a less gender progressive attitude, suggesting asymmetry in the way participants update or reveal beliefs across differently framed questions.

Finally, mean-difference analyses (not controlling for covariates) show that edutainment appears more effective in revealing gender-progressive attitudes among women, married respondents, and adults aged 51-70. It is also more effective among employed participants and those with secondary education. These subgroup patterns suggest that edutainment may shift attitudes differentially across demographic groups, especially in domains related to entrenched gender norms.

The main contribution of this paper is here that it studies the effects of edutainment in the city of Kolkata, India, on creating social awareness regarding revealing gender biased attitudes and attitudes towards VAW. To the best of my knowledge, no previous study has investigated this using these methodologies. In fact, there remains a gap in exploring the

effects of edutainment in the context of VAW and gender-biased norms India as a whole. This paper therefore fills in that gap in the literature.

Following this introductory section, this paper is structured as follows. Section 2 reviews the literature relevant to this paper. In section 3, the experiment design and description has been explained. Section 4 describes the research methodologies used. Section 5 discusses the main results in this study, while section 6 discusses some additional results generated. Finally, the conclusions are given in Section 7.

4.2 Literature Review

A number of experimental and interventionist studies have been carried out in the recent years on reducing Violence Against Women (VAW). Among studies carried out in developing countries other than India, the paper by Banerjee et al. (2019) is most significant in the context of my research. This paper demonstrates the benefits of education through entertainment on VAW prevention using a popular TV series through Randomised Controlled Trials (RCT) in Nigeria. Banerjee et al. (2019) used an MTV series called "Shuga", which had a sub-theme of domestic violence (DV), as their edutainment method. The study revealed significant improvements in the attitudes of men in the treatment group, with reduced incidences of DV. Kearney and Levine (2015) in their paper study the effect of edutainment among American children, using a popular kids' show called "Sesame Street" that has been airing on American television since 1969. They carry out a secondary data analysis on the coverage of the show broadcasted and find positive impacts of edutainment in the learning outcomes of kids. They further found that watching "Sesame Street" improved school readiness among children from economically disadvantaged backgrounds.

Singhal and Rogers (2012) discuss the importance of education through entertainment in their theoretical paper. They explain how carefully designed entertainment can educate audience and viewers about a particular socio-political issue. They argue that entertainment can be used as driver of "social change" by bringing about changes in attitudes and perspectives about a certain scenario. They go on to cite examples of television programmes which use entertainment to educate people, especially in the US. Like Kearney and Levine (2015), they too discuss the effects of "Sesame Street" as one of the educating TV programmes.

In similar lines, a previous paper by Singhal (2013) explained the power of education through entertainment in creating gender awareness among children through fairy tales. It discusses the rising importance of entertainment education (EE) as an effective strategy to combat various issues like gender inequality, gender violence, and various societal taboos. It argues that because the human mind is always drawn to stories, EE helps to capture the attention of people easily. The paper also discusses the effects of fantasy and fairytales on social norms concerning female children and teenage girls.

An important paper studying the association of entertainment on violence suffered by women in India is that of Jensen and Oster (2009) who conduct a secondary panel data analysis after the introduction of cable television in India. They find that cable TV was associated with significant decreases in the domestic violence suffered by women as well as decreases in son preference and fertility. They found that cable TV instead is associated with increases in women's participation in household decision-making, which in turn increases school enrolment of children.

Steinmetz et al. (2019) in their paper use cognitive dissonance mechanism whereby college students are required to write essays on rape myths. After just a run-time of two weeks, their findings suggest significant reduction in rape-supportive attitudes among the participants. This further implies the importance of education on controlling VAW and changing gender norms. As described in the experimental design below, I follow this method in my research after each movie screening and ask the participants to write down their thoughts. Previous papers like Nieder et al. (2019) and Roy and Bailey (2021) conduct interviews and focus-group discussions to understand the strategies used by women to navigate and cope with gender-based harassment in public places like roads and public transport. While Nieder et al. (2019) do this in the context of Delhi, the capital city of India, Roy and Bailey (2021) carry out their study in the city of Kolkata. Both of these studies find that women usually resort to using avoidance and prevention strategies. Most Indian women usually prefer to internalise such issues, rather than confronting and being outspoken about the problems.

A more direct approach, albeit more expensive and difficult to implement, for educating and creating awareness among the adult population is through programmes offering behavioural counselling. This has been done by a long-term empirical study based on

cluster RCTs in the Mumbai slums by Daruwalla et al. (2020) to prevent violence against women (VAW). They used a combination of crisis intervention, psychological counselling, and support services, and found that counselling and community mobilisation are effective intervening tools in controlling VAW. The positive effects of counselling on VAW can be juxtaposed with those of education through various channels, including education through entertainment.

Another previous paper that I closely follow in this work is the one by Bulte and Lensink (2019) that discussed an RCT being conducted in Vietnam based on a training program to economically empower women. The RCT itself is based on a similar training program like that of Daruwalla et al. (2020). They observe that women who participated in the training program faced more abuse as their income increased. They measure intimate partner violence (IPV) by both a direct survey as well as a preference revealing list survey, a method which I follow as well in my paper. However, Bulte and Lensink (2019) discover a reversal of results between the direct survey and list survey. While in the former method, women in the treatment group (i.e., who attended the training program) report facing less abuse than before, in the latter method, the treated women revealed facing more abuse than before. Imai (2011) in their paper also study the list survey or item count method and investigate the suitable ways to measure the outcome. Imai (2011) and Blair and Imai (2012) construct a new method using maximum likelihood estimators to analyse the results of multivariate regression analysis with list surveys. They mention that statistical efficiency can be an important concern while working with list surveys as in indirect surveys some information can be expected to be lost. Corstange (2009) and Glynn (2013) both advocate the use of list surveys as effective methods for revealing attitudes towards sensitive topics.

The application of the maximum likelihood (ML) model, based on the original work of Imai (2011), to estimate the list experiment data is common in recent literature. Corstange (2009) uses it in politically sensitive surveys in the Middle East; Glynn (2013) and Blair and Imai (2012) provide formal theoretical justification and simulation evidence for the estimator's performance; and Tsai (2019) extends the method for covariate-adjusted inference. Most recently, Zampetakis (2024) demonstrate the practical utility of ML estimation with design protection in field experiments on electoral behaviour.

There seems to be a gap in the literature in experimental studies trying to address the gender biased norms and attitudes against violence against women and girls in the complex urban Indian socio-economy. In terms of new contributions to the existing literature, I intend to conceptualise and measure this link in the socio-economic context of the city of Kolkata. Also, in terms of methodological contributions, this paper studies the effect of edutainment on revealing attitudes regarding gender norms and VAW, which is not known to have been done before in Indian context. Yet another methodological contribution would be the use of list surveys to reveal the attitudes of the RCT participants about sensitive questions, aiming to address the problem of under reporting in such cases.

4.3 Experiment Design and Description

In this experiment, the primary aim is to find out whether the adult urban and sub-urban population can be educated to change their attitudes and beliefs on gender biased norms and violence against women. The population residing in and around Kolkata is of interest to my study. Anyone below 18 years was not taken as subjects (interchangeably referred to as "participants") for this study for both ethical reasons as well as for my research objective aiming to study the attitudes of the adult population. I focus on the adult population as majority of the Indian population belongs to the middle age group and the mean age of the Indian population is constantly rising due to improvement of medical facilities (O'Neill (2023)). There is a pressing need for the larger adult population to be refreshed on the notions of gender equality and awareness about gendered violence. My aim was to use entertainment[4] through movies as the means of education in my study, combining the methodologies of Banerjee et al. (2019) and Bulte and Lensink (2019). The flowchart in Figure 4.1 below details out the experiment design.

4.3.1 Randomised Controlled Trial (RCT)

The Randomised Controlled Trial (RCT) is based on the effectiveness of edutainment (education through entertainment) following the methodology of Banerjee et al. (2019). For the (RCT), three movie screening centres were set up in and around Kolkata, in collaboration with the three local branches of "*Arogya Sandhan Charitable Trust*". The three centres are based in Santoshpur, Kolkata; Sonarpur, South 24 Parganas; and Habra,

[4]Edutainment (i.e., education through entertainment) has been previously used in papers like Banerjee et al. (2019) in the context of violence against women in an RCT in Nigeria. Kearney and Levine (2015) and Singhal and Rogers (2012) have studied the effects of edutainment on the learning and behavioural outcomes among children.

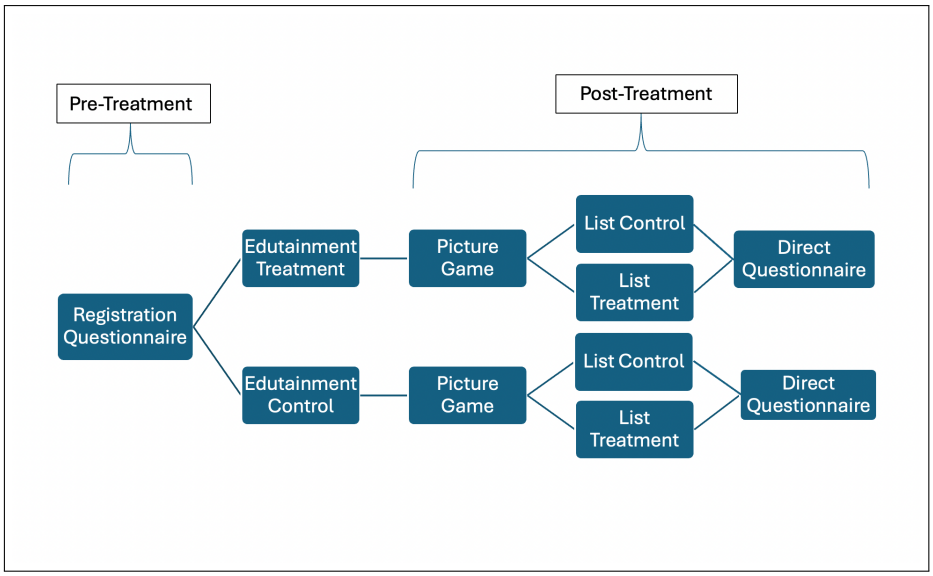

Figure 4.1: A Flowchart representing the design of the field experiment

North 24 Parganas. These centres are run for various causes including free schools for poor children, low-cost medical treatment, homes for disabled children, old-age homes, women empowerment centres and natural disaster relief centres. The subjects or participants were recruited from the staff members and beneficiaries of the Trust so that my sample population was from both low and middle-income groups. "*Arogya Sandhyan*" encourages participation of women in the labour force, along with men and supports women empowerment in all three centres in various ways. It offers full-time and part-time employment to both women and men at various levels across the three centres, for example teachers, caregivers, managers, cooks, helpers, tailors and nurses. While recruiting participants to the treatment and control groups for both the edutainment and list survey, this factor was taken into consideration. Women empowered by the Trust were recruited in both the control and treatment groups.

The sample size of the RCT set-up was 305 individuals, including both the edutainment control (EC) and edutainment treatment (ET) groups. These individuals were randomly allocated to the movie control and treatment groups. Therefore, randomisation of subject allocation was done at the very beginning of the programme. From the power analysis, I needed at least 173 subjects (minimum detectable effect (MDE)) (Gupta et al. (2022)). Due to the concerns about potential drop outs, I recruited a total number of 305 subjects. However, out of 305, only 183 completed the programme by attending both the movie sessions and the end surveys. 90 of these individuals had been randomly assigned to the edutainment control (EC) groups and 93 of them had been randomly allocated to the

edutainment treatment (ET) groups in the centres. Out of these 183 individuals, 123 participants who attended movie shows on all four weekends and were therefore considered to have attended the programme completely. I take this sample of 123 participants as my main sample and that of the 183 participants as my larger sample used in robustness checks.

In each of these centres, movies were shown every weekend from 16th November to 10th December. The screenings were arranged in two slots for the edutainment control (EC) group and edutainment treatment (ET) group participants separately, so that in total eight movies were screened over four weeks. Four movies on different themes were shown to each of the EC and ET groups on four weekends. The edutainment treatment (ET) group was shown Indian movies depicting relatable stories of women empowerment and sub-themes of violence faced by women, which was mainly the "treatment" in this programme. The choice of the movies was done in a manner that takes into account both the relatability and the entertainment factors, to prevent drop-outs and motivate the participants to join the next sessions. The edutainment control (EC) group, on the other hand, was shown Indian movies on general topics, which was the "placebo". The order of the movies in each centre was randomly shuffled to take into account order effects.

Screening centres were set up in each of these centres. The screening rooms were set up in the pattern of a cinema (set up with a projector screen and projector) where the subjects were seated in well-spaced seats. Each session had about 20-35 participants and seating arrangement was done in a way so as to keep communication among the participants to a minimum. These movie sessions along with offering them entertainment free of cost, was also accompanied by economic incentivisation (distribution of Biryani meal packets) at the end of each of the movie screenings. Clear instructions were given to the participants about requirement of silence and attentiveness during the sessions. The sessions were monitored by the researcher. Four such movie sessions took place for each of the edutainment control (EC) and edutainment treatment (ET) groups on four consecutive weekends across the three centres. In the tables **??** and **??**, a breakdown of the number of participants in each group across each centre and the movies screened has been given.

In this study, Indian movies in Hindi and Bengali language are screened. The edutainment treatment (ET) movies aimed at gender sensitising, have cultural gender norms and

abuse faced by women as sub-themes[5]. The movies were chosen keeping both the educating power and the entertainment value of movies in mind. Singhal and Rogers (2012) pointed out the importance of choosing the forms of entertainment meant for education as the ones which should not be degrading a message for commercial gains (like increased use of sexually explicit or violent scenes). Neither should the entertainment be boredom-inducing and so non-engaging that it loses the audience for any education to be effective (Singhal and Rogers (2012)). Thus, the relatability factor was also considered particularly important so that the common people relate to the films or shows screened. Even though a few of them gained some commercial success, they were not available easily and were entertaining enough for repeated viewing. Additionally, care was taken to not show movies depicting too gruesome details or sexualised content, or even those which focus on more sensitive issues that may hurt the general sentiments or affect minds too adversely, at par with ethical considerations (Gupta (2016), Singhal and Rogers (2012)). Similarly, the edutainment control (EC) group were shown enlightening, relatable and entertaining movies on general non-gender-specific themes (placebo).

Furthermore, in order to prevent spillovers (Jacquemet and l'Haridon (2018), Gupta (2016)), i.e., preventing the edutainment control (EC) group from watching the movies being shown to the edutainment treatment (ET) group, quite a few steps were taken. The first step taken in this regard was to have separate timings for the screenings of the EC group and ET group. Once the participants of one group left, only then the participants of the other group were let in. The two groups had two different slots for the movie screenings. This was done to minimise interaction between the participants of the two groups and keep them separate. The screenings for the edutainment control (EC) groups usually started an hour after the screenings for the edutainment treatment (ET) groups. Secondly, in order to prevent spillovers within a household, members from the same household were asked to attend the same group's sessions every weekend. In order to achieve this, coupons/ tickets were created and distributed to every household in such a way so that every household had one coupon, with every one of its members enlisted therein. Thirdly, in the pre-treatment survey, the participants were provided with a list of movies and were asked to choose movies that they have seen to ensure that the edutainment control (EC) group participants had not watched before the movies shown to the edutainment treatment (ET) group. Finally, the names of the movies screened were not

[5]These movie options were prepared in consultation with a film critic (who requested to stay anonymous) as well as with the board members of *"Arogya Sandhan"*, keeping the sensitivity of the study in mind

disclosed to the viewers, so that the other group's participants couldn't look the movies up. They were explicitly asked to not discuss the movies outside the screening centres[6]. When collecting data however, I had individual participant codes for every person who watched the show for ease in data compilation.

After every movie session, participants were handed out sheets to write their thoughts and reflections on the movie screened that day. There weren't any word-limits for this, so these feedback sheets that I collected consisted responses ranging from a couple of words to a long paragraph. I am not analysing these after-thoughts of the participants regarding the movies they had seen in this paper, but I hope to look at the association between the after-thoughts and end survey responses in future. In this paper, this was merely done as an exercise (following Steinmetz et al. (2019)) to encourage the participants to reflect on the movies they see by writing about them. Steinmetz et al. (2019) found that writing essays has a significant impact on behavioural attitudes regarding gender norms and gender violence.

4.3.2 List Experiment Description

All the people who participated in the RCT were invited to participate in a survey at the end after about one month of the treatment. The first part of this end survey was a picture game, followed by a list survey (or a survey using item count method) where an individual is asked to choose the number of statements that they agree with or upset about from a list of statements. People were randomly allocated to the treatment and control group of the list experiment, so that both of these groups in the list experiment were a combination of treated and untreated individuals from the RCT done before (Bulte and Lensink (2019)), as illustrated in Table 4.1. The list treatment (LT) group participants were given one statement more than the list control (LC) group for every category of question. The extra statement in the list treatment forms concerned with the attitude I intend to study (Imai (2011), Blair and Imai (2012), Bulte and Lensink (2019) and Lépine et al. (2020)). It is to be noted here that the participants were only asked the number of statements that they agree with or were upset about and not which of the statements. This prevents them from being afraid of revealing their actual attitudes and giving false responses.

[6]However, despite all the measures, I acknowledge there could still be chances of spillover as many participants of the two groups were familiar with one another and lived in the same neighbourhood, or shared the same workplace. As is the norm, the common middle class Bengali people are prone to gossip and they may have discussed with each other, although I don't have any evidence to confirm this but neither do I have evidence to refute this. This is the reason we use the ML model with design protection to analyse the data, as explained more later.

For the **attitude regarding gender biased norms**, the list control (LC) group were given the following four statements and were asked how many of the following statements upset them:

1 Corruption in the government is hampering the welfare of the citizens.

2 Petrol prices continue increasing, leading to rising prices of all commodities.

3 Educated young people are unable to find well-suited and well-paying jobs.

4 Pollution from industries is affecting crops and leading to rising temperatures.

The list treatment (LT) group were given five statements, four of which are the same above statements, though not necessarily in the same order. In addition, they were given a fifth statement concerning the gender-biased attitude I aim to study and were asked how many of the following statements upset them:

1 Corruption in the government is hampering the welfare of the citizens.

2 Petrol prices continue increasing, leading to rising prices of all commodities.

3 Educated young people are unable to find well-suited and well-paying jobs.

4 Pollution from industries is affecting crops and leading to rising temperatures.

5 Women pursuing their career and giving less time to their household duties.

For the **attitude regarding violence against women (VAW)**, the list control (LC) group was given the following four statements and was asked how many of these do they agree with:

1 Access to internet is an inevitable requirement in the present world.

2 Global warming is the primary cause of deteriorating quality of environment.

3 The quality of food-crops, fruits and vegetables have deteriorated over the years.

4 In another couple of decades, India is going to be a developed country.

The list treatment (LT) group is again given five statements and the participants are asked how many statements do they agree with. The same four statements as above are given, not necessarily in the same order, along with a fifth sensitive statement regarding VAW as follows:

1 Access to internet is an inevitable requirement in the present world.

2 Global warming is the primary cause of deteriorating quality of environment.

3 The quality of food-crops, fruits and vegetable have deteriorated over the years.

4 In another couple of decades, India is going to be a developed country.

5 It is unfair for men to force women physically or psychologically to do anything.

Two different types of framing were used for the two list survey questions. The first question on gender norms used a negative framing and asked participants how many of those statements upset them. On the other hand, the second question on violence against women (VAW) used a positive framing and asked participants how many of those statements they agreed with. The positive framing was used for the VAW question as it is the more sensitive topic. The two framings have opposite significance in responses. The sensitive item in the gender-biased norms list ("Women pursuing their career and giving less time to household duties upsets me") is gender-traditional, whereas the sensitive item in the VAW-attitudes list ("It is unfair for men to force women physically or psychologically to do anything") is gender-progressive. If a person is upset by sensitive statement on gender biased norm, then he or she can be said to have less gender progressive views, and has more traditional views of a woman's role at par with the patriarchal mindset. On the other hand, if a person agrees to the sensitive statement on VAW, then he or she considers VAW can be said to be of a more gender progressive attitude, supporting women empowerment. To improve interpretability, I harmonise the direction of attitudinal responses across the two list experiments. I reverse-code the first outcome so that responses to both the questions can be interpreted in terms of gender progressiveness. All coefficients are therefore discussed in terms of the extent to which the intervention increases or decreases gender-progressive attitudes.

Furthermore, the order of the statements were randomised for questions 1 and questions 2 to prevent order effects. The list survey method helps to reveal people's attitudes or beliefs while also maintaining anonymity (Imai (2011)), which is not possible in direct questioning as is done in national surveys like the Demographic Health Surveys (DHS) (Bulte and Lensink (2019)). If the average number of statements agreed with is higher for the treatment group than the control group, then the attitude regarding a certain issue will be revealed to me (Bulte and Lensink (2019), Blair and Imai (2012), Aksoy et al. (2022) and Zampetakis (2024)). The mean number of statements is calculated for both

the list treatment (LT) and list control (LC) groups in the list experiment. The difference in these means gives me a possible difference in the attitudes. In this study, the differences in the means between the treatment and control groups for the list experiment not only captures within group differences. But also as each of these groups include the treated and controlled subjects from the edutainment RCT, it also aids me in comparing the differences in responses owing to the edutainment training within the group, in line with what is previously done by Bulte and Lensink (2019). To estimate the impact of edutainment on the revealing of attitudes on gender biased norms and VAW, I use a maximum likelihood (ML) model described in the following section.

4.3.3 Experimental Procedure

As mentioned earlier, the subjects (or partcipants) were randomly allocated to the treatment and control groups in both the RCT and the list experiment, with an attempt at keeping the sampling bias to a minimum (Gupta (2016), Jacquemet and l'Haridon (2018)). Subjects were asked for their consent before being recruited to participate in this study. However, any mention of treatment and control groups to the participants was not done, at par with a standard RCT design (Gupta (2016)). Participation was voluntary and anonymous so as to protect their identity and privacy concerns. In order to measure the effects of the edutainment training on the people, data was collected in the format of (1) direct questionnaire collecting socio-economic and demographic data in the beginning and collecting their experiences in the end, and (2) list survey experiments capturing the attitudes and beliefs of participants in the end. The collection of this data was done by the research team trained to minimise loss of information, maintain survey protocols and to protect responders' data. The questionnaires were translated from English to the local language Bengali (Gupta (2016)).

The baseline survey was done on the first movie screening weekend of 16th, 17th and 18th November in the three centres. On that first weekend, the baseline data was collected through direct questionnaires in the beginning of the programme (termed as "registration questionnaire" in the field). This survey included socio-economic (like income-group, occupation, education level etc.) and demographic questions (like age, religion, caste, marital status, location etc.). The endline surveys were carried out on 11th, 12th and 13th January 2024. The end survey started with a Picture game, where the participants were presented with some pictures of the characters in movies and were asked which characters

they relate with most closely, in line with the methodology of Banerjee et al. (2019). This served two purposes: one, it helped to refresh their memories on the movies they had seen; and second, to collect information on how much they related with the movies screened. This in turn helped them answer to the surveys more in response to the movies they had actually seen.

After the picture game, the list survey was carried out. For the list survey, participants from both the treatment and control groups of the edutainment training were pooled together. From this combined pool, I then randomly allocated people to a second treatment and control group setting for the list experiment. So, essentially, the edutainment treatment (ET) group was divided into list treatment (ETLT) and list control (ETLC) groups, and the edutainment control (EC) group was also divided into list treatment (ECLT) and list control (ECLC). The following 2x2 matrix in Table 4.1 explains this:

Table 4.1: Matrix explaining treatment arms in this field work

	Edutainment Control (EC)	**Edutainment Treatment (ET)**
List Control (LC)	ECLC	ETLC
List Treatment (LT)	ECLT	ETLT

In a list survey or item count method, I asked the responders to choose the number of the statements they agree with or are upset about from a list of statements. This helped me to gauge and distinguish the effects of edutainment on the RCT treatment and control groups. If the RCT training was effective, I would expect the within group differences in means (i.e. the differences between the averages of ECLC and ECLT; and differences between the averages of ETLC and ETLT) to be more significant for the treatment group in the list survey.

After the list survey, the participants were asked another set of direct questions based on their experience and witnessing of discrimination on various grounds in the past one month following the edutainment and the end survey. This was done after the list experiment so that it did not affect the responses in the list surveys, following the methodology

of Bulte and Lensink (2019). Also, I had generalised the questions to discrimination and not necessarily gender based violence or gender biased cultural norms to prevent self-consciousness and social desirability bias among the participants. The generalisation was also done so that I could look at the effects of the screened movies on any other social aspects in the lives of the participants.

Participants were economically incentivised in kind and cash. The economic incentivisation in field experiments is done so as to provide them with a material motivation akin to the real-world situations (Gupta (2016), Jacquemet and l'Haridon (2018)). In this field work, food packets were distributed at the end each movie session. The movie shows being free were in itself an incentive. On the day of the end survey, every participant received gifts and a lottery was held where top three draws were given cash prizes in every screening centre.

4.4 Research Methods and Summary Statistics

4.4.1 Research Methods: List Survey

Mean Difference Analysis:

I calculated the average number of statements for each list survey question for various combinations of the demographic controls. I then calculated the differences between the means of the list control (LC) and list treatment (LT) groups and compared the mean differences of the edutainment control (EC) and edutainment treatment (ET) groups for each variation. If the difference between the LC and LT averages for ET group is greater than the difference in the LC and LT averages for EC group, then I know the proportion of participants who are upset by and agree to the sensitive statement. Also, if this difference is greater than 1, then it can be possibly inferred that all the participants in the list treatment groups agree with the sensitive statement, which signals a presence of ceiling effect[7]. But if the difference lies between 0 and 1, then the differences are into account and I draw further inferences about those. For both the questions on Gender Norms (q1) and Violence Against Women (q2), the differences between the average number of statements endorsed by the participants are calculated for the list treatment (LC) and list control (LT) groups and are then compared across the edutainment control (EC) and treatment (ET) groups based on different demographic segmentations.

[7]Ceiling effect in a list survey occurs when participants of a group tend to agree with all the statements. On the contrary, flooring effect occurs when no participant agrees with the sensitive statement.

Reverse coding for Q1 For ease of interpretation, I reverse-code the gender-biased norms outcome (Q1) so that higher average values uniformly indicate more gender-regressive attitudes. Specifically, I define

$$Q1^{\text{rev}} = -\,Q1,$$

so that decreases in $Q1^{\text{rev}}$ correspond to movement toward more gender-progressive attitudes. All reported means, treatment effects and plots in the main text use the reverse-coded scale. For transparency and replication, I provide the original estimates (without reverse coding) in the tables and graphs. It is to be noted here therefore that while a higher mean difference value for Q1 means revelation of lower gender progressive attitude, a higher mean difference value for Q2 means revelation of higher gender progressive attitude. The attitudes revealed in the two questions therefore are in the opposite directions.

Maximum Likelihood Model:

To estimate the attitudes of the participants towards the sensitive statements in the list experiment (also known as the item count technique(ICT)), I analysed the data using a Maximum Likelihood Estimator (MLE) with protection against design effects (Blair and Imai (2012)). In this model, the interaction between edutainment and list treatment assignment isolates the causal effect of the edutainment intervention on endorsement of the sensitive item. As emphasized in the previous works of Corstange (2009), Imai (2011), Blair and Imai (2012) and Glynn (2013), the assumptions of "no design effect"[8] and "no liars"[9] underlying list experiments can be violated in real-world applications due to ceiling and flooring effects, strategic misreporting, or spillover across groups. I carry out tests detecting the presence of some design effects in my data. So, the maximum likelihood (ML) model was implemented allowing for non-linear modelling and adjusted for design effects following Imai (2011).

This ML model (as described in the Appendix 5.1.2) that I use in this paper is based on what was originally proposed by Imai (2011)[10] To estimate the probability of the participants endorsing a sensitive item while minimizing design effects, I adopt the maximum

[8]The first identification assumption is usually here that including the sensitive item to the list doesn't change the responses of the participants to the control items in the list as clearly explained in Blair and Imai (2012).

[9]The second identification assumption is that the participants give truthful responses to the sensitive item in the list, again as explained clearly in Blair and Imai (2012).

[10]Imai's ML model from Imai (2011) is so complex to implement that efficient optimisation gets difficult even for statistical software programs like Stata. This problem has been addressed by Tsai (2019) in the code with the option `protect(#)` in the `kict` package in Stata.

likelihood estimation (MLE) framework for list experiments as developed by Tsai (2019) and formalized by Blair and Imai (2012). The following version of the ML model is applied in this paper (as the main model) to estimate the treatment effects of edutainment in the list survey.

For individuals in the list treatment (LT) group who receive the list with the sensitive item, i.e. the ith individual being in the list treatment group ($T_i = 1$) I define the probability of endorsing the sensitive item, conditional on observed covariates $\mathbf{X}$, as:

$$\Pr(S_i = 1 \mid T_i = 1, \mathbf{X}_i) = \text{logit}^{-1}(\psi_0 + \psi_1 + \mathbf{X}_i^\top \boldsymbol{\beta}), \tag{4.1}$$

where $S_i \in \{0, 1\}$ captures endorsement of the sensitive item by participant i. It is to be noted here that the endorsement of the sensitive statement takes two forms here in the two different list survey questions: while in the first question on gender norms, it reflects a more gender-progressive attitude (i.e., being less upset by career-oriented women), in the second question on VAW, it reflects a more gender-progressive stance (agreement that men should not force women). The treatment effect for the gender norms question, after reverse coding, indicates that the intervention increased gender-progressive attitudes by X percentage points. On the other hand, the estimated treatment effect for the VAW question captures the extent to which the intervention strengthened egalitarian norms regarding women's autonomy. $T_i = 1$ indicates the participant's assignment to the list treatment group, i.e., it is 1 if the sensitive statement is present, and if the participant is assigned to list control group, it is 0. $\mathbf{X}_i$ denotes a vector of covariates for individual i controlling for age, gender, marital status, centre location, highest education level, employment status and income level. ψ_0 is the model intercept when $\mathbf{X}_i = 0$, i.e. baseline log-odds of endorsing the sensitive statement. ψ_1 is the model coefficient, capturing the change in log-odds of endorsing the sensitive statement due to participant i being in the list treatment group. $\boldsymbol{\beta}$ represents the effects of covariates, including effects of the edutainment training programme, on the log-odds of endorsing the sensitive item. The logistic function ensures that the probability is bounded between 0 and 1, accounting for heterogeneity across respondents.

For the list control (LC) group, respondents do not receive the sensitive item, i.e. $T_i = 0$. The total number of endorsed items (Y_i) is assumed to follow a binomial distribution with J non-sensitive items and a common item endorsement probability π_i: $Y_i \sim \text{Binomial}(J, \pi_i)$.

I model π_i using a logistic regression as:

$$\text{logit}(\pi_i) = \alpha_0 + \mathbf{X}_i^\top \boldsymbol{\gamma}, \tag{4.2}$$

where π_i is the probability that respondent i endorses any given non-sensitive item, α_0 is the intercept for the baseline item endorsement probability, and $\boldsymbol{\gamma}$ is a vector of covariate effects on baseline item endorsement. This list control group model provides an estimate of typical item endorsement behaviour in the absence of the sensitive item, serving as a baseline for identifying the sensitive item's impact in the list treatment group.

Together, the models for π_i and $\Pr(S_i = 1)$ are combined in a likelihood function over the observed list experiment responses. The maximum likelihood estimator jointly estimates the parameters $\psi_0, \psi_1, \boldsymbol{\beta}$ and $\alpha_0, \boldsymbol{\gamma}$, leveraging variation in list treatment assignment and observed covariates to infer the latent sensitive response probabilities. However, in the results I report, control group responses are not modelled separately with distinct regression coefficients. Instead, they are incorporated into the joint likelihood function to estimate the baseline endorsement probabilities. The coefficients ψ_0 and ψ_1 capture the baseline log-odds and the effect of being shown the sensitive item, respectively. This structure follows the modelling strategy proposed by Blair and Imai (2012) and Tsai (2019), wherein responses from both list treatment and list control groups contribute to estimating the underlying endorsement probabilities.

In addition to the ML model, the model also predicts the average treatment effect of the list experiment, denoted by Δ in the tables. While Δ captures the raw difference in mean item counts between the list treatment (LT) and list control (LC) groups, it is substantially more variable and doesn't take into account the controls. The maximum likelihood estimation, by contrast, offers a more precise and interpretable estimate of the sensitive item probability while controlling for other demographic characteristics of the participants. Specifically, the coefficient for the interaction term 'Edutainment $\times$ List Treatment' reflects the change in the probability of endorsing the sensitive belief caused by the intervention, conditional on being presented with the sensitive item.

I use this specification as my main model as it allows me to take into account how participants respond to the non-sensitive items (h) and also how likely they are to admit to the sensitive item, if it was included (g). It doesn't assume a linear relationship and therefore

allows me to efficiently estimate given my sample size is small and I have multiple covariates to include (in comparison to the linear least squares model). It improves on the non-linear least squares model by taking into account all the information about the joint distribution by using a stable maximising algorithm for the likelihood function (Blair and Imai (2012)). It also accommodates individual characteristics $\mathbf{X}_i$ like gender, education, employment status, income group etc., thus helping to adjust for respondent heterogeneity.

I apply the above ML model with protection against design effects for both the list survey questions on gender biased attitudes and violence against women (VAW) attitudes[11] Increasing the protection level makes the estimator more conservative but robust, thereby safeguarding against misleading inference due to assumption violations. As robustness checks, I report the results of this model applied on the larger sample as well as results of the ML model without protection against design effects.

Maximum Likelihood Estimation with Protection:

The Maximum Likelihood (ML) framework (following Imai (2011) and Blair and Imai (2012)) separates the modelling of non-sensitive and sensitive item responses in the list survey using two component functions:

Non-sensitive item response function: $h(y; \mathbf{x})$ denotes the probability that a participant endorses y out of J non-sensitive items, given covariates $\mathbf{x}$. This is modelled as a binomial distribution:

$$h(y; \mathbf{x}) = \Pr(Y_i = y \mid T_i = 0) = \binom{J}{y} \pi(\mathbf{x})^y \left[1 - \pi(\mathbf{x})\right]^{J-y},$$

where $\pi(\mathbf{x}) = \text{logit}^{-1}(\mathbf{x}^\top \boldsymbol{\psi})$ is the probability of endorsing a single non-sensitive item.

Sensitive item response function: $g(\mathbf{x}, y)$ denotes the probability that a participant endorses the sensitive item, conditional on their covariates $\mathbf{x}$ and on having endorsed y of the control items. This is modelled as:

$$g(\mathbf{x}, y) = \Pr(S_i = 1 \mid \mathbf{x}, y, T_i = 1) = \text{logit}^{-1}(\alpha\, y + \mathbf{x}^\top \boldsymbol{\beta}).$$

[11] The `protect(#)` option in `kict` package in Stata, as developed by Tsai (2019) and derived originally in Blair and Imai (2012), provides a correction for such design effects by bounding the maximum number of respondents potentially affected.

Using these two components, the likelihood of observing a total count $Y_i = k$ in the Edutainment treatment (ET) group is given by:

$$\Pr(Y_i = k \mid T_i = 1, \mathbf{X}_i = \mathbf{x}) = \sum_{y=0}^{k-1} h(y; \mathbf{x}) \cdot g(\mathbf{x}, y),$$

while in the Edutainment control (EC) group, the likelihood simplifies to:

$$\Pr(Y_i = k \mid T_i = 0, \mathbf{X}_i = \mathbf{x}) = h(k; \mathbf{x}).$$

Combining the two, the ML model can be summarized as:

$$Y_i = f(\mathbf{X}_i, \boldsymbol{\gamma}) + T_i \cdot g(\mathbf{X}_i, \boldsymbol{\delta}) + \varepsilon_i,$$

where $f(\mathbf{X}_i, \boldsymbol{\gamma})$ captures the expected number of control item endorsements, $g(\mathbf{X}_i, \boldsymbol{\delta})$ captures the shift due to the sensitive item under treatment, and ε_i is a random error term.

The ML framework that is used in this paper ensures valid inference even when design effects (for example, ceiling effect, flooring effect, spillover effect, attrition etc.) are present. The observed outcome for each respondent, Y_i, represents the total number of items they endorse. This total depends on whether the respondent was shown the list without the sensitive item ($T_i = 0$) or with the sensitive item ($T_i = 1$). The estimating equation can be written as:

$$E[Y_i \mid \mathbf{X}_i, T_i] = f(\mathbf{X}_i, \boldsymbol{\psi}) + T_i \cdot g(\mathbf{X}_i, \boldsymbol{\beta}),$$

where $f(\mathbf{X}_i, \boldsymbol{\psi})$ captures the expected number of non-sensitive items endorsed (the control list), and $g(\mathbf{X}_i, \boldsymbol{\beta})$ captures the change in expected endorsements when the sensitive item is added. The coefficient on T_i therefore represents the estimated probability that a respondent would endorse the sensitive item, conditional on their characteristics.

The model parameters are as follows: $\boldsymbol{\psi}$ representing parameters describing the probability of endorsing the non-sensitive (control) items; $\boldsymbol{\beta}$ representing parameters describing the probability of endorsing the sensitive item, conditional on the control count and covariates; and α representing a design-effect parameter that captures how the presence of the

sensitive item changes the endorsement pattern of control items. A significant α indicates a possible violation of the "no design effect" assumption.

For a respondent in the list control (LC) group ($T_i = 0$), the probability of endorsing y_i out of J control items is:

$$\Pr(Y_i = y_i \mid T_i = 0, \mathbf{X}_i) = \binom{J}{y_i} \pi(\mathbf{X}_i)^{y_i} [1 - \pi(\mathbf{X}_i)]^{J - y_i},$$

where $\pi(\mathbf{X}_i) = \text{logit}^{-1}(\mathbf{X}_i^\top \boldsymbol{\psi})$ is the probability of endorsing any individual control item. For the gender-biased norms list, the estimated endorsement probability is transformed as $\pi^* = 1 - \pi$, such that higher values represent more progressive views. The VAW attitudes measure already has this interpretation.

For respondents in the list treatment (LT) group ($T_i = 1$), the probability of endorsing y_i total items (including the sensitive item) is:

$$\Pr(Y_i = y_i \mid T_i = 1, \mathbf{X}_i) = \sum_{k=0}^{y_i - 1} \Pr(Y_i = k \mid T_i = 0, \mathbf{X}_i) \times \Pr(S_i = 1 \mid Y_i = k, \mathbf{X}_i),$$

where $\Pr(S_i = 1 \mid Y_i = k, \mathbf{X}_i) = \text{logit}^{-1}(\alpha k + \mathbf{X}_i^\top \boldsymbol{\beta})$.

The full log-likelihood function is then given by:

$$\ell(\boldsymbol{\theta}) = \sum_{i=1}^{n} \log \Pr(Y_i = y_i \mid T_i, \mathbf{X}_i; \boldsymbol{\theta}),$$

where $\boldsymbol{\theta} = (\boldsymbol{\psi}, \boldsymbol{\beta}, \alpha)$.

The ML estimates are obtained by maximizing $\ell(\boldsymbol{\theta})$ numerically. Standard errors are computed from the inverse of the observed information matrix, and the "protection" term involving α ensures that the model remains robust to potential design effects arising from the inclusion of the sensitive item.

4.4.2 Summary Statistics: Main Sample

This section discusses the summary statistics of the main sample. The main sample is the smaller sample of 123 participants who completed the programme by attending all four

weeks of movie screenings and also attended the end survey.

Demographics

Edutainment Groups	ALL	HABRA	SANTOSHPUR	SONARPUR
Movie Treatment:-				
List Control	40.66	41.67	36.36	42.22
List Treatment	59.34	58.33	63.64	57.78
Movie Control:-				
List Control	48.78	48.57	44.44	51.72
List Treatment	51.22	51.43	55.56	48.28

Table 4.2: Proportion of participants (percentage) in the List Control and List Treatment groups within the Movie Edutainment Treatment and Control group in the Individual Screening Centres and in Total

Table A3.1.4 reports the balance test results for baseline covariates between the edutainment treatment and control groups for the main sample of 123 participants. Overall, the two groups are well-balanced across nearly all observable characteristics, including gender, education, literacy, employment, caste, household income, marital status, and other key variables. The only notable difference is age, which shows a modest but statistically significant imbalance. To address this, age is included as a control in the ML model specification, and the estimator with protection against design effects further mitigates any influence of this small imbalance. Taken together, these results indicate that, apart from age, the treatment and control groups are comparable at baseline, supporting the validity of the estimated treatment effects.

Among the 123 participants who attended all four weeks of edutainment training and also attended the end survey, around 43.09% were in the treatment group and 56.91% were in the control group. Table 4.2 gives a centre-wise breakdown of the proportion of control group and treatment group participants. From Fig. 4.2, it can be observed that around 33% of the participants who completed the programme are housewives. Almost 80% of the participants had atleast basic reading and writing ability, half of whom were proficient in Bengali. 54% of the participants had attended class 6-12 as highest education level, while 49% of the 123 people were employed. About 69% of them fell in the household income group of <20,000 per month as elaborated centre-wise in Table A3.1.3. Majority of the participants who completed were married, at about 73% of the total. 55% of them were from SC/ST, followed by 35% from General castes. Women comprise the larger proportion of the participants who completed the entire treatment and attended the end surveys. The age group of 18-35 happens to form the largest age group among the attendees.

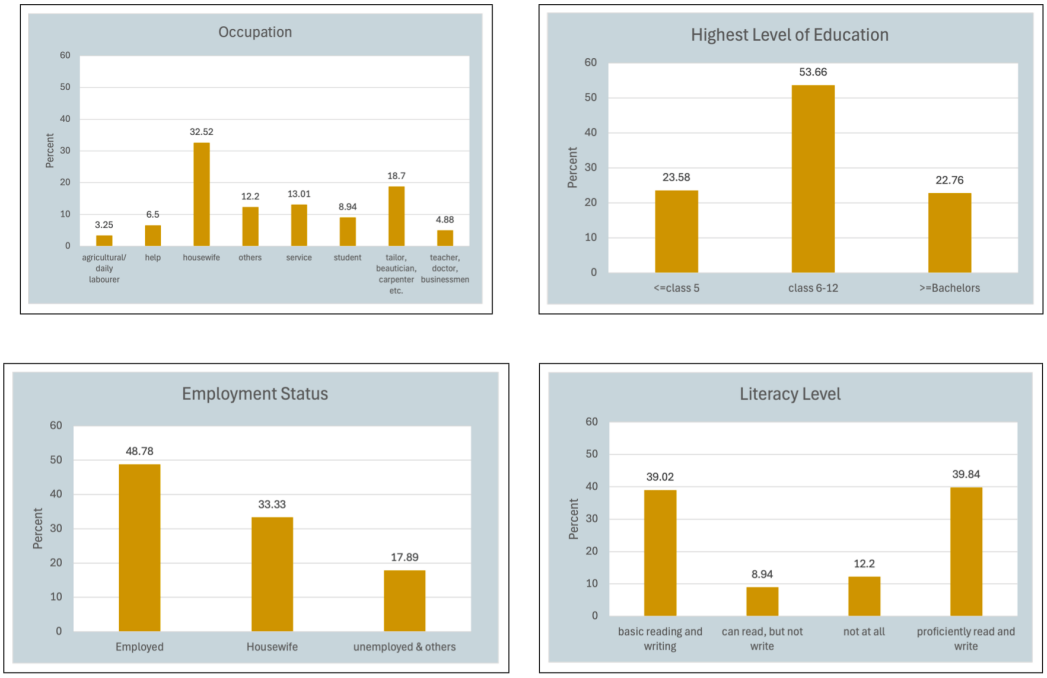

Figure 4.2: Bar-graphs Showing Distribution of Participants by Different Demographical Characteristics

The gender imbalance at the Habra centre reflects local circumstances: men in this suburban area generally work even on weekends, giving them less flexibility to attend the survey sessions. While many men joined the movie screenings, far fewer participated in the endline survey due to limited leisure time and lower interest. This imbalance is unlikely to affect the results in a meaningful way, as the ML estimator with protection mitigates design-related differences, and centre fixed effects absorb systematic location-specific patterns such as gender composition. Together, these adjustments ensure that the uneven participation at Habra does not bias the estimated treatment effects.

In the above bar-graphs shown in Fig. 4.2., I present the distribution across some important socio-economic demographics relevant to my study. I look at those especially related to women empowerment like employment, occupation, highest education level and literacy level. In the pool of participants, in the occupation groups, 32.52% of the participants identified themselves as "housewives"[12], which was the largest occupation category. At around 49% the largest fraction of participants had reported their employment status as being employed. This included both employed and self-employed people. For about

[12]Majority of Indian women identify themselves as housewives, which involves hard labour of doing all household chores single-handedly including cooking and cleaning, along with managing the household, children, elderly in-laws.

54% of the participants, the highest level of education (HEL) for is secondary school, i.e. those who attended class 6-12. People whose HEL was none or less than or equaivalent to class 5 formed 24% of the pool, while those who had degrees greater than or equivalent to Bachelors degrees formed 22% of the pool. Majority of the people have proficient to basic skills in reading and writing in Bengali at around 39%. In order to see how the distributions for various demographics for the control and treatment groups compare, I carry out some non-parametric tests. I find that the groups are mostly balanced and that there are no significant differences in the group distributions[13].

4.4.3 Summary Statistics: Larger Sample

The summary statistics from the larger sample of 183 participants who attended the end surveys are reported in the Appendix in Fig. A3.1.3. Not all of these participants attended for all four weekends of movie screenings. Some attended three, two or even one weekend of movie screening. Among 183 people, 123 attended all four weeks which is around 67%, 34 participants attended three weeks, which amounts to about 19%. 15 participants attended two weeks amounting to around 8% of the total 183 and 11 participants attended only one week, amounting to 6.01% of the larger sample. Some of them either got to know of the programme late and registered late, or they couldn't attend all weekends due to personal reasons. They nevertheless turned up for the end survey day, either motivated by the programme itself or by the positive incentivisation at the end as promised by the rewards. It was interesting to observe that although there were a few drop-outs, the number of attendees increased with the weeks, suggesting the attractiveness of the program. The idea is to see if there are any marked differences in the effects of the edutainment for the larger sample over the smaller sample.

In Table A3.1.13, I provide the summary statistics of the 60 participants from the larger sample who didn't attend all four weeks. As I can see many of these 60 participants were females and people who were married. Many of them belonged to the income group of $<$ Rs. 20,000 and many of them could proficiently read and write. About 40% of these

[13]The Wilcoxon signed-rank test helps to compare two samples from related groups. I carry this out between the sample of participants in the movie edutainment control group vs the treatment group, and the sample of participants in the list control or list treatment group. It tests whether the distribution of the differences between the two related groups is symmetric around zero. For statistical inference, as the p-value for the Wilcoxon signed rank test is greater than 0.05, it signifies there is no significant difference between the two groups. I also carry out the Kruskal-Wallis equality-of-populations rank test, which is a non-parametric test used to compare the distributions of two or more independent groups within the demographic variables. The Kruskal-Wallis test is used in this paper instead of the Wilcoxon rank-sum test as it suits my dataset better. Again, as the p-value is greater than equal to 0.05, I do not reject the null hypothesis, and infer that there is no significant difference between the group distributions.

60 people identified themselves with the occupation of "housewife". This suggests that people who could not attend all four weeks might have had to attend activities with higher priorities (due to reasons owing to livelihood, occupation etc.). However, some of the participants joined and registered for the programme late, after first or second weekend, due to various reasons including communication gap. This is the reason I am inclined not to use the term "drop-outs" or even "attrition" for these participants, because not all of them dropped out of the programme but some of them joined late. The summary statistics of the larger sample are overall similar to the main sample in terms of demographics as seen in Fig. A3.1.3. As observed, the highest fraction of the 183 participants at 34.27% were housewives by occupation; 50.27% were employed; about 47% had less than or equal to class 5 level of education and about 39% of them could proficiently read and write in Bengali.

4.5 Main Results

4.5.1 Mean Difference Analysis of List Survey

From the average number of statements people were upset about (in question 1) and people agreed to (in question 2), the differences in means were calculated. I analysed these mean differences and discuss the findings in this section. Table 4.3 shows that for the first list survey question on gender-biased norms (Q1), the original differences between list treatment (LT) and list control (LC) groups were 0.973 for the edutainment control (EC) group and 0.898 for the edutainment treatment (ET) group. Higher mean difference values for Q1 indicate more gender–regressive attitudes, whereas higher mean difference values for Q2 indicate more gender-progressive attitudes. After reverse–coding, the differences become -0.973 (EC) and -0.898 (ET), so that the ET group now shows an overall improvement in gender–progressive attitudes compared to the EC group. This indicates that the edutainment intervention contributed to reducing gender–regressive views. For the second list survey question (Q2) on violence against women (VAW), the difference between LC and LT for the ET group (0.939) is smaller than the EC group (1.222); however, the magnitude exceeds 1, indicating the presence of a ceiling effect. These patterns from the overall mean-difference analysis suggest that even though the list survey may not have captured strong shifts in attitudes towards VAW, it did capture attitudinal shifts for gender biased norms, attributable to the edutainment intervention. Examining the mean differences across demographic subgroups reveals further notable and

nuanced patterns.

Table 4.3: Table showing differences between list control (LC) and list treatment (LT) groups within edutainment control (EC) and treatment (ET) groups for the two list survey questions on gender biased norms (Q1) and violence against women (Q2)

Gender Biased Norms Question (Q1)	**Edutainment Control (EC)**		**Edutainment Treatment (ET)**	
	Obs	**Mean**	**Obs**	**Mean**
Q1 List Control (Q1LC)	34	3.382	23	3.435
Q1 List Treatment (Q1LT)	31	4.355	30	4.333
Q1 Difference		**0.973**		**0.898**
Violence Against Women Question (Q2)	**Obs**	**Mean**	**Obs**	**Mean**
Q2 List Control (Q2LC)	34	3.294	23	3.261
Q2 List Treatment (Q2LT)	31	4.516	30	4.2
Q2 Difference		**1.222**		**0.939**

The graphs in Figures 4.3 and 4.4 present the differences in average responses between the list control (LC) and list treatment (LT) groups for the gender-biased norms (Q1) and violence against women (VAW; Q2) questions, separately for the edutainment control (EC) and edutainment treatment (ET) groups. After reverse–coding Q1 so that higher absolute average values of Q1 indicate increase in patriarchal attitudes and lower gender progressive attitudes, one of the key findings is that the edutainment intervention appears to have reduced patriarchal attitudes in the suburban centres of Habra and Sonarpur, whereas no such pattern is observed in the Santoshpur centre (urban). The average differences in Habra and Santoshpur for the Movie treatment group are lower, which means reverse-

coding them (multiplying them by -1) will in turn imply for lower absolute averages to be interpreted as higher gender progressive attitudes. So, the gender progressive attitudes improves for the edutainment treatment group for Habra and Sonarpur (Figure 4.3). Figures 4.3 and 4.4 further show that, for attitudes toward VAW, the edutainment treatment (ET) tends to have a stronger effect among men than among women. For gender biased attitudes in the reverse–coded Q1, larger mean difference for men in edutainment (movie) control (EC) group means men show less gender progressive attitudes in the edutainment control (EC) group than women. On the contrary, in the edutainment treatment (ET) group, women having smaller absolute mean difference translates to women having larger actual difference post treatment showing that the programme was more effective among women in regards to gender progressive attitudes.

In addition, Figure 4.3 shows that for gender-biased norms, individuals in the ET group who are employed exhibit larger absolute mean averages (i.e., lower values when reverse-coded) than those who are not employed, suggesting that edutainment may have been more effective for unemployed participants as far as gender-biased attitudes are concerned. Similarly, individuals with higher education levels (Bachelor's degree or above) show greater absolute mean averages (i.e., lower values when reverse-coded) compared to participants with lower levels of education, suggesting again that edutainment may have been more effective for participants with lower education level for gender-biased attitudes. Furthermore, for Q1 the younger age group (18-35) shows differences less than 1 (Figure A3.1.1). However, after reverse-coding Q1 so that higher values indicate more gender-regressive attitudes, this implies that the edutainment intervention was ineffective among younger adults. However, many of these subgroup differences also exceed 1, again suggesting ceiling effects that constrain the precision of the list experiment estimates. For Q2, the differences exceed 1 for several subgroups, indicating ceiling effects and thus limiting the interpretability of these patterns.

For VAW attitudes, none of the income groups are more likely to reveal their attitudes towards the sensitive statement without presence of ceiling effects, as can be seen in Fig. 4.4. Furthermore, for the VAW attitudes, married people tend to reveal their attitudes towards the sensitive statement more than unmarried people, but the differences are greater than 1, which signals there might be some ceiling effect here. The direction of the differences is opposite for participants who are unmarried, as presented in Table A3.1.3 and in Figures A3.1.1 and A3.1.2. Also, for attitudes regarding VAW, people in

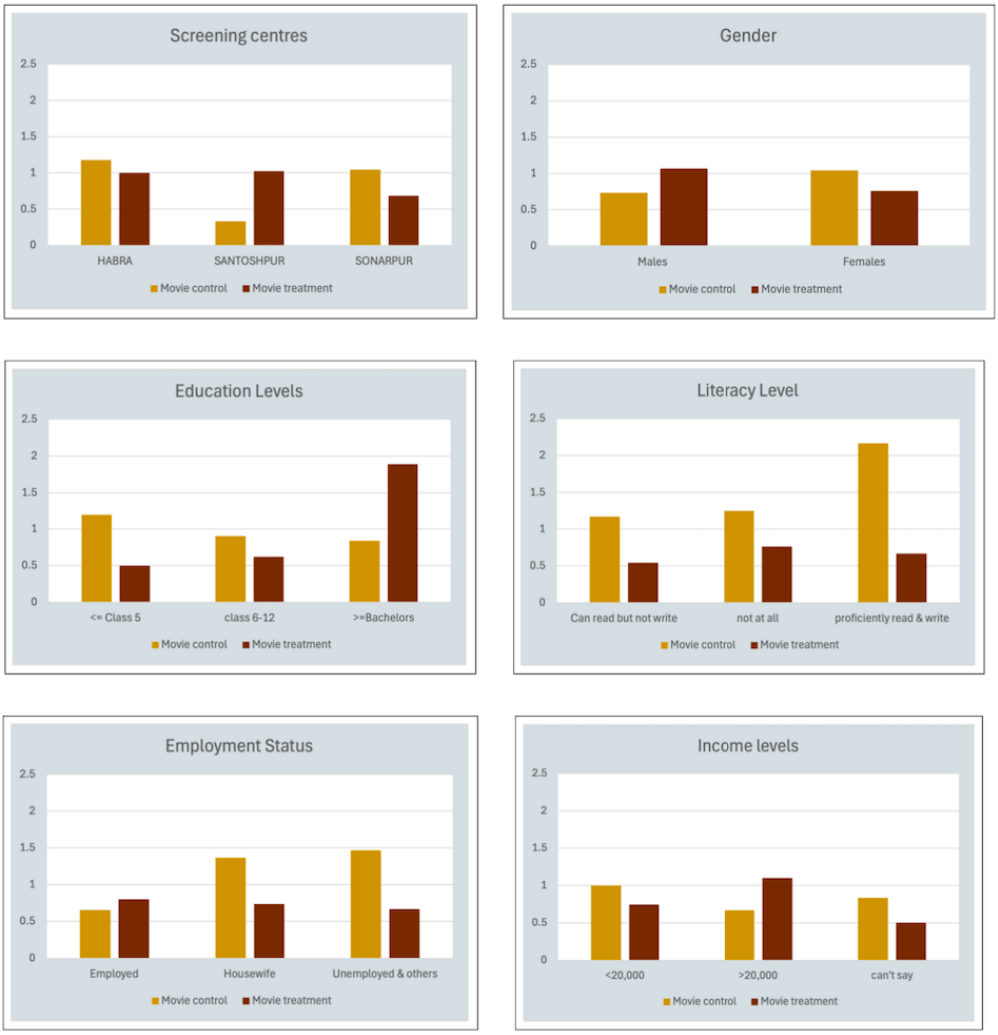

Figure 4.3: Graphs showing differences in the means of list survey questions on GB norms (Q1) within different demographical groups

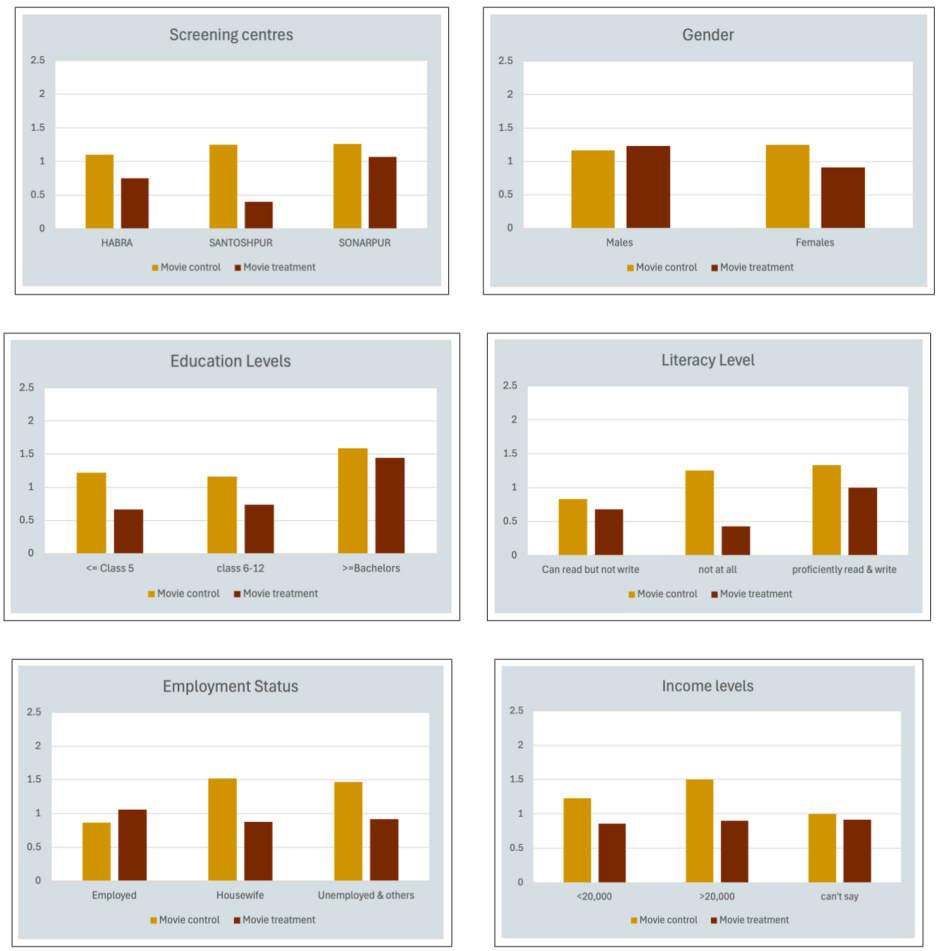

Figure 4.4: Graphs showing differences in the means of list survey questions on VAW attitudes (Q2) within different demographical groups

the age group 36-50 tend to be more revealing about their attitudes towards the sensitive statement, as shown in Figure A3.1.2 in the Appendix. However, as the differences within the movie treatment groups are greater than 1, there might be some ceiling effect.

Overall, from the mean-difference analysis through these graphs, if I look at the mean differences being greater for the edutainment (movie) treatment (ET) group in the instances where it they were less than 1, this is what I find. In the main sample of 123 participants, after reverse-coding for the gender norms question, edutainment was effective for the suburban centres of Habra and Sonarpur and for the group of unemployed participants and participants with lower education level. The treatment couldn't be concluded as effective for revealing attitudes towards VAW for the main sample, but the list survey responses were biased by ceiling effects[14]. However, as the mean difference analysis doesn't take into account design-effects or control for demographic heterogeneity, I apply the Maximum Likelihood (ML) Model with protection against design effects and report results in the following sub-section.

4.5.2 Maximum Likelihood Model with Protection (Adjusted for Design Effects)

For the first list survey question on gender-biased attitudes (Q1), the key parameter of interest is the coefficient ψ_1 in column (3) of Table 4.4. After reverse-coding Q1 so that higher values represent more gender-regressive attitudes, the negative and statistically significant estimate ($\psi_1 = -2.047$) indicates that exposure to the edutainment intervention is associated with a reduction in gender-regressive views. In other words, respondents exposed to the intervention were less likely to endorse the gender-biased statement, even when responding indirectly under the list experiment format. This suggests a meaningful improvement in gender-progressive attitudes attributable to the intervention. The coefficient is significant at the 1% level, implying a robust treatment effect.

The intercept term ψ_0 in column (2) is negative but not statistically significant, which may reflect a relatively low baseline level of gender-regressive attitudes in the absence of treatment. Individual-level demographic controls are included in the ML model to account for heterogeneity and improve precision. These controls include age, gender, mar-

[14] Although the mean differences were larger for men and among participants who are employed, the difference is greater than 1 for VAW attitudes, which means there were some ceiling effects within the movie treatment group.

ital status, centre location, highest education level, employment status, income level and number of weeks attended.

Table 4.4: Results of the Maximum Likelihood Model with protection against design effects for the main sample

	List Survey Question on Gender Biased Attitudes (Q1)			**List Survey Question on Attitudes regarding VAW (Q2)**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Delta (Δ)	**Psi0 (ψ_0)**	**Psi1 (ψ_1)**	**Delta (Δ)**	**Psi0 (ψ_0)**	**Psi1 (ψ_1)**
Edutainment x List Treatment	45.19	-33.16	-2.047***	9.110**	-11.07	-0.885**
	(31.40)	(76.19)	(0.603)	(3.929)	(7.749)	(0.419)
Constant	-57.29	15.21	5.266***	-2.859	8.019	5.488***
	(38.06)	(33.66)	(1.478)	(3.461)	(7.039)	(1.086)
Observations	116	116	116	116	116	116
X Controls x List Treatment			Yes			Yes
Protection			Yes			Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of individual-level controls including age, gender, marital status, centre location, highest education level, employment status, income-level and number of weeks attended. All predictor variables are interacted with list treatment assignment, following the Imai ML estimator framework given in Blair and Imai (2012) and Tsai (2019). Thus, coefficients reflect effects on the probability of endorsing the sensitive item, conditional on being shown the sensitive item.

In contrast, the unadjusted Average Treatment Effect (ATE) estimate in column (1) ($\Delta = 45.19$) is likely distorted due to the small number of list items and sensitivity to design violations, making it less reliable. For this reason, the protected ML model, which incorporates design-effect corrections and covariate adjustments, provides a more credible estimate of attitudinal change. In summation, the protected ML results for Q1 indicate that the edutainment intervention reduced endorsement of gender-regressive norms, consistent with genuine shifts toward more gender-progressive attitudes or with increased awareness of the social unacceptability of such attitudes.

Similarly, for the second list survey question on attitudes related to violence against women (Q2), I apply the same maximum likelihood framework using estimates reported in columns (4)-(6) of Table 4.4. The intercept $\psi_0 = -11.07$ is strongly negative, which again indicates substantial social desirability bias: respondents are generally unwilling to openly endorse the sensitive attitude related to VAW, even when responding through an indirect list format. The coefficient $\psi_1 = -0.885$, capturing the marginal effect of being in the edutainment treatment group, is statistically significant at the 5% level. Because higher

values reflect more gender-progressive attitudes towards VAW in our survey design, this negative coefficient implies that exposure to the edutainment intervention is associated with a reduction in progressive attitudes (as revealed) towards VAW. In other words, after treatment, respondents are less likely to endorse the gender-progressive statement related to VAW-related item, even if asked indirectly. This inference is opposite to what we find for Q1.

The list-experiment average treatment effect estimate, $\Delta = 9.11$, is also statistically significant at the 5% level and reflects the raw difference in mean item counts between the list treatment and list control groups. While informative as a design-based estimate, Δ does not adjust for covariates and is therefore less precise than the ML estimates.

Taken together, the ML results for Q2 suggest that the edutainment intervention is associated with a significant reduction in gender progressive attitudes regarding violence against women (VAW). On the other hand, the reverse-coded interpretation adopted for Q1, where negative and significant treatment effects indicated movement toward more gender-progressive positions. Thus, these results may reflect a reversal in attitudes revealed when the sensitive statement in the list survey involves gender biased norms versus attitudes towards VAW. Genuine attitudinal change or heightened social awareness is observed moving from gender norm question to VAW question, making respondents change their attitude from more gender progressive to less gender progressive. However, we do also observe among the participants a reluctance to reveal attitudes. Either mechanism is consistent with the earlier mean-difference analysis and with findings in related literature (e.g., Bulte and Lensink (2019)), where interventions increased social awareness around gender norms and violence.

4.6 Robustness Checks

4.6.1 Maximum Likelihood Model, Unadjusted for Design Effects: Main Sample

As robustness checks, similar specifications were run for ML model without protection for the main sample. Table 4.5 presents estimates from the Maximum Likelihood (ML) model applied to the list experiment, without using the design effect protection adjustment. The ML model estimates the probability of endorsing the sensitive item while accounting

for treatment assignment and respondent covariates. Delta (Δ) captures the average treatment effect of being exposed to the sensitive item (i.e., the difference in the number of endorsed items between treatment and control groups). Psi0 (ψ_0) represents the baseline probability of endorsing non-sensitive items in the control list. Psi1 (ψ_1) estimates the probability of endorsing the sensitive item itself among treated respondents.

Table 4.5: Maximum Likelihood model results for main sample without protection against design effects

	List Survey Question on Gender Biased Attitudes (Q1)			**List Survey Question on Attitudes regarding VAW (Q2)**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Delta (Δ)	**Psi0 (ψ_0)**	**Psi1 (ψ_1)**	**Delta (Δ)**	**Psi0 (ψ_0)**	**Psi1 (ψ_1)**
Edutainment x List Treatment	0.852	1.275	-2.838**	-0.0798	0.268	-1.390
	(1.173)	(1.041)	(1.214)	(0.611)	(0.585)	(0.865)
Constant	-0.445	0.716	4.910**	2.327	1.178	3.148*
	(1.930)	(1.695)	(2.193)	(1.680)	(1.599)	(1.730)
Observations	116	116	116	116	116	116
X Controls x List Treatment			Yes			Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of individual-level controls including age, gender, marital status, centre location, highest education level, employment status, income-level and number of weeks attended. All predictor variables are interacted with list treatment assignment.

The interaction term 'Constant $\times$ List Treatment' shows how the baseline endorsement changes when participants receive the treatment list. In columns where covariates are included, they are all interacted with treatment status, following the ML framework given by Imai (2011) and as formulated by Blair and Imai (2012) and Tsai (2019).

For question 1 (Gender-Biased Attitudes), the ML estimates in Table 4.5 imply a reduction in gender-regressive endorsement following the edutainment intervention. In particular, the treatment-group sensitive-item parameter in Model (3) is negative and statistically significant ($\psi_1 = -2.838^{**}$), indicating that conditional on covariates respondents shown the treatment list are less likely to endorse the gender-biased statement. Interpreted on the model scale, this negative ψ_1 implies a decline in the propensity to agree with the regressive item after exposure to edutainment, i.e. an observable shift toward more gender-progressive attitudes. By contrast, a positive ψ_1 would have implied an increase in gender-regressive endorsement; the observed negative sign therefore points the attitudes revealed by the participants in the gender progressive direction.

The unadjusted ATE ($\Delta = 0.852$) reported in column (1) is small and statistically insig-

nificant in this specification, and the baseline parameter $\psi_0 = 1.275$ reflects the modelled control-list endorsement level. Because this robustness specification does not include the design-effect protection used in the main results, these estimates should be treated with caution: standard errors are relatively large and the estimates are more vulnerable to design violations or strategic response behaviour. Nonetheless, the sign and significance of ψ_1 in Model (3) are consistent with the interpretation that the edutainment intervention reduced endorsement of the gender-regressive statement (i.e. increased gender-progressive attitudes) in the sample.

Following (Blair and Imai (2012) and Tsai (2019)), I also report non-linear least squares (NLS) model estimates in the Appendix (results in Table A3.1.11) and linear least squares model estimates (results in Table A3.1.10), which I had tried initially. But none of the results turned out to be meaningful for interpretation with or without bootstrapping standard errors. This suggested need for different model specifications, which is why I opted to shift to the maximum likelihood specification. However, the estimates still indicate potential aversion to endorsing the sensitive items, in line with the overall findings of my main model.

4.6.2 Mean Difference Analysis and ML Model: Larger Sample

The graphs for the difference-in-means analysis for the larger sample are given in the Appendix in Figures A3.1.4 and A3.1.5 respectively and are observed to be overall consistent to the findings of the main sample. The mean-difference analysis for the list survey question on gender biased (GB) norms in Fig.A3.1.4 shows that the mean difference was lower and gender progressive attitudes revealed higher (and yet lower than 1) for those with education level between classes 6 to 12 (secondary level of education) in the edutainment treatment (ET) group. The mean-difference analysis for the list survey question on violence against women (VAW) in Fig. A3.1.5 shows that the difference was higher for both men and women, for those who could proficiently read and write in the movie treatment group, for employed people and people with income level higher than Rs. 20,000 in the edutainment treatment (ET) group. Figures A3.1.6 and A3.1.7 in the Appendix also provide additional graphs plotted on mean-difference analysis on the basis of marital status and age of the participants for both the list survey questions.

Overall, I find that when the larger sample of 183 participants is considered, the mean

differences are greater for the edutainment treatment group, while being less than 1 in magnitude for the following demographics. The results improve for revealing the VAW attitudes in contrast to the main sample. The edutainment treatment is more effective for participants in the age group of 18-35 (young adults) in revealing the attitudes towards VAW. I also find that female participants were willing to reveal more than males regarding their attitudes towards VAW. For revealing the attitudes towards GB norms, however, the treatment was more effective for participants with secondary education level.

As further robustness checks, the ML model with protection was estimated using the larger sample of 183 participants. Table 4.6 reports the corresponding results. For the first question on gender-biased attitudes (Q1), the edutainment–treatment interaction yields an estimated average treatment effect of $\Delta = 0.957$, significant at the 10% level. This indicates that the list treatment participants endorse, on average, slightly more items than the list control participants, although this value does not by itself distinguish between sensitive and non-sensitive endorsement. The baseline probability of endorsing the sensitive item is positive and statistically significant ($\psi_0 = 1.117^{**}$), which suggests a non-trivial level of underlying support for the gender-regressive statement even before accounting for treatment status.

Crucially, the sensitive-item parameter under treatment is strongly negative and highly significant ($\psi_1 = -5.381^{***}$). Under the reverse-coded interpretation of Q1, higher values imply more gender-regressive attitudes and lower values imply more gender-progressive attitudes. Thus, a negative ψ_1 indicates that exposure to the edutainment intervention substantially reduces endorsement of the gender-regressive item. In other words, after accounting for covariates and applying design-effect protection, the model implies a marked shift toward more gender-progressive attitudes among those receiving the edutainment treatment. This pattern is consistent with the findings from the main protected ML specification.

Table 4.6: Additional Results of the Maximum Likelihood Model with protection against design effects for the larger sample

	List Survey Question on Gender Biased Attitudes (Q1)			**List Survey Question on Attitudes regarding VAW (Q2)**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Delta (Δ)	**Psi0 (ψ_0)**	**Psi1 (ψ_1)**	**Delta (Δ)**	**Psi0 (ψ_0)**	**Psi1 (ψ_1)**
Edutainment x List Treatment	0.957*	1.117**	-5.381***	2.064*	-2.698**	-0.531
	(0.508)	(0.554)	(1.472)	(1.072)	(1.257)	(0.327)
Constant	-0.985	1.298	32.28***	11.34*	-96.06***	4.302***

	(1.314)	(1.665)	(3.458)	(6.885)	(2.953)	(1.023)
Observations	177	177	177	177	177	177
X Controls x List Treatment			Yes			Yes
Protection			Yes			Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of individual-level controls including age, gender, marital status, centre location, highest education level, employment status, income-level and number of weeks attended. All predictor variables are interacted with list treatment assignment, following the Imai's ML estimator framework.

For the second question on VAW attitudes using the larger sample, from Table 4.6, I observe that the estimated average treatment effect ($\Delta = 2.064$) is statistically significant at the 10% level, suggesting that inclusion of the sensitive item led to a modest increase in the number of items endorsed. Additionally, The baseline probability of endorsing the sensitive item ($\psi_0 = -2.698$) is significantly negative at the 5% level, indicating a low underlying propensity to admit to the sensitive behaviour. I also find that the interaction term for treatment ($\psi_1 = -0.531$) is negative but not statistically significant, implying that the responders may be reluctant to endorse the sensitive item post-treatment, and the treatment does not substantially change this tendency after adjusting for covariates. This is in line with the findings of the main model and further proves my model robust.

Overall, these robustness checks confirm that, for gender-biased attitudes (Q1), the edutainment intervention is associated with a sizeable reduction in support for the regressive statement, reinforcing the evidence from the main ML estimates with protection. Comparing the list-experiment results across the main and larger samples for both sensitive items (Q1 and Q2), I find that the smaller main sample (123 participants) yields higher estimated baseline endorsement rates for both sensitive items. In the larger sample, the reverse-coded Q1 results show a sharply negative ψ_1, indicating that exposure to the edutainment content substantially reduces the probability of endorsing the gender-regressive statement. Because Q1 is reverse-coded, this implies that participants in the edutainment condition became more gender progressive. The magnitude of this shift in the larger sample also suggests a pronounced degree of social desirability bias: respondents appear less willing to indirectly endorse the regressive gender-norm item when exposed to the edutainment intervention, even under the protection afforded by the list-experiment design. By contrast, the estimates for Q2 remain small and statistically imprecise across both samples.

4.7 Additional Discussions

As suggested in the previous works of Singhal and Rogers (2012) and Banerjee et al. (2019), any study examining the effects of education through entertainment should be accompanied by studying whether the viewers related with the entertainment form. In this study, the participants understanding the issue from the perspective of the characters portrayed in the movies was considered important measures of relatability and of their attention being captured (Banerjee et al. (2019)). Participants were presented with the pictures of the main characters portrayed in each movie and were asked if they related with any of the characters. The picture game also provided a premise for ensuring that the list survey responses captured were linked more to the movies the participants had watched, rather than other factors. I report the distribution of participants who related with the central characters of the movies they see across different centres for the main sample in Table A3.1.15.

I segregate the characters that participants associate with into male and female characters supporting women empowerment, those against women empowerment and those suffering violence. In Fig. A3.1.8 and A3.1.9, I graph the distribution of treatment group (Edutainment) participants relating to the different characters of the movies for the main sample and larger sample. In Table A3.1.6, I summarise male and female participants who reveal attitudes to the list survey sensitive statements and also relate to characters fighting GB Norms and VAW. I observe that 15 women who revealed attitudes towards the sensitive statement on GB norms connected with characters portraying women empowerment, while 22 women who revealed attitudes towards the sensitive statement on VAW attitudes connected with characters fighting VAW. On the other hand, the responses from female participants on the list survey question on VAW Attitudes when they connected to the female characters fighting VAW do not have many responses. Also, responses from male participants on either list survey question, given they related with the characters fighting GB norms and VAW are few.

As seen in Table A3.1.5, a large proportion of the participants relate to women empowering characters like Shakuntala Devi, Mithali Raj, Aditi Mukherjee and Tuku. On comparing the edutainment treatment and control groups, I find that 70% of the women in the movie treatment group relate to the empowered women characters fighting gender norms (like Aditi Mukherjee, Tuku, Mithali Raj, Jhorna Ghosh) and 5% women

relate to women facing and fighting violence (like the character called Putul Das in the movie "Mukherjeedar Bou"). I further find that 27% of the men identified with the male characters supporting women empowerment (like those of Coach Sampath and Shamyo) and 9% men relate to the abusive male characters (like Pablo in the movie "Sweater"). In Table A3.1.15, I provide a distribution of all the participants relating with the main characters of the movies shown to the edutainment treatment groups. I group the movie characters into those fighting Gender Biased (GB) norms and VAW, and summarise the number of participants who relate to each category of characters. I observe that 37.4% of the participants relate with female characters fighting GB norms, followed by 9% of the participants relating with male characters supporting women empowerment. While 3.25 % participants relate to female characters facing VAW, 0.81% participants relate to male characters inflicting violence. The same has been graphed in figures A3.1.8 and A3.1.9 in the Appendix. Therefore, in line with Banerjee et al. (2019), I find that female participants related more with the women empowering characters, having either identified with them personally or had been acquainted with someone similar.

In the direct questionnaire design in the very end, every participant was asked whether they witnessed or experienced any form of discrimination in the past one month. If they responded in affirmative, then I went on to ask them on what basis the discrimination was: caste, religion, mother-tongue, occupation, gender, education-level or income-level. By including "gender" as one of the bases of discrimination, and not asking questions solely involving GB norms or VAW, I aimed to prevent social desirability bias and speculation among other participants. The participants were further asked the frequency and development of witnessing or experiencing the discrimination in the past one month, i.e. whether the frequency of such incidents had increased, or decreased, or remained the same. It is to be noted that the questions on witnessing and facing were asked separately and after the picture game and the list survey, to take into account any possible impacts on any other social aspects. Although I had initially intended to run Oprobit and Ologit regressions with these variables, the sample size of participants who actually reported having witnessed or experienced discrimination was so small, that it was not meaningful to carry out a regression analysis any more. I have limited myself to reporting the summary statistics from this portion of the data collection.

However, from the data collected in the end direct questionnaire, I do have a few in-

teresting findings. It is observed in Table A3.1.8 that 16% of the participants reported to have witnessed discrimination in one form or the other, while 11% reported to have faced discrimination. Upon comparing the treatment and control groups, it is found that treated people report to have witnessed discrimination more than the control group people by about 13%. Also, treated people report to have faced discrimination more than the control group people by about 6%. About 20% of these participants who reported witnessing violence, have found it to have decreased over the past 1 month. About 13% of these participants who reported facing violence, have found it to have decreased over the past 1 month.

Furthermore, I find that the results from the picture game and the direct questionnaire for the larger sample of 183 participants, as observed in Table A3.1.14, are consistent to the findings from the main sample. It would be interesting to see in a larger-scale study if the results of the picture game could be examined in relationship to the results of the direct questionnaire, which was also the motive to carry these out in this paper. However, because the number of affirmative responses in the direct questionnaire was very small, it was not possible to explore this association.

Thus, the statistics from the direct questionnaire in general suggest that treated people report such events of witnessing or facing discrimination more than the control group people. Also, the incidences had reduced over the last one month following the edutainment, which is surely a promising sign. Although as these were direct responses, these could have been biased by social desirability factors as found by Bulte and Lensink (2019). Besides, the fact that the affirmative responses in the direct questionnaire were so small in number is another evidence in support of reluctance to reveal attitudes regarding sensitive topics of discrimination. This is similar to the findings of avoidance strategies as discussed in Nieder et al. (2019) and Roy and Bailey (2021).

4.8 Conclusion

This paper analyses the effects of education through entertainment, otherwise known as edutainment in the literature (Banerjee et al. (2019)), on the attitudes towards gender biased norms and violence against women (VAW) through a field experiment carried out in India. The field work is based on a Randomised Controlled Trial (RCT), where the treatment group is shown movies based on women empowerment (treatment), while the

control group is shown movies irrelevant to such context and more general in themes (placebo). The edutainment is carried out for a month, followed by a month gap before the post-treatment surveys. My field work is designed closely following the methodologies of previous works like Banerjee et al. (2019) and Bulte and Lensink (2019). The post-treatment data was collected mainly through a list survey to reveal the true attitudes of the participants towards the sensitive topics of gender biased (GB) norms and VAW.

I analyse the list survey data using various techniques. The two most important ones that I have emphasised in my paper is a difference-in-means analysis and a causal model based on maximum likelihood (ML) theory as devised by Imai (2011) and Tsai (2019). The mean-difference analysis was conducted across key demographic groups. For the main sample of 123 participants who completed the full programme (attending all four weekends of screenings and the endline survey), the edutainment intervention appears more effective in eliciting gender-progressive attitudes toward gender-biased (GB) norms among women, participants with secondary education, and respondents from suburban centres. This pattern is partly consistent with Roy and Bailey (2021), who find that women in Kolkata are often more outspoken and more likely to confront perpetrators of sexual harassment in public spaces.

For the larger sample of 183 participants—those who completed the endline survey but attended fewer than four weekends of screenings—the intervention shows a somewhat different pattern. Edutainment was more effective in revealing gender-progressive attitudes toward VAW among female participants, while it was more effective in shifting attitudes toward GB norms among respondents with secondary education, married participants, unemployed individuals, and those above the age of 50. Overall, the intervention appears most effective among women and among participants with higher prior levels of education. Women and married respondents may be more directly exposed to or familiar with the issues described in the sensitive statements, which could explain their greater likelihood of revealing such attitudes.

The ML model allows a deeper examination of whether the edutainment intervention causally influenced respondents' willingness to privately endorse the sensitive attitudes, as well as whether they would admit to them when the item is indirectly embedded in a list. Across both the gender norms (Q1) and VAW attitudes (Q2) list experiments, the

results indicate that respondents in the treatment group, on average, endorsed more items than those in the control group. Although the estimated average treatment effects (ATEs) are numerically large, they should not be interpreted literally as counts of endorsed items because list length and uncontrolled demographic heterogeneity affect scale. Instead, the sign and significance of these coefficients indicate that edutainment meaningfully shifted endorsement behaviour toward the sensitive statements.

Crucially, once reverse-coding is accounted for in the gender norms question, which is negatively framed ("upset") and therefore captures gender-regressive attitudes when interpreted directly. Thus, higher average responses imply greater gender bias or gender regressive attitudes, the ML estimates reveal a consistent pattern: exposure to the sensitive item after the intervention reduces the probability of endorsing the gender-regressive statement. This is reflected in the negative and statistically significant estimates of the sensitive-item parameter (ψ_1) for Q1, suggesting that participants become less willing to support the biased gender norm when offered the anonymity of the list format, i.e. a reduced probability of endorsing the regressive statement. For the positively framed question on VAW (Q2), respondents reveal a less gender progressive attitude, with framing-dependent differences in magnitude. This suggests asymmetry in the way participants update or reveal beliefs across differently framed questions. Overall, the findings are consistent with either increased awareness of social stigma and legal norms surrounding gender and violence, or with genuine attitude change, as also documented in Bulte and Lensink (2019). These conclusions remain robust across alternative ML specifications—including models with protection against design effects—and across both the main sample and the larger sample of participants.

The reluctance to report and be outspoken about the sensitive topics of GB norms and VAW has also been discussed in previous studies like Amaral and Bhalotra (2017), Nieder et al. (2019), Roy and Bailey (2021) and Ghatak and Chakraborty (2024). The results from this field experiment suggest that the act of reporting VAW is not merely a proxy for incidence of VAW, but is a substantive outcome of gender biased norms in its own right. The shame and stigma concerning VAW and gender biased norms are so deeply ingrained that even in indirect questioning, people become extra-conscious of not revealing their true attitudes.

This study seeks to design an easy-to-implement and effective interventionist programme for the larger adult Indian population to address attitudes regarding gender biased norms and violence against women (VAW). It would be interesting to see the results of this experiment carried out on a larger scale so that I could have the results based on a larger sample. The policy implications of this study would be to increase free screenings of movies based on women empowering stories and challenging taboos regarding VAW. The motive shouldn't be to sexualise such incidents by showing explicit scenes, but to sensitise people about the mental and physical health consequences suffered by women following such incidents. Given the high penetrative attribute of entertainment among the general populace, using it to educate people could go a long way in reversing attitudes.

Chapter 5

Conclusions

In conclusion, this PhD thesis carries out an in-depth examination of the dynamics of the connection between gender based violence with gender discrimination and gender biased norms in India. The first chapter of my thesis studies the relationship of domestic violence (DV) with a gender disparity ratio index (GDRI) that measures the gender disparity in the four dimensions of education, employment, health and household decision-making. I find overall that as district-level gender disparity rises, DV in the households mostly fall, in line with the theory of "male backlash" in the previous literature like Eswaran and Malhotra (2011), Bhalotra et al. (2021) and Anukriti et al. (2022). I also find that as gender disparity falls, women tend to justify wife-battering more, indicating that the women view wife battering as a "marital prerogative", as explained in Eswaran and Malhotra (2011) and the "guilt channel" sets in as explained Bandyopadhyay et al. (2020). I further find that with GDRI rising, the z-score index for DV increases. DVZI also is found to have a positive relationship with gender disparity in employment and a negative relationship with the gender disparity in household decision-making. All of these results suggest the presence of strong gender discrimination in the Indian society in connection to domestic violence.

The second chapter of my PhD thesis studies the relationship of sex ratio at birth (SRB) and son preference (SP) with violence against women (VAW) rates. The main findings in this paper are here that female son preference index (FSPI) has positive significant associations with rates of total VAW and domestic violence (DV).This positive relationship might indicate that in districts where women in general reveal a preference for sons over daughters, patriarchal gender norms are in prevalence, and therefore women face more violence from men in these districts. Another main finding from this chapter is that sex

ratio at birth (SRB) has positive associations with most of the VAW measures, indicating that with the ratio of male births to female births in the districts rising, women face more violence. Again, this signals that with rising prevalence of son biased gender norms, VAW increases in the districts. These results are robust to other models using different set-ups and measures. I carry out a host of additional tests including examining the case of dowry deaths, different model construction methods, the difference in associations by demographics and even a model with a cumulative son preference index. All the findings seem to point to the direction that patriarchal norms have strong associations with violent crimes against women, consistent to the previous works in the literature like Amaral and Bhalotra (2017) and Anukriti et al. (2022).

The third chapter of my thesis analyses the effects of education through entertainment on the probability of people revealing their attitudes regarding gender biased (GB) norms and VAW, through primary data collected from a field experiment in India. The Randomised Controlled Trial (RCT) in my field work is designed following the methodologies of previous works like Banerjee et al. (2019) and Bulte and Lensink (2019). The post-RCT data was collected mainly through a list experiment to reveal the true attitudes of the participants towards the sensitive questions. I analyse the list experiment data using difference-in-means analysis and a causal model based on maximum likelihood (ML) theory as devised by Imai (2011) and Tsai (2019). The main finding from the former method is that the intervention was more effective for women, married people and among the participants with secondary education in general which is in line with Banerjee et al. (2019) and Roy and Bailey (2021). The main findings from the ML model for both the gender biased norms and VAW attitudes suggest that on average, respondents in the treatment group endorsed more items than those in the control group. However, I find that exposure to the sensitive item on the list post intervention led to an overall reluctance among participants to respond to the sensitive statement, which could be due to increased social awareness or an actual change in attitude. Also, reverse-coding the negatively framed list survey question on gender norms shows participants revealing more gender-progressive attitudes. For the positively framed and more sensitive list survey question on attitude towards VAW, respondents reveal less gender-progressive attitudes, suggesting that participants disclose their underlying attitudes differently depending on the framing of the sensitive item and the degree of sensitivity associated with the behaviour being measured. These findings are robust to the other ML model specifications and consistent to the findings of the study by

Bulte and Lensink (2019). The reluctance to report and a general avoidance in behaviour about these sensitive issues is in line with previous works like Nieder et al. (2019), Roy and Bailey (2021) and Ghatak and Chakraborty (2024).

5.1 Contributions

To summarise the contributions of my first paper, the use of the comprehensive measure of GDRI to study the impact of gender disparity on domestic violence (DV) is one. I also use various different measures for DV, including indices built on two different approaches. This paper is a holistic study of the association of DV with gender disparity in India, which hasn't been done before. The second chapter contributes to the literature by taking into account various forms of VAW during the years 2001 to 2019 and studying their associations with the gender biased trends favouring male children in India. Again, I explore a wide range of model specifications and a number of robustness checks to examine this relationship in depth. To the best of my knowledge, no previous study has investigated all forms of VAW in connection to biased trends towards male children in the context of India. The third chapter might be the first of its kind to study the effects of edutainment on creating social awareness regarding revealing gender biased attitudes and attitudes towards VAW in the city of Kolkata, India. This is another contribution of this PhD thesis to the literature.

5.1.1 Policy Recommendations

The policy recommendations from the first chapter would be to design policies directed at reducing discriminatory practices in education, employment, health and decision-making. The "male backlash" effects shouldn't be an encouragement to slow down women empowering efforts in the Indian socio-economy. The focus should be to bring gender parity and reduce gender discriminatory trends in ways that don't increase violence. From my second chapter, the main policy implications would be to design interventions and strategies that can address the social gender norms at the root. Programmes could be designed to reverse the gender discriminatory practices across children and correct the biased attitudes against daughters. Spreading gender awareness and sensitisation might be helpful, especially for the adult population, who tend to grow more rigid attitudinally and revert back to orthodox cultural schools of thought. Lastly, the main policy implications of my third chapter would be here that along with other measures; in order to effectively reduce these crimes, policy-makers also need to target the deep-rooted bias on a continuous basis through mass

awareness programmes meant for the adult citizens. Given the cost effectiveness and the easy penetrability of entertainment, free screenings of relatable movies based on stories of women empowerment and fighting VAW (without sexualising the content) should be increased.

5.1.2 Scope for future research

My research paves the way for future research possibilities in the area. Based on the first two chapters, it might be possible to extend this to a causal-inference analysis. That would help me to see whether gender discrimination and gender norms are actually causes of violence against women. Additionally, using my third chapter as a pilot study, the experiment could be carried out on a larger scale so that I could have the results based on a larger sample. It would also give me scope to improve on the design effects of the experiment, giving me better policy implications for future policy-makers.

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APPENDIX

A1. Paper 1 Appendix

Table A1.1: Summary Statistics of the Control Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
omen's Dataset:-					
Age	986784	33.237	8.432	15	49
Location Type	.	.	.	.	.
- Rural	986784	.74	.438	0	1
- Urban	986784	.26	.438	0	1
Wealth Index	.	.	.	.	.
- Poor	986784	.42	.493	0	1
- Middle or rich	986784	.58	.493	0	1
Religion	.	.	.	.	.
- Hindus	986784	.766	.423	0	1
- Muslims	986784	.124	.33	0	1
- Christians	986784	.062	.242	0	1
- Sikhs	986784	.022	.147	0	1
- Buddhists	986784	.012	.109	0	1
- Others	986784	.013	.112	0	1
en's Dataset:-					
Age	204647	32.103	11.097	15	54
Location Type	.	.	.	.	.
- Rural	204647	.709	.454	0	1
- Urban	204647	.291	.454	0	1
Wealth Index	.	.	.	.	.
- Poor	204647	.389	.487	0	1
- Middle or rich	204647	.611	.487	0	1
Religion	.	.	.	.	.
- Hindus	204647	.758	.428	0	1
- Muslims	204647	.129	.336	0	1
- Christians	204647	.063	.243	0	1
- Sikhs	204647	.023	.15	0	1
- Buddhists	204647	.014	.118	0	1
- Others	204647	.013	.111	0	1
istrict-level Controls:-					
Nightlights	994993	-7.813	37.551	-1962.703	65.334

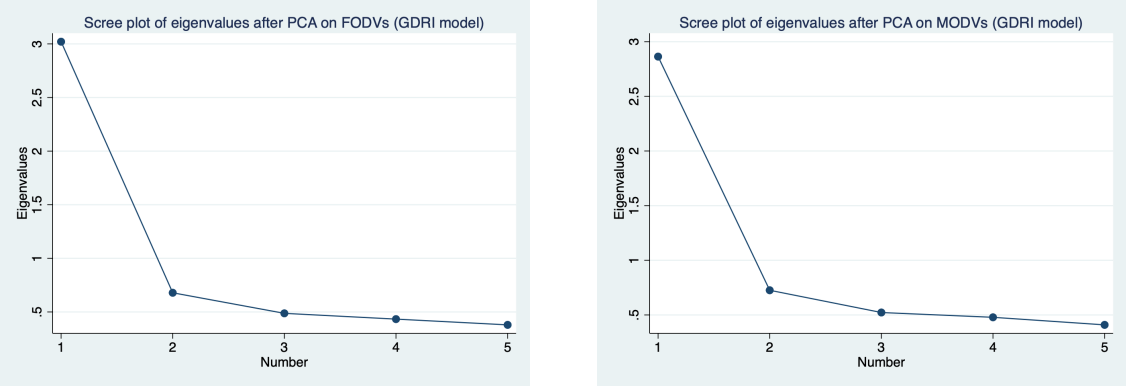

Figure A1.1: Scree plots from the PCAs carried out for the GDRI model

Table A1.2: Kaiser-Meyer-Olkin (KMO) measures for the PCA on women's and men's opinions on domestic violence (ODV)

ODV Variable	**Women**	**KMO**	**Men**	**KMO**
Beating justified if wife goes out without telling husband	F_ODVa	0.8390	M_ODVa	0.8241
Beating justified if wife neglects children	F_ODVb	0.8181	M_ODVb	0.8022
Beating justified if wife argues with husband	F_ODVc	0.8413	M_ODVc	0.8340
Beating justified if wife refuses to have sex with husband	F_ODVd	0.8514	M_ODVd	0.8388
Beating justified if wife doesn't cook food properly	F_ODVe	0.8538	M_ODVe	0.8407
	Overall	0.8395	Overall	0.8264

Table A1.3: Factor Loadings of the PCA run on Women's and Men's Opinions on Domestic Violence in GDRI model

Variable	**Eigenvector of Component 1**	**Unexplained**
omen:-		
Beating justified if wife goes out without telling husband (F_ODVa)	0.452	0.382
Beating justified if wife neglects children (F_ODVb)	0.463	0.353
Beating justified if wife argues with husband (F_ODVc)	0.469	0.334
Beating justified if wife refuses to have sex with husband (F_ODVd)	0.418	0.473
Beating justified if wife doesn't cook food properly (F_ODVe)	0.432	0.437
en:-		
Beating justified if wife goes out without telling husband (M_ODVa)	0.459	0.397
Beating justified if wife neglects children (M_ODVb)	0.469	0.370
Beating justified if wife argues with husband (M_ODVc)	0.464	0.383
Beating justified if wife refuses to have sex with husband (M_ODVd)	0.410	0.518
Beating justified if wife doesn't cook food properly (M_ODVe)	0.431	0.469

Table A1.4: Regression Results of GDRI on Domestic Violence Experienced by Women (Pooled OLS without District FE)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
VARIABLES	**DVZI**	**Any DV**	**Physical DV**	**Emotional DV**	**Sexual DV**
GDRI	-0.339***	-0.0164**	-0.0129*	-0.00637	-0.00273
	(0.0699)	(0.00767)	(0.00747)	(0.00405)	(0.00310)
Constant	-0.0838	0.389***	0.343***	0.149***	0.104***
	(0.144)	(0.0201)	(0.0194)	(0.0119)	(0.00931)
Observations	47,565	36,107	36,107	36,107	36,107
R-squared	0.187	0.028	0.029	0.010	0.009
X Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

X is the vector of control variables constituting

individual religion, age, location type, wealth index and district nightlights.

Table A1.5: Regression Results of GDRI on Men's Opinions on DV (Pooled OLS without District FE)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**MODVI**	**MODVa**	**MODVb**	**MODVc**	**MODVd**	**MODVe**
GDRI	-0.0661**	-0.00964*	-0.0292***	-0.00738	-0.00541	-0.000989
	(0.0335)	(0.00563)	(0.00871)	(0.00663)	(0.00485)	(0.00568)
Constant	0.562***	0.239***	0.303***	0.307***	0.134***	0.150***
	(0.0796)	(0.0147)	(0.0195)	(0.0162)	(0.0120)	(0.0131)
Observations	47,565	47,565	47,565	47,565	47,565	47,565
R-squared	0.015	0.008	0.016	0.014	0.007	0.008
X Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.6: Regression Results of GDRI on Women's Opinions on DV (Pooled OLS without District FE)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**WODVI**	**FODVa**	**FODVb**	**FODVc**	**FODVd**	**FODVe**
GDRI	-0.155***	-0.0362***	-0.0528***	-0.0234***	-0.0139***	-0.0143**
	(0.0440)	(0.0113)	(0.0149)	(0.00782)	(0.00531)	(0.00599)
Constant	0.551***	0.325***	0.409***	0.366***	0.182***	0.233***
	(0.0983)	(0.0246)	(0.0312)	(0.0191)	(0.0132)	(0.0150)
Observations	47,565	47,565	47,565	47,565	47,565	47,565
R-squared	0.039	0.025	0.031	0.033	0.014	0.023
X Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.7: Summary Statistics by wave of Gender Disparity (male to female ratio) in Highest Education Level (HEL), Literacy, Employment, Household Decision Making, Diabetes Medication and Blood Pressure Medication

	NFHS-4		**NFHS-5**	
	Obs	**Mean**	**Obs**	**Mean**
HEL GD	58967	1.274	54137	1.192
Literacy GD	58967	1.282	54137	1.222
Employment GD	58960	3.991	54075	3.559
HDM GD	58967	1.242	54137	1.174
Diabetes Medication GD	58671	1.752	53795	1.705

BP Medication GD	58955	.862	54001	.984

Table A1.8: Summary Statistics by region of Gender Disparity (male to female ratio) in Highest Education Level (HEL), Literacy, Employment, Household Decision Making, Diabetes Medication and Blood Pressure Medication

	East		North		North East		South		West	
	Obs	Mean	Obs	Mean	Obs	Mean	Obs	Mean	Obs	Mean
HEL GD	25966	1.284	16444	1.244	19328	1.171	21407	1.143	29959	1.293
Literacy GD	25966	1.298	16444	1.249	19328	1.204	21407	1.171	29959	1.306
Employment GD	25936	3.927	16444	3.988	19321	3.562	21407	3.549	29927	3.861
HDM GD	25966	1.241	16444	1.224	19328	1.154	21407	1.176	29959	1.234
Diabetes Medication GD	25664	1.897	16438	1.29	19203	1.898	21407	1.676	29754	1.759
BP Medication GD	25931	0.933	16438	0.823	19250	0.916	21407	1.011	29930	0.9

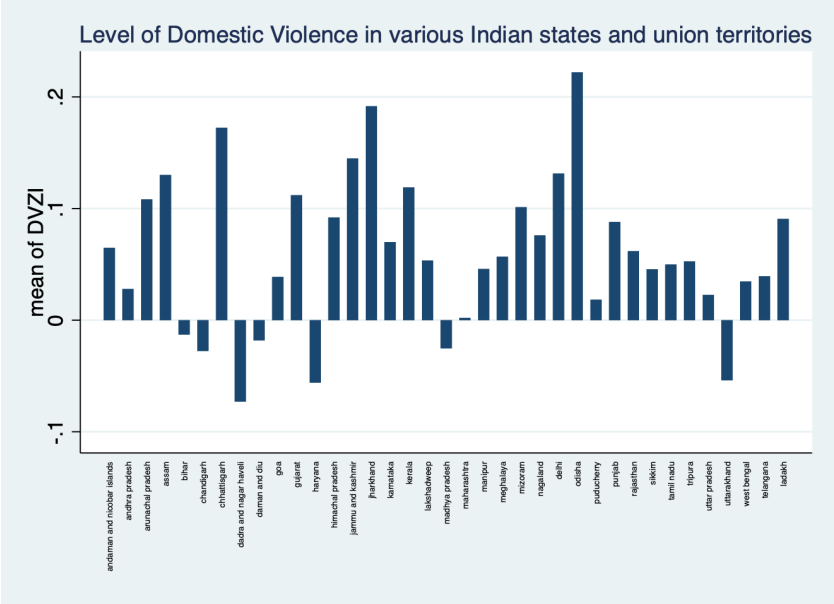

Figure A1.2: Distribution of DVZI across Indian States

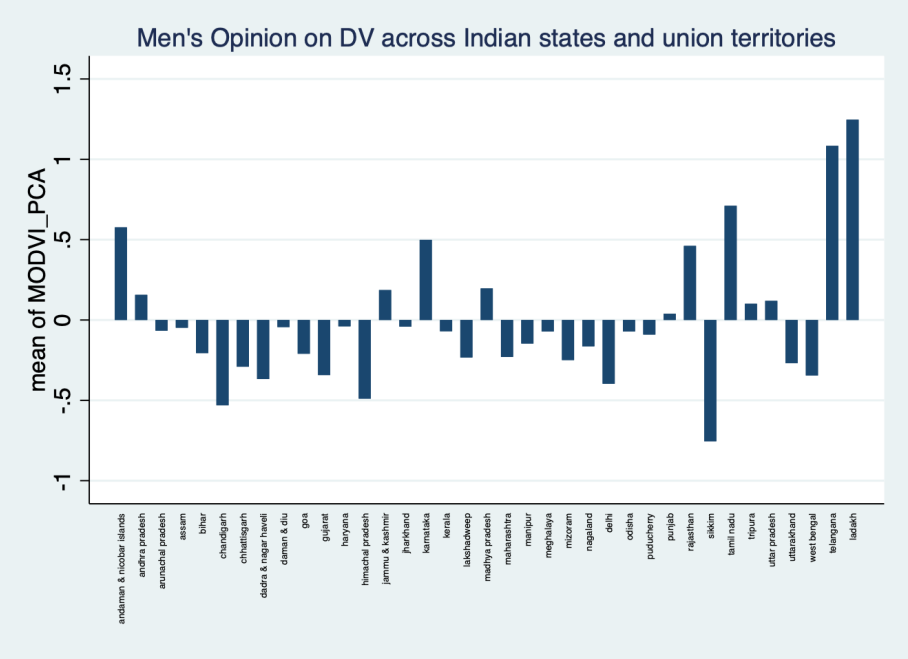

Figure A1.3: Distribution of men's opinion on domestic violence, given by MODVI, across the states

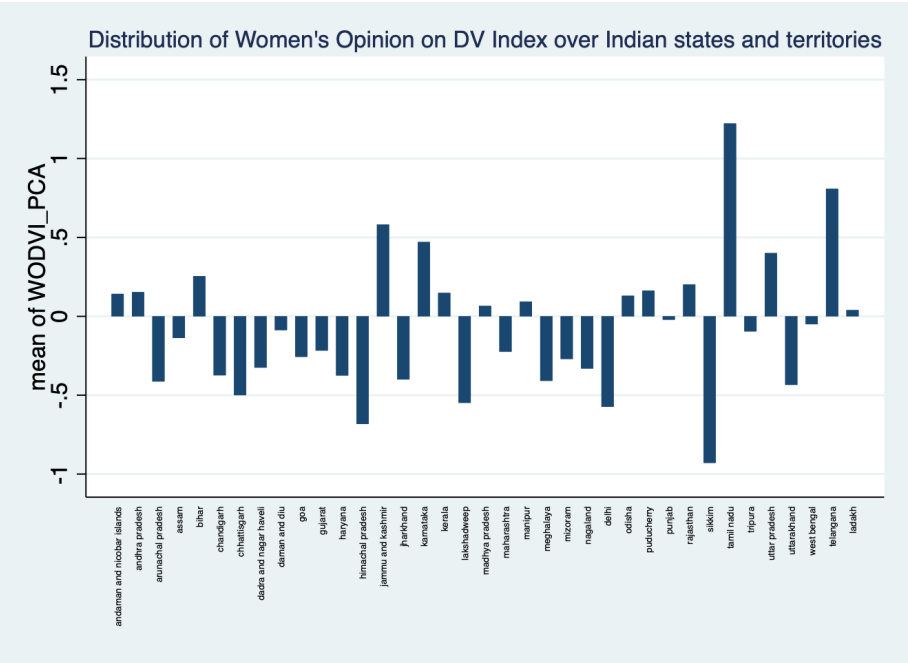

Figure A1.4: Distribution of women's opinion on domestic violence, given by WODVI, across the states

Table A1.9: Association of Gender Disparity in the Education Dimension with Domestic Violence Experiences

	(1)	(2)	(3)	(4)	(5)
Variables	**DVZI**	**Any DV**	**Physical DV**	**Emotional DV**	**Sexual DV**
Gender Disparity in Highest Education Level	-0.00615	0.0820	0.102	-0.0300	0.0331
	(0.00588)	(0.0651)	(0.0650)	(0.0410)	(0.0334)

Gender Disparity in Literacy	-0.00739	0.0620	0.0657	0.00698	0.0279
	(0.00459)	(0.0496)	(0.0524)	(0.0250)	(0.0288)
Gender Disparity in Education (Weighted Average)	-0.00820	0.0821	0.0934	-0.00770	0.0353
	(0.00567)	(0.0605)	(0.0627)	(0.0326)	(0.0339)
Constant	-0.267***	0.0176	-0.0352	0.120**	0.00410
	(0.00790)	(0.0801)	(0.0798)	(0.0530)	(0.0415)
Observations	47,849	36,347	36,347	36,347	36,347
R-squared	1.000	0.097	0.097	0.046	0.042
X Controls	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.10: Association of Gender Disparity in the Health Dimension with Domestic Violence Experiences

	(1)	(2)	(3)	(4)	(5)
Variables	**DVZI**	**Any DV**	**Physical DV**	**Emotional DV**	**Sexual DV**
Gender Disparity in Diabetes medication use	0.000464**	-0.000975	-0.00111	0.00254	-0.00292***
	(0.000206)	(0.00256)	(0.00281)	(0.00156)	(0.000981)
Gender Disparity in blood pressure medication use	-0.000729	-0.00376	-0.00356	-0.00582	-0.00331
	(0.000490)	(0.00718)	(0.00717)	(0.00453)	(0.00268)
Gender Disparity in Health	0.000242	-0.00249	-0.00251	-0.00129	-0.00781**
	(0.000580)	(0.00854)	(0.00876)	(0.00613)	(0.00306)
Constant	-0.275***	0.119***	0.0900***	0.0830***	0.0460***
	(0.00142)	(0.0235)	(0.0235)	(0.0163)	(0.0125)
Observations	47,592	36,130	36,130	36,130	36,130
R-squared	1.000	0.097	0.098	0.046	0.043
X Controls	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.11: Association of Gender Disparity in the Employment Dimension with Domestic Violence Experiences

	(1)	(2)	(3)	(4)	(5)
Variables	**DVZI**	**Any DV**	**Physical DV**	**Emotional DV**	**Sexual DV**
Gender Disparity in Employment	0.000801***	0.00123	0.00225	-0.000202	-0.00322**
	(0.000243)	(0.00558)	(0.00518)	(0.00303)	(0.00141)
Constant	-0.277***	0.115***	0.0825***	0.0852***	0.0543***
	(0.00138)	(0.0310)	(0.0304)	(0.0184)	(0.0132)
Observations	47,780	36,288	36,288	36,288	36,288
R-squared	1.000	0.096	0.097	0.046	0.043
X Controls	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes

Year FE	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.12: Association of Gender Disparity in the Dimension of Household Decision Making with Domestic Violence Experiences

	(1)	(2)	(3)	(4)	(5)
Variables	**DVZI**	**Any DV**	**Physical DV**	**Emotional DV**	**Sexual DV**
Gender Disparity in Household decision making	-0.00695**	0.0701	0.0517	0.0521*	0.0232
	(0.00324)	(0.0469)	(0.0461)	(0.0289)	(0.0192)
Constant	-0.265***	0.0198	0.0168	0.0108	0.0122
	(0.00505)	(0.0708)	(0.0697)	(0.0449)	(0.0315)
Observations	47,849	36,347	36,347	36,347	36,347
R-squared	1.000	0.097	0.097	0.046	0.042
X Controls	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.13: Association of Gender Disparity (GD) in the Dimension of Education (Edu), which is the weighted average (WA) of the constituting sub-indicators Highest Education Level (HEL) and Literacy (Lit) Level with Women's Opinions on Domestic Violence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	**Beating justified if wife goes out without telling husband (F_ODVa)**	**Beating justified if wife neglects children (F_ODVb)**	**Beating justified if wife argues with husband (F_ODVc)**	**Beating justified if wife refuses to have sex with husband (F_ODVd)**	**Beating justified if wife doesn't cook food properly (F_ODVe)**	**Beating justified in any of five scenarios (WODV)**	**PCA Index of Women's Opinions on DV (WODVI)**
HEL GD	-0.00405	0.115*	0.0446	-0.0318	-0.00157	0.0702	0.121
	(0.0578)	(0.0682)	(0.0659)	(0.0386)	(0.0441)	(0.0789)	(0.260)
Constant	0.394***	0.173*	0.340***	0.240***	0.166***	0.352***	0.350
	(0.0766)	(0.0888)	(0.0831)	(0.0466)	(0.0539)	(0.100)	(0.325)
Observations	47,849	47,849	47,849	47,849	47,849	47,849	47,849
R-squared	0.127	0.161	0.107	0.057	0.078	0.163	0.143
Lit GD	0.0233	0.0541	0.0123	0.00836	-0.0139	-0.0186	0.0894
	(0.0389)	(0.0415)	(0.0366)	(0.0271)	(0.0308)	(0.0495)	(0.152)
Constant	0.362***	0.251***	0.381***	0.192***	0.180***	0.460***	0.395**
	(0.0518)	(0.0565)	(0.0482)	(0.0325)	(0.0382)	(0.0672)	(0.197)
Observations	47,849	47,849	47,849	47,849	47,849	47,849	47,849
R-squared	0.127	0.161	0.107	0.057	0.078	0.163	0.143
Edu WA GD	0.0157	0.0904	0.0285	-0.00745	-0.0111	0.0164	0.119
	(0.0514)	(0.0559)	(0.0526)	(0.0333)	(0.0389)	(0.0644)	(0.210)
Constant	0.370***	0.206***	0.361***	0.210***	0.177***	0.419***	0.356
	(0.0674)	(0.0735)	(0.0665)	(0.0396)	(0.0472)	(0.0836)	(0.263)
Observations	47,849	47,849	47,849	47,849	47,849	47,849	47,849
R-squared	0.127	0.161	0.107	0.057	0.078	0.163	0.143
X Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.14: Association of Gender Disparity (GD) in the Health dimension, which is the weighted average (WA) of the constituting sub-indicators Diabetes (Diab) medication use and Blood Pressure (BP) medication use with Women's Opinions on Domestic Violence

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Variables	**Beating justified if wife goes out without telling husband (F_ODVa)**	**Beating justified if wife neglects children (F_ODVb)**	**Beating justified if wife argues with husband (F_ODVc)**	**Beating justified if wife refuses to have sex with husband (F_ODVd)**	**Beating justified if wife doesn't cook food properly (F_ODVe)**	**Beating justified in any of five scenarios (WODV)**	**PCA Index of Women's Opinions on DV (WODVI)**
Diab GD	0.00413	0.00441	0.00482	0.00266*	0.00212	0.00574	0.0203
	(0.00321)	(0.00331)	(0.00342)	(0.00154)	(0.00202)	(0.00434)	(0.0133)
Constant	0.391***	0.317***	0.398***	0.204***	0.166***	0.443***	0.512***
	(0.0200)	(0.0230)	(0.0202)	(0.0139)	(0.0172)	(0.0263)	(0.0849)
Observations	47,617	47,617	47,617	47,617	47,617	47,617	47,617
R-squared	0.127	0.161	0.107	0.056	0.078	0.163	0.143
BP GD	-9.40e-05	0.00217	0.00241	-0.00231	0.00321	-0.00227	0.00560
	(0.00567)	(0.00625)	(0.00559)	(0.00426)	(0.00431)	(0.00694)	(0.0202)
Constant	0.390***	0.314***	0.395***	0.203***	0.162***	0.441***	0.499***
	(0.0207)	(0.0232)	(0.0205)	(0.0140)	(0.0175)	(0.0266)	(0.0859)
Observations	47,740	47,740	47,740	47,740	47,740	47,740	47,740
R-squared	0.127	0.161	0.107	0.056	0.078	0.163	0.143
GD Health WA	0.00531	0.00894	0.00824	0.00296	0.00626	0.00652	0.0352
	(0.00661)	(0.00746)	(0.00721)	(0.00475)	(0.00534)	(0.00827)	(0.0270)
Constant	0.388***	0.313***	0.394***	0.201***	0.163***	0.439***	0.494***
	(0.0202)	(0.0229)	(0.0202)	(0.0138)	(0.0174)	(0.0262)	(0.0849)
Observations	47,592	47,592	47,592	47,592	47,592	47,592	47,592
R-squared	0.127	0.161	0.107	0.056	0.078	0.163	0.143
X Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.15: Association of Gender Disparity (GD) in the Dimension of Employment (Emp) Status with Women's Opinions on Domestic Violence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	**Beating justified if wife goes out without telling husband (F_ODVa)**	**Beating justified if wife neglects children (F_ODVb)**	**Beating justified if wife argues with husband (F_ODVc)**	**Beating justified if wife refuses to have sex with husband (F_ODVd)**	**Beating justified if wife doesn't cook food properly (F_ODVe)**	**Beating justified in any of five scenarios (WODV)**	**PCA Index of Women's Opinions on DV (WODVI)**
Emp GD	-0.00358	-0.00937*	-0.00645*	0.000892	-0.00116	-0.01000	-0.0209
	(0.00348)	(0.00490)	(0.00390)	(0.00291)	(0.00412)	(0.00608)	(0.0199)
Constant	0.399***	0.341***	0.414***	0.199***	0.167***	0.468***	0.558***
	(0.0234)	(0.0277)	(0.0249)	(0.0175)	(0.0227)	(0.0353)	(0.113)
Observations	47,780	47,780	47,780	47,780	47,780	47,780	47,780
R-squared	0.127	0.161	0.107	0.056	0.077	0.163	0.143
X Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.16: Association of Gender Disparity (GD) in the Dimension of Household Decision-making (HDM) with Women's Opinions on Domestic Violence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	**Beating justified if wife goes out without telling husband (F_ODVa)**	**Beating justified if wife neglects children (F_ODVb)**	**Beating justified if wife argues with husband (F_ODVc)**	**Beating justified if wife refuses to have sex with husband (F_ODVd)**	**Beating justified if wife doesn't cook food properly (F_ODVe)**	**Beating justified in any of five scenarios (WODV)**	**PCA Index of Women's Opinions on DV (WODVI)**
HDM GD	0.0231	-0.0212	0.00414	0.0306	0.0314	-0.00707	0.0838
	(0.0341)	(0.0408)	(0.0339)	(0.0263)	(0.0306)	(0.0423)	(0.141)
Constant	0.357***	0.343***	0.389***	0.159***	0.120**	0.448***	0.381*
	(0.0531)	(0.0600)	(0.0501)	(0.0427)	(0.0470)	(0.0698)	(0.222)
Observations	47,849	47,849	47,849	47,849	47,849	47,849	47,849
R-squared	0.127	0.161	0.107	0.057	0.078	0.163	0.143
X Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.17: Association of Gender Disparity (GD) in the Dimension of Education (Edu), which is the weighted average (WA) of the constituting sub-indicators Highest Education Level (HEL) and Literacy (Lit) Level with Men's Opinions on Domestic Violence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	**Beating justified if wife goes out without telling husband (M_ODVa)**	**Beating justified if wife neglects children (M_ODVb)**	**Beating justified if wife argues with husband (M_ODVc)**	**Beating justified if wife refuses to have sex with husband (M_ODVd)**	**Beating justified if wife doesn't cook food properly (M_ODVe)**	**Beating justified in any of five scenarios (MODV)**	**PCA Index of Men's Opinions on DV (MODVI)**
HEL GD	-0.00907	0.0188	0.0301	-0.0246	-0.0293	-0.0456	-0.0322
	(0.0519)	(0.0676)	(0.0604)	(0.0356)	(0.0474)	(0.0830)	(0.287)
Constant	0.278***	0.307***	0.328***	0.209***	0.215***	0.546***	0.848**
	(0.0688)	(0.0866)	(0.0742)	(0.0464)	(0.0601)	(0.103)	(0.366)
Observations	47,849	47,849	47,849	47,849	47,849	47,849	47,849
R-squared	0.086	0.125	0.081	0.061	0.070	0.130	0.118
Lit GD	0.0216	0.0173	0.0361	0.0426	-0.00364	-0.0215	0.150
	(0.0327)	(0.0443)	(0.0447)	(0.0364)	(0.0327)	(0.0598)	(0.195)
Constant	0.241***	0.310***	0.323***	0.130***	0.183***	0.515***	0.636**
	(0.0443)	(0.0593)	(0.0554)	(0.0440)	(0.0447)	(0.0764)	(0.261)
Observations	47,849	47,849	47,849	47,849	47,849	47,849	47,849
R-squared	0.086	0.125	0.081	0.061	0.070	0.130	0.118
Edu WA	0.0123	0.0211	0.0401	0.0214	-0.0154	-0.0358	0.0983
	(0.0435)	(0.0565)	(0.0514)	(0.0397)	(0.0396)	(0.0719)	(0.234)
Constant	0.252***	0.304***	0.317***	0.153***	0.198***	0.532***	0.692**
	(0.0577)	(0.0736)	(0.0631)	(0.0493)	(0.0522)	(0.0905)	(0.306)
Observations	47,849	47,849	47,849	47,849	47,849	47,849	47,849
R-squared	0.086	0.125	0.081	0.061	0.070	0.130	0.118
X Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.18: Association of Gender Disparity (GD) in the Dimension of Health, which is the weighted average (WA) of the constituting sub-indicators diabetes (Diab) and blood pressure (BP) medication use, with Men's Opinions on Domestic Violence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	**Beating justified if wife goes out without telling husband (M_ODVa)**	**Beating justified if wife neglects children (M_ODVb)**	**Beating justified if wife argues with husband (M_ODVc)**	**Beating justified if wife refuses to have sex with husband (M_ODVd)**	**Beating justified if wife doesn't cook food properly (M_ODVe)**	**Beating justified in any of five scenarios (MODV)**	**PCA Index of Men's Opinions on DV (MODVI)**
Diab GD	-6.10e-05	-0.00265	-0.00311	0.000823	-0.00178	-0.00192	-0.00841
	(0.00270)	(0.00357)	(0.00332)	(0.00134)	(0.00224)	(0.00463)	(0.0154)
Constant	0.266***	0.328***	0.364***	0.179***	0.179***	0.489***	0.805***
	(0.0185)	(0.0210)	(0.0211)	(0.0137)	(0.0163)	(0.0268)	(0.0935)
Observations	47,617	47,617	47,617	47,617	47,617	47,617	47,617
R-squared	0.086	0.125	0.081	0.060	0.070	0.130	0.117
BP GD	0.0108*	0.00773	0.00473	-0.00134	0.00821**	0.00964	0.0392

	(0.00612)	(0.00596)	(0.00499)	(0.00425)	(0.00407)	(0.00757)	(0.0272)
Constant	0.260***	0.325***	0.362***	0.180***	0.175***	0.484***	0.786***
	(0.0185)	(0.0210)	(0.0214)	(0.0138)	(0.0160)	(0.0271)	(0.0932)
Observations	47,740	47,740	47,740	47,740	47,740	47,740	47,740
R-squared	0.086	0.125	0.081	0.060	0.069	0.130	0.117
Health WA	0.00927	0.00234	-0.000412	7.17e-05	0.00400	0.00458	0.0203
	(0.00783)	(0.00936)	(0.00833)	(0.00506)	(0.00622)	(0.0114)	(0.0408)
Constant	0.263***	0.329***	0.365***	0.179***	0.179***	0.488***	0.803***
	(0.0186)	(0.0215)	(0.0214)	(0.0137)	(0.0161)	(0.0273)	(0.0936)
Observations	47,592	47,592	47,592	47,592	47,592	47,592	47,592
R-squared	0.086	0.125	0.081	0.060	0.069	0.130	0.117
X Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.19: Association of Gender Disparity (GD) in the Dimension of Employment (Emp) Status with Men's Opinions on Domestic Violence

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Variables	**Beating justified if wife goes out without telling husband (M_ODVa)**	**Beating justified if wife neglects children (M_ODVb)**	**Beating justified if wife argues with husband (M_ODVc)**	**Beating justified if wife refuses to have sex with husband (M_ODVd)**	**Beating justified if wife doesn't cook food properly (M_ODVe)**	**Beating justified in any of five scenarios (MODV)**	**PCA Index of Men's Opinions on DV (MODVI)**
Emp GD	0.00561	0.00492	0.00580	0.00289	0.00699**	0.00594	0.0347
	(0.00357)	(0.00388)	(0.00417)	(0.00349)	(0.00311)	(0.00529)	(0.0218)
Constant	0.250***	0.315***	0.347***	0.170***	0.158***	0.472***	0.703***
	(0.0202)	(0.0213)	(0.0234)	(0.0156)	(0.0172)	(0.0276)	(0.102)
Observations	47,780	47,780	47,780	47,780	47,780	47,780	47,780
R-squared	0.085	0.125	0.081	0.060	0.070	0.130	0.117
X Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting
religion, age, location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

Table A1.20: Association of Gender Disparity (GD) in the Dimension of Household Decision Making (HDM) with Men's Opinions on Domestic Violence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	**Beating justified if wife goes out without telling husband (M_ODVa)**	**Beating justified if wife neglects children (M_ODVb)**	**Beating justified if wife argues with husband (M_ODVc)**	**Beating justified if wife refuses to have sex with husband (M_ODVd)**	**Beating justified if wife doesn't cook food properly (M_ODVe)**	**Beating justified in any of five scenarios (MODV)**	**PCA Index of Men's Opinions on DV (MODVI)**
HDM GD	-0.0111	-0.0404	-0.0481	-0.00926	-0.0258	-0.0457	-0.172
	(0.0313)	(0.0409)	(0.0396)	(0.0304)	(0.0292)	(0.0512)	(0.196)
Constant	0.282***	0.386***	0.432***	0.192***	0.215***	0.554***	1.050***
	(0.0491)	(0.0602)	(0.0642)	(0.0460)	(0.0449)	(0.0810)	(0.303)
Observations	47,849	47,849	47,849	47,849	47,849	47,849	47,849
R-squared	0.086	0.125	0.081	0.061	0.070	0.130	0.118
X Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:- Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*
X is the vector of control variables constituting religion, age,
location type and wealth index taken at individual level.
I also control for district-level infrastructural development using nightlights data.

A2. Paper 2 Appendix

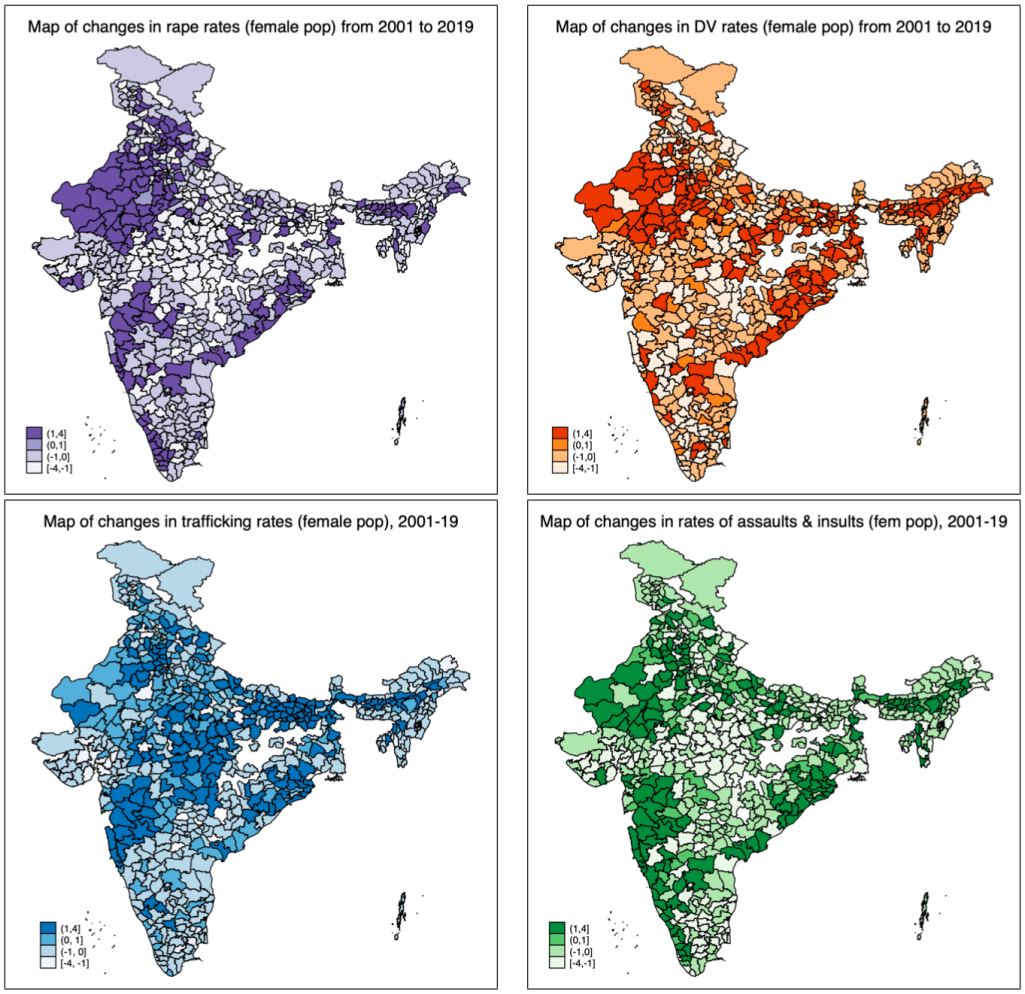

Figure A2.1: Changes in rates of rapes, DV, trafficking and assaults and insults (logarithm per 100,000 females) are plotted on maps of India

Table A2.1: Summary Statistics of VAW per person rates and percentages

VAW Measures	Obs	Mean	Std. Dev.	Min	Max
VAW rates (log per 100,000 persons of total population):-					
Rate of Total VAW	2662	2.601	.764	.009	6.715
Rape rate	2666	.61	.652	0	5.636
DV rate	2666	1.536	.914	0	5.4
Trafficking rate	2666	.843	.764	0	5.368
Rate of assaults and insults	2666	1.308	.891	0	5.374
VAW percentages (per 100 persons of total population):-					
VAW percent (total)	2666	.018	.026	0	.824
Rape percent (total)	2666	.002	.006	0	.28
DV percent (total)	2666	.007	.01	0	.221

Trafficking percent (total)	2666	.003	.006	0	.214
Assaults and Insults percent (total)	2666	.006	.009	0	.216
VAW percentages (per 100 persons of female population):-					
VAW percent (female)	2666	.038	.052	0	1.546
Rape percent (female)	2666	.005	.011	0	.526
DV percent (female)	2666	.015	.02	0	.444
Trafficking percent (female)	2666	.007	.012	0	.402
Assaults and Insults percent (female)	2666	.011	.017	0	.448

Table A2.2: Region-wise and Year-wise Summary Statistics of SRB

SRB	Obs	Mean	SD	Min	Max
SRB Region-wise:-					
North	2106	112.186	7.861	95.62	143.749
West	2157	110.21	7.221	95.673	129.864
East	2580	107.697	6.468	91.457	128.706
North-east	2766	107.958	7.098	88.267	126.164
South	2766	107.261	7.083	91.315	129.976
SRB Year-wise:-					
2001	481	109.112	7.202	91.315	143.749
2002	450	109.071	7.143	91.315	143.749
2003	452	109.079	7.127	91.315	143.749
2004	452	109.078	7.163	91.315	143.749
2005	451	109.061	7.151	91.315	143.749
2006	455	109.049	7.131	91.315	143.749
2007	450	109.089	7.13	91.315	143.749
2008	448	109.077	7.146	91.315	143.749
2009	454	109.08	7.172	91.315	143.749
2010	452	109.13	7.159	91.315	143.749
2011	484	109.145	7.1	91.315	143.749
2012	452	109.115	7.169	91.315	143.749
2013	451	109.114	7.142	91.315	143.749
2014	443	109.123	7.191	91.315	143.749
2015	442	109.175	7.195	91.315	143.749
2016	439	109.159	7.178	91.315	143.749
2017	429	109.227	7.175	91.315	143.749
2018	428	109.294	7.17	91.315	143.749
2019	435	109.209	7.155	91.315	143.749

Table A2.3: Results of Poisson Regressions run on VAW percentages with FSPI as predictor variables

	(1)	(2)	(3)	(4)	(5)
District Average Variables	**VAW percent**	**DV percent**	**Rape percent**	**Percent of Assaults & Insults**	**Trafficking percent**
Weighted FSPI (interpolated)	8.352	17.76***	1.861	41.23	-2.656
	(9.336)	(5.377)	(6.372)	(0)	(14.60)
Constant	-3.330***	-4.125***	-5.312***	-4.198	-4.116***
	(0.109)	(0.135)	(0.167)	(0)	(0.146)
Observations	2,468	2,468	2,468	2,468	2,468
X controls	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes

Year FE	Yes	Yes	Yes	Yes	Yes
District Trends	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

Table A2.4: Results of Poisson Regressions run on VAW measures (log of rates per 100,000 total population in districts) with FSPI and SRB as predictor variables

	(1)	(2)	(3)	(4)	(5)
District Average Variables	**VAW rate**	**DV rate**	**Rape rate**	**Rate of assaults & insults**	**Trafficking rate**
Weighted SRB	0.0435*	0.0401	0.00182	0.346***	0.0819*
	(0.0223)	(0.0274)	(0.00778)	(0.0399)	(0.0441)
Constant	-0.302***	-0.202***	-0.241***	0.907***	-0.114***
	(0.0146)	(0.0302)	(0.0670)	(0.0874)	(0.0377)
Observations	4,501	4,388	4,122	4,211	4,391
Weighted FSPI (interpolated)	7.383**	13.85***	3.135	81.05	7.782
	(3.654)	(4.022)	(7.787)	(0)	(7.426)
Constant	-0.253***	-0.0496	0.0453	1.031	0.0774
	(0.0440)	(0.0899)	(0.202)	(0)	(0.0962)
Observations	2,468	2,428	2,205	2,283	2,387
X controls	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
District trends	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

Table A2.5: Results of Poisson Regressions run on VAW percentages with SRB as predictor variables

	(1)	**(2)**	**(3)**
District Average Variables	**VAW percent**	**Percent of Assaults & Insults**	**Trafficking percent**
Weighted SRB	0.0188***	0.169	0.0993**
	(0.00495) (0)	(0.0491)	

Constant	-3.332***	-4.211	-4.299***
	(0.0375)	(0)	(0.0618)
Observations	4,517	4,476	4,490
X controls	Yes	Yes	Yes
District FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
District Trends	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

Table A2.6: Summary Statistics of the Son Preference Indices for the Uninterpolated model and MSPI/ CSPI model

Variables	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Uninterpolated Model:-					
weighted FSPI	793	.351	.224	-.015	1.007
MSPI/ CSPI Model:-					
weighted FSPI	1713	.094	.051	-.008	.247
weighted MSPI	1713	.084	.04	-.072	.23
weighted CSPI	1713	1.029	3.592	-66.35	29.192

Table A2.7: Results of Poisson Regressions run on VAW measures with interpolated and weighted CSPI

	(1)	**(2)**	**(3)**	**(4)**
Variables	**VAW rate**	**DV rate**	**Rape rate**	**Trafficking rate**
Weighted CSPI	30.19	86.84	-71.53	87.42
	(0)	(0)	(0)	(0)

Constant	-0.127	-4.329	10.21	1.030
	(0)	(0)	(0)	(0)
Observations	1,394	1,320	1,241	1,282
X controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
District trends	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

Table A2.8: Results of Poisson Regressions run for the un-interpolated model, i.e., regressions on VAW measures with FSPI not interpolated for missing values in intermittent years

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Female Population	**VAW rate**	**DV rate**	**Rape rate**	**Rate of assaults & insults**	**Trafficking rate**
Weighted FSPI	12.03	15.62	49.49	-3.913	58.11
	(0)	(0)	(0)	(14.33)	(0)
Constant	-0.399	-0.277	-0.661	0.453	0.151
	(0)	(0)	(0)	(0.548)	(0)
Observations	619	599	533	541	580
X controls	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
District Trends	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

Table A2.9: Heterogeneous Tests Results for SRB around 2012 year: the year of "Nirbhaya" incident

	(1a)	**(1b)**	**(2a)**	**(2b)**	**(3a)**	**(3b)**
District Variables (yr 2012)	**VAW rate (pre 2012)**	**VAW rate (post 2012)**	**DV rate (pre 2012)**	**DV rate (post 2012)**	**Trafficking rate (pre 2012)**	**Trafficking rate (post 2012)**
weighted SRB	-0.0211	0.0320	0.0334	0.123**	-0.140	0.130
	(0)	(0.0269)	(0)	(0.0488)	(0)	(0.118)
Observations	2,244	2,216	2,201	2,172	2,129	2,093
X Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
District Trends	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

Table A2.10: Heterogeneous Tests Results for SRB around the median of district female population with or without primary level of education

	(1)	(2)	(3)	(4)
District Variables (Primary Education)	**VAW rate (<= median)**	**VAW rate (>median)**	**Rape rate (<= median)**	**Rape rate (>median)**
weighted SRB	0.0306***	-0.0336	0.897	0.0300
	(0.00517)	(0)	(0)	(0.0187)
Constant	-0.366***	-0.199	-0.461	0.246
	(0.0121)	(0)	(0)	(0.198)
Observations	2,263	2,210	2,203	2,191
X Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
District Trends	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

Table A2.11: Heterogeneous Tests Results for FSPI around the median of district female population with or without primary level of education

	(1)	**(2)**
District Variables (Primary Education)	**VAW rate (<= median)**	**VAW rate (>median)**
weighted FSPI (interpolated)	6.191***	-13.10
	(1.359)	(0)
Constant	-0.450***	-0.200
	(0.0761)	(0)
Observations	1,110	1,339
X Controls	Yes	Yes
District FE	Yes	Yes
Year FE	Yes	Yes
District Trends	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

Table A2.12: Heterogeneous Tests Results around the states divided into different regions for weighted sex ratio at birth (SRB)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	Rates of Violence	Against Women	(per 100,000	persons per	district)
Region	**West**	**South**	**North**	**East**	**North-East**
VAW rate:-					
SRB	0.204***	0.0127***	-0.0144***	0.0874***	-0.0226***
	(0.0230)	(0.00230)	(0.00445)	(0.0265)	(0.00608)
Constant	-0.431***	-0.274***	-0.480***	-0.349***	-0.278***
	(0.0623)	(0.0198)	(0.0305)	(0.0491)	(0.0160)
Observations	789	1,070	665	736	1,077
DV rate:-					
SRB	0.198**	0.0153***	-0.0178	-	0.0164*
	(0.0773)	(0.00559)	(0.0164)	-	(0.00915)
Constant	-0.406***	-0.214***	-0.255***	-	0.162***
	(0.103)	(0.0494)	(0.0837)	-	(0.0290)

Observations	789	1,065	665	-	1,071
Rape rate:-					
SRB	-	0.00688	0.0219	0.0296	-0.107***
	-	(0.0101)	(0.0232)	(0.0318)	(0.0176)
Constant	-	-0.184**	-0.0700	-0.507**	-0.313***
	-	(0.0920)	(0.150)	(0.236)	(0.0643)
Observations	-	1,056	665	721	1,077
Trafficking rate:-					
SRB	0.684***	-	-0.0352***	-	-0.423***
	(0.117)	-	(0.0123)	-	(0.0581)
Constant	0.107	-	0.421***	-	0.562***
	(0.285)	-	(0.109)	-	(0.0673)
Observations	786	-	662	-	1,054
Rate of assaults & insults:-					
SRB	0.536***	0.00705	-0.0521***	0.0445	-0.128***
	(0.164)	(0.00511)	(0.0147)	(0.0909)	(0.0152)
Constant	0.0506	0.0174	-0.119	0.252	-0.317***
	(0.0984)	(0.0401)	(0.0893)	(0.167)	(0.0705)
Observations	789	1,070	665	702	1,072
X Controls	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
District Trends	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

Table A2.13: Heterogeneous Tests Results around the states divided into different regions for weighted women's son preference index (FSPI)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	Rates of Violence	Against Women	(per 100,000	persons per	district)
Region	**West**	**South**	**North**	**East**	**North-East**
VAW rate:-					
weighted FSPI	-0.989	59.91**	-4.061***	43.74	-3.602
	(0.848)	(28.80)	(0.745)	(0)	(2.221)
Constant	-0.413***	-0.0698	0.118	-0.765	-0.405***
	(0.122)	(0.0518)	(0.171)	(0)	(0.0637)
Observations	557	895	318	285	303
DV rate:-					
weighted FSPI	-1.259	158.5**	-2.620	444.6	2.037
	(1.429)	(80.61)	(2.603)	(0)	(2.529)
Constant	-0.478**	0.278***	1.238*	1.290	-0.0246
	(0.194)	(0.104)	(0.676)	(0)	(0.0961)
Observations	557	895	318	**277**	303
Rape rate:-					
weighted FSPI	7.425**	-	-32.27***	9.656	-10.47**
	(3.044)	-	(10.74)	(96.96)	(4.495)
Constant	-0.343	-	0.778	-0.542	-1.007***

	(0.326)	-	(1.244)	(1.006)	(0.345)
Observations	550	-	318	285	303
Trafficking rate:-					
weighted FSPI	0.274	-	-17.37***	-82.95	-20.82*
	(2.432)	-	(2.830)	(0)	(12.50)
Constant	0.540	-	1.081**	0.0326	1.734***
	(0.489)	-	(0.541)	(0)	(0.270)
Observations	557	-	318	285	303
Rate of assaults & insults:-					
weighted FSPI	0.386	41.74	-9.284***	-	-13.75***
	(1.662)	(55.37)	(2.653)	-	(3.139)
Constant	-0.133	0.196	1.073**	-	-0.225*
	(0.279)	(0.121)	(0.480)	-	(0.131)
Observations	557	893	318	-	303
X Controls	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
District Trends	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

Table A2.14: Results of Regressions run on Dowry Deaths for FSPI in various models

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Variables	**Dowry deaths (Female Pop)**	**Dowry deaths (Total Pop)**	**Dowry deaths (lagged model)**	**Dowry deaths (CSPI model)**	**Dowry deaths (MSPI model)**
weighted FSPI	-5.018	-15.65**	-1.261	86.72	684.8
	(4.149)	(6.731)	(0)	(0)	(0)
Constant	-0.308	-0.560	-0.2588	-0.765	-9.651
	(0.497)	(1.413)	(0)	(0)	(0)
Observations	1,310	511	178	500	500
X controls	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
District Trends	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of district-level controls including women's age and education level; men's age and education level; and household demographics like location type and religion are also controlled for. District nightlights are used to control for district level economic development.

A3. Paper 3 Appendix

A3.1. Tables and Graphs

CONTROL MOVIES	ALL	HABRA	SANTOSHPUR	SONARPUR
Week 1 movie		Hawaaizada	'83	Rosogolla
Week 2 movie		'83	Rosogolla	Hawaaizada
Week 3 movie		Rosogolla	Daal, baati, churma	'83
Week 4 movie		Daal, baati, churma	Hawaaizada	Daal, baati, churma
Participants	90	36	19	34

Table A3.1.1: Distribution of no. of participants by the movie show attended in the control group across centres and in total

TREATMENT MOVIES	ALL	HABRA	SANTOSHPUR	SONARPUR
Week 1 movie		Shakuntala Devi	Shabaash Mithu	Mukherjeedar Bou
Week 2 movie		Shabaash Mithu	Mukherjeedar Bou	Shakuntala Devi
Week 3 movie		Mukherjeedar Bou	Sweater	Shabaash Mithu
Week 4 movie		Sweater	Shakuntala Devi	Sweater
Participants	93	24	23	46

Table A3.1.2: Distribution of no. of participants by the movie show attended in the treatment group across centres and in total

Table A3.1.3: Distribution by other demographical factors of the main sample of 123 participants

	Habra	Santoshpur	Sonarpur
Age:-			
- 18-35	57.14	34.78	37.25
- 36-50	28.57	21.74	25.49
- 51-70	10.20	39.13	29.41
- others	4.08	4.35	7.84
Gender:-			
- Male	8.33	40.91	33.33
- Female	91.67	59.09	66.67
Marital Status:-			
- Married	75.51	56.52	78.43
- Unmarried	24.49	43.48	21.57
Household Income:-			
- <20,000	71.43	47.83	76.47
- >20,000	8.16	30.43	9.80
- can't say	20.41	21.74	13.73

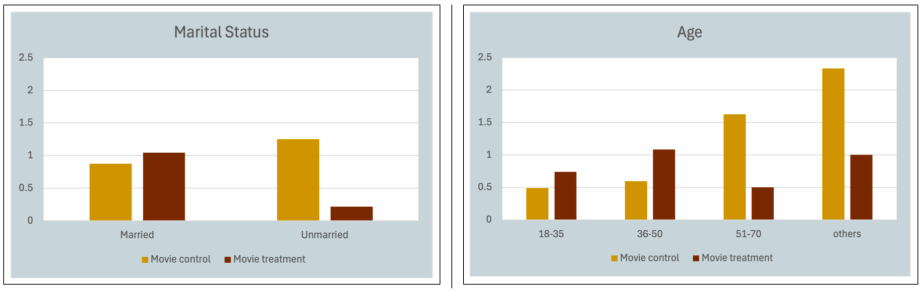

Figure A3.1.1: Additional graphs about mean differences for list survey on GB norms for 123 participants (main sample)

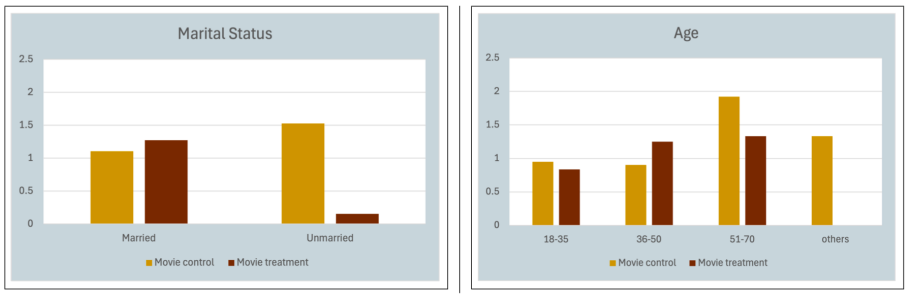

Figure A3.1.2: Additional graphs about mean differences for list survey on VAW for 123 participants (main sample)

Table A3.1.4: Table reporting results of balance tests of various variables of interest in the Main Model of 123 participants

		(1) Control		(2) Treatment		(1)-(2) Pairwise t-test
Variable	N	Mean/(SE)	N	Mean/(SE)	N	Mean difference
No. of items chosen for list 1	65	3.846	53	3.943	118	-0.097
		(0.157)		(0.144)		
No. of items chosen for list 2	65	3.877	53	3.792	118	0.084
		(0.140)		(0.148)		
place	70	1.971	53	2.075	123	-0.104
		(0.111)		(0.120)		
age	70	2.043	53	1.717	123	0.326*
		(0.121)		(0.115)		
gender	69	0.725	52	0.788	121	-0.064
		(0.054)		(0.057)		
highest education level	70	1.943	53	2.057	123	-0.114

		(0.086)		(0.087)		
literacy	70	3.971	53	3.868	123	0.104
		(0.209)		(0.260)		
employment	70	1.671	53	1.717	123	-0.046
		(0.090)		(0.106)		
caste	70	2.186	53	2.415	123	-0.229
		(0.126)		(0.125)		
household income	70	1.500	53	1.472	123	0.028
		(0.093)		(0.110)		
marital status	70	1.286	53	1.245	123	0.040
		(0.054)		(0.060)		

Treatment movie characters	**HABRA**	**SANTOSHPUR**	**SONARPUR**
"Shakuntala Devi" characters:-			
"Anupama Banerjee"	8.33	13.04	21.74
"Paritosh Banerjee"	8.33	34.78	8.7
"Shakuntala Devi"	41.67	13.04	54.35
"Tarabai"	4.17	-	-
none of these	33.33	39.13	-
others	4.17	-	4.35
"Shabaash Mithu" characters:-			
"BCCI Chairperson"	-	-	2.17
"Coach Sampath"	20.83	8.7	13.04
"Jhorna Ghosh"	4.17	4.35	8.7
"Mithali Raj"	54.17	13.04	65.96
none of these	20.83	69.57	-
others	-	4.35	2.17
"Mukherjeedar Bou" characters:-			
"Aditi Mukherjee"	54.17	21.74	57.45
"Putul Das"	4.17	17.39	4.35
"Shashwata Mukherjee"	8.33	13.04	6.52
"Shobharani Mukherjee"	20.83	4.35	10.87
none of these	12.5	39.13	19.15
others	-	4.35	2.17
"Sweater" characters:-			
"Gouri Sen"	8.33	4.35	17.02
"Pablo"	4.17	4.35	4.35
"Shamyo"	4.17	17.39	10.87
"Tuku"	62.5	34.78	60.87
none of these	20.83	34.78	6.38
others	-	4.35	2.17

Table A3.1.5: Picture Game Summary Statistics:- Distribution of no. of participants (Percent) who related with the characters of the movie shows they attended in the treatment group across centres and in total

Mean no. of list survey statements	**Female Participants**	**Male Participants**
Question on GB norms and participants relating with women characters fighting GB norms	3.6	5
Question on GB norms and participants relating with women characters fighting VAW Attitudes	4.364	5

Mean no. of list survey statements	Female Participants	Male Participants
Question on VAW Attitudes and participants relating with women characters fighting GB norms	4	4
Question on VAW Attitudes and participants relating with women characters fighting VAW Attitudes	3	0

Table A3.1.6: Women and Men from the movie treatment group who relate to characters fighting Gender Biased Norms and Violence Against Women and respond to the sensitive statements in the list surveys

Table A3.1.7: Distribution of Treatment Group Participants (Percent) who witnessed discrimination, the basis on which the discrimination was and respond to how the frequency of the discrimination evolved over the past one month following the treatment across centres and in total

Witnessed Discrimination (Treatment)	ALL	HABRA	SANTOSHPUR	SONARPUR
- No	77.42	75	65.22	84.78
- Yes	20.43	25	30.43	13.04
- Prefer not to say	2.15	-	4.35	2.17
if yes, then on what basis (Treatment)				
- Education level	2.15	-	4.35	2.17
- Income	3.23	-	8.71	2.17
- Language/ place of origin	1.08	-	4.35	-
- Occupation	6.45	8.33	-	8.7
- Income/ education	1.08	-	4.35	-
- Others	2.15	4.17	4.35	-
- Prefer not to say	5.38	12.5	4.35	2.17
Freq and development of witness in last 1 month (Treatment)				
- Not in the past one month, but I have witnessed before	9.68	33.33	4.35	-
- Yes, I have witnessed and it has increased over the past one month	2.15	-	8.7	-
- Yes, I have witnessed it just like before, but I stood up for the person being mistreated/ discriminated against which I couldn't do before and therefore; the frequency of such incidents have decreased.	3.23	4.17	8.7	-
- Yes, I have witnessed, but it is same as before	1.08	-	-	2.17
- Yes, I have witnessed, but it was less in the past one month	6.45	-	4.35	10.87
- others	1.08	-	4.35	-
- prefer not to say	1.08	-	-	2.17

Table A3.1.8: Distribution of Treatment Group Participants (Percentage) who experienced discrimination, the basis on which the discrimination was and respond to how the frequency of the discrimination evolved over the past one month across centres and in total

Experienced discrimination (Treatment)	ALL	HABRA	SANTOSHPUR	SONARPUR
- No	82.8	83.33	86.96	80.43
- Yes	15.05	16.67	8.7	17.39
- prefer not to say	2.15	-	4.35	2.17
If yes, then on what basis (Treatment)				
- Caste	1.08	4.17	-	-
- Education level	2.15	-	-	4.35
- Gender	1.08	-	-	2.17
- Income	3.22	-	8.69	2.17
- Occupation	5.37	8.69	-	6.52
- others	1.08	4.17	-	-
- prefer not to say	6.45	12.5	4.35	4.35

Table A3.1.8: Distribution of Treatment Group Participants (Percentage) who experienced discrimination, the basis on which the discrimination was and respond to how the frequency of the discrimination evolved over the past one month across centres and in total

Experienced discrimination (Treatment)	**ALL**	**HABRA**	**SANTOSHPUR**	**SONARPUR**
Frequency and development of experience in last 1 month (Treatment)				
- Yes, I have faced and it has decreased over the past one month	3.23	-	-	6.52
- Yes, I have faced and it has increased over the past one month	4.3	-	4.35	6.52
- Yes, I have faced and it has remained the same	3.23	-	4.35	4.35
- Yes, I have faced it just like before, but I stood up for myself which I couldn't do before and therefore the frequency of such incidents have decreased.	1.08	4.17	-	-
- Yes, I have not faced in the past one month, but have faced before	6.45	20.83	4.35	-
- prefer not to say	2.15	4.17	-	2.17

Table A3.1.9: Design effects test results

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Variables	**R0S1**	**R0S0**	**R1S1**	**R1S0**	**R2S1**	**R2S0**	**R3S1**	**R3S0**	**R4S1**	**R4S0**
Q1 (GB Norms)										
Constant	0.0351	0	0.0889**	-0.0187	0.0595	-0.00690	0.118	0.0224	0.639***	0.0624
	(0.0244)	(1.12e-06)	(0.0438)	(0.0293)	(0.0615)	(0.0557)	(0.0781)	(0.0690)	(0.0615)	(0.0863)
Observations	118	118	118	118	118	118	118	118	118	118
Q2 (VAW)										
Constant	0.0175	-0	0.0877**	-0.0175	0.161***	-0.0385	0.240***	-0.0466	0.574***	0.0227
	(0.0174)	(1.75e-06)	(0.0375)	(0.0174)	(0.0607)	(0.0466)	(0.0804)	(0.0719)	(0.0633)	(0.0907)
Observations	118	118	118	118	118	118	118	118	118	118

Table A3.1.10: Linear Least Squares model results for main sample with and without bootstrap

	Non-linear Least Squares (with Bootstrap)				**Non-linear Least Squares (without Bootstrap)**			
	List Survey Question on Gender Biased Attitudes (Q1)		**List Survey Question on Attitudes towards VAW (Q2)**		**List Survey Question on Gender Biased Attitudes (Q1)**		**List Survey Question on Attitudes towards VAW (Q2)**	
Variables	**Delta**	**Gamma**	**Delta**	**Gamma**	**Delta**	**Gamma**	**Delta**	**Gamma**
Edutainment x List	0.0467	-0.158	-0.0643	-0.205	0.110	-0.215	-0.179	-0.243
	(0.591)	(0.497)	(0.520)	(0.427)	(0.451)	(0.348)	(0.426)	(0.358)
Constant	-0.570	3.505***	0.453	4.304***	0.435	2.415***	2.531***	2.979***
	(1.546)	(0.962)	(1.103)	(0.831)	(1.182)	(0.824)	(0.962)	(0.791)
Observations	116	116	116	116	116	116	116	116
X Controls x List	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of individual-level controls including age, gender, marital status, centre location, highest education level, employment status, income-level and number of weeks attended. All predictor variables are interacted with list treatment assignment.

Table A3.1.11: Non-Linear Least Squares model results for main sample with and without bootstrap

	Non-linear Least Squares (with Bootstrap)				**Non-linear Least Squares (without Bootstrap)**			
	List Survey Question on Gender Biased Attitudes (Q1)		**List Survey Question on Attitudes towards VAW (Q2)**		**List Survey Question on Gender Biased Attitudes (Q1)**		**List Survey Question on Attitudes towards VAW (Q2)**	
Variables	**Delta**	**Gamma**	**Delta**	**Gamma**	**Delta**	**Gamma**	**Delta**	**Gamma**
Edutainment x List	3.297	-0.552	123.0	-2.047	3.297	-0.552	123.0***	-2.047**
	(8,528)	(649.5)	(284,807)	(247.8)	(41.87)	(0.760)	(6.245)	(0.957)
Constant	-52.06	5.800	1.77	4.437	-52.06	5.800***	1.770	4.437***
	(2.118e+20)	(1,276)	(284,680)	(262.5)	(79.40)	(2.223)	(1.624)	(1.589)
Observations	116	116	116	116	116	116	116	116
X Controls x List	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of individual-level controls including age, gender, marital status, centre location, highest education level, employment status, income-level and number of weeks attended. All predictor variables are interacted with list treatment assignment.

Table A3.1.12: LM model results for larger sample without protection

	List Survey Question on Gender Biased Attitudes (Q1)			**List Survey Question on Attitudes regarding VAW (Q2)**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Delta (Δ)	**Psi0 (ψ_0)**	**Psi1 (ψ_1)**	**Delta (Δ)**	**Psi0 (ψ_0)**	**Psi1 (ψ_1)**
Edutainment x List	1.049**	0.729	-3.022***	0.141	0.527	-0.187
	(0.523)	(0.499)	(0.935)	(0.562)	(0.558)	(0.356)
Constant	1.258	1.244	4.393***	1.486	0.856	2.793***
	(1.020)	(1.064)	(1.422)	(1.272)	(1.315)	(0.745)
Observations	177	177	177	177	177	177
X Controls x List			Yes			Yes

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. X is a vector of individual-level controls including age, gender, marital status, centre location, highest education level, employment status, income-level and number of weeks attended. All predictor variables are interacted with list treatment assignment.

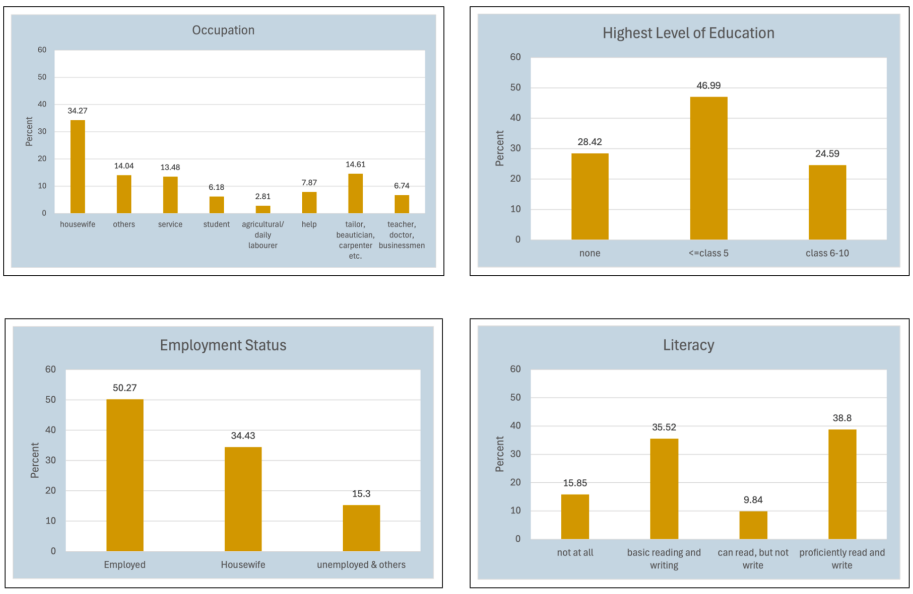

Figure A3.1.3: Bar-graphs showing Distribution of participants by different demographical characteristics for the larger sample of 183 participants

Table A3.1.13: Summary Statistics of the demographics of the people who didn't attend all 4 weeks of the movie screenings but attended the end survey

	Habra		Santoshpur		Sonarpur		Total	
	Freq.	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**
Age:-								
- 18-35	9	75.00	3	17.65	7	22.58	19	31.67
- 36-50	1	8.33	3	17.65	9	29.03	13	21.67
- 51-70	1	8.33	10	58.82	12	38.71	23	38.33
- others	1	8.33	1	5.88	3	9.68	5	8.33
Gender:-								
- Male	1	9.09	3	17.65	5	17.86	9	16.07
- Female	10	90.91	14	82.35	23	82.14	47	83.93
Marital Status:-								
- Married	11	91.67	12	70.59	24	77.42	47	78.33
- Unmarried	1	8.33	5	29.41	7	22.58	13	21.67
Employment:-								
- Employed	4	33.33	10	58.82	16	51.61	30	50.00
- Housewife	7	58.33	5	29.41	11	35.48	23	38.33
- Unemployed & others	1	8.33	2	11.76	4	12.90	7	11.67
Household Income:-								
- <20,000	11	91.67	8	47.06	16	51.61	35	58.33
- >20,000			6	35.29	6	19.35	12	20.00
- can't say	1	8.33	3	17.65	9	29.03	13	21.67
Highest Education Level:-								
- none	4	33.33			18	58.06	22	36.67
- <=class 5	8	66.67	4	23.53	8	25.81	20	33.33
- class 6-10			13	76.47	5	16.13	18	30.00
Literacy Level:-								
- not at all	2	16.67			11	35.48	13	21.67
- basic reading and writing	4	33.33	2	11.76	8	25.81	14	23.33
- can read, but not write	1	8.33	1	5.88	6	19.35	8	13.33
- proficiently read and write	5	41.67	14	82.35	6	19.35	25	41.67
Occupation:-								
- housewife	6	50.00	6	37.50	10	35.71	22	39.29
- others	1	8.33	3	18.75	7	25.00	11	19.64
- service			3	18.75	4	14.29	7	12.50
- agricultural/ daily labourer					1	3.57	1	1.79
- domestic help, cook	1	8.33			4	14.29	5	8.93

- tailor, beautician, carpenter etc.	3	25.00	1	6.25			4	7.14
- teacher, doctor, businessmen	1	8.33	3	18.75	2	7.14	6	10.71
Total	12	20.00	17	28.33	31	51.67	60	100

	Witnessed discrimination (Treatment)		**Experienced discrimination (Treatment)**	
If did:	**Treatment (Percent)**	**Control (Percent)**	**Treatment (Percent)**	**Control (Percent)**
May be		2.3		1.15
No	73.96	72.41	79.17	78.16
Yes	18.75	14.94	13.54	12.64
prefer not to say	7.29	10.34	7.29	8.05
If yes, then on what basis:				
NA	81.61	80.21	81.25	85.06
Caste			1.04	
Income, Education level	3.44	6.25	4.17	4.6
Gender			1.04	2.3
Occupation	2.3	6.25	5.21	2.3
Religion	1.15			
Locality where I reside	1.15			
Others	10.34	7.29	7.29	5.75
Frequency and development in last one month:				
NA	77.08	78.16	81.25	85.06
Not in the past one month, but I have done before.	9.38	2.3	6.25	2.3
Yes,I have and it has increased over the past one month	1.04	4.6	3.12	3.45
Yes,I have just like before, but I stood up which I couldn't do before and therefore the frequency of such incidents have decreased.	3.12	3.45	1.04	
Yes, I have, but it is same as before/	1.04	2.3	3.12	1.15
Yes,I have, but it has decreased in the past one month.	6.25	5.75	3.12	5.75
others	2.08	3.45	2.08	2.3

Table A3.1.14: Percentage of participants who reported witnessing and experiencing discrimination in the larger sample of 183 (from the direct questionnaire)

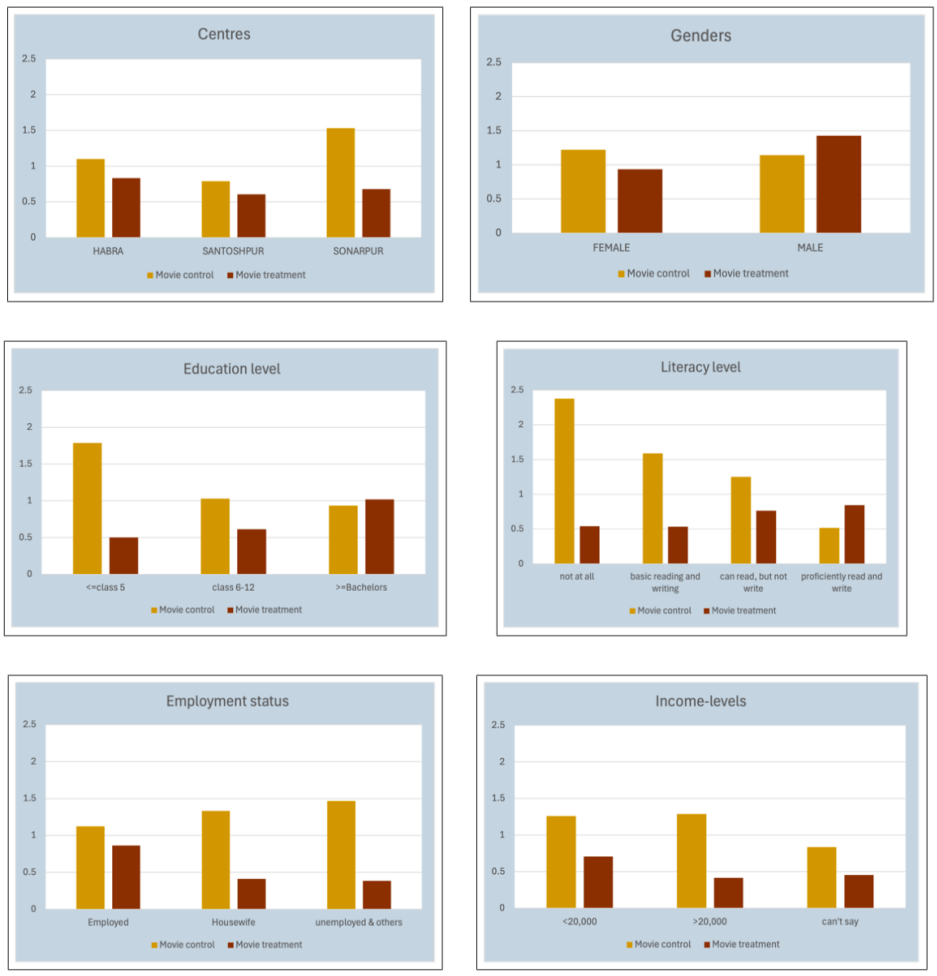

Figure A3.1.4: Graphs showing differences in the means of list survey questions on GB norms (Q1) within different demographical groups for the larger sample of 183 participants who completed attending the programme

	Total	Habra	Santoshpur	Sonarpur
- Participants relating to female characters facing violence (VAW)	3.25	2.04	8.70	1.96
- Participants relating to male characters inflicting violence	0.81	-	4.35	-
- Participants relating to female characters working towards women empowerment standing up against GB norms	37.40	34.69	34.78	41.18
- Participants relating to male characters fighting GB norms, supporting women empowerment	9.76	8.16	13.04	9.80

Table A3.1.15: Picture Game Results: Distribution of number (percentage) of participants who related with the characters of the movie shows they attended in the treatment group across centres and in total

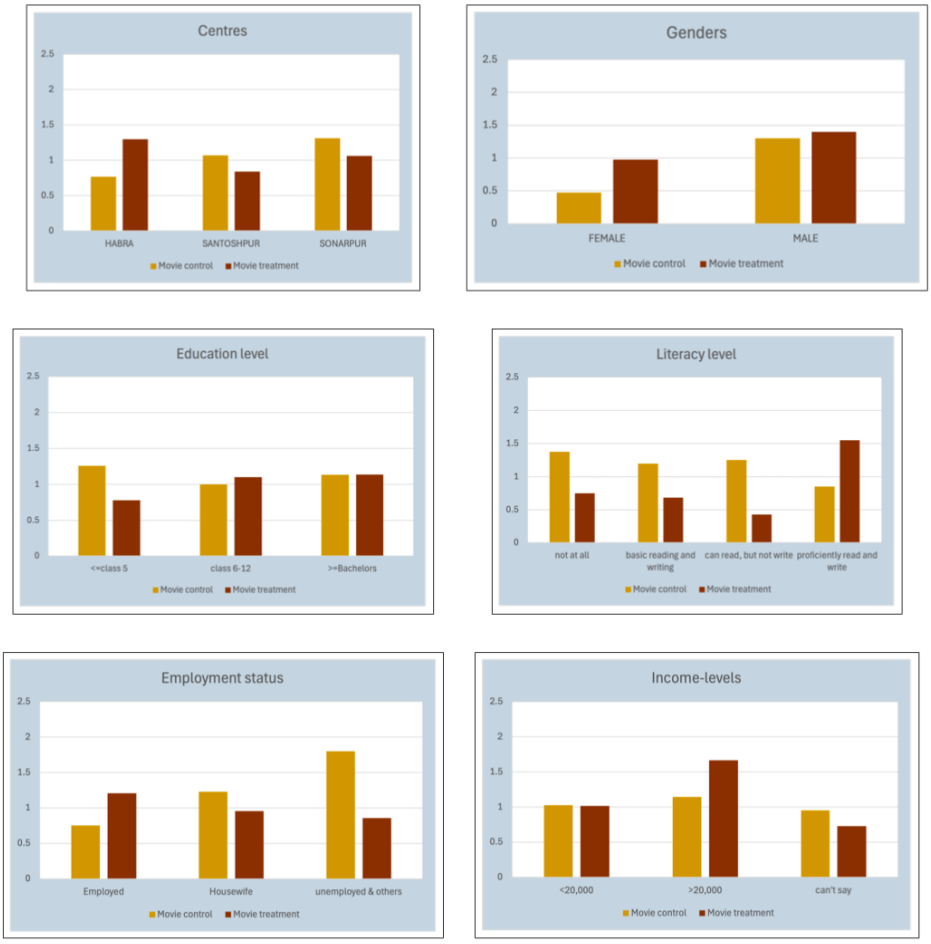

Figure A3.1.5: Graphs showing differences in the means of list survey questions on VAW attitudes (Q2) within different demographical groups for the larger sample of 183 participants who completed attending the programme

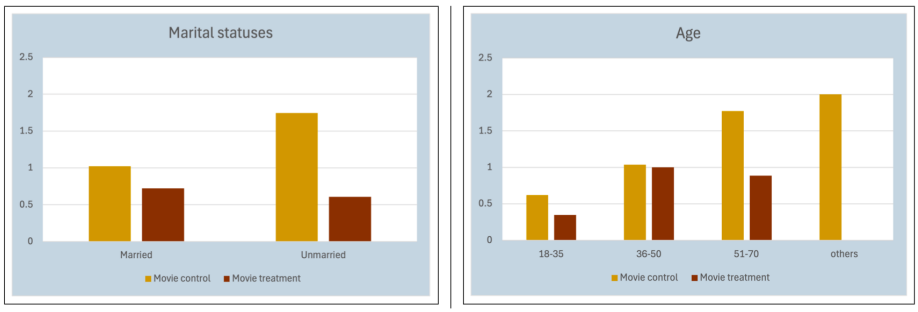

Figure A3.1.6: Additional graphs about mean differences for list survey on GB norms for all (183) participants

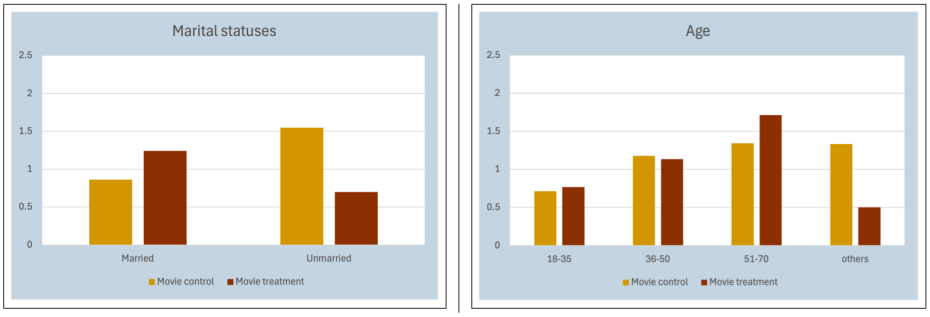

Figure A3.1.7: Additional graphs about mean differences for list survey on VAW attitudes for all (183) participants

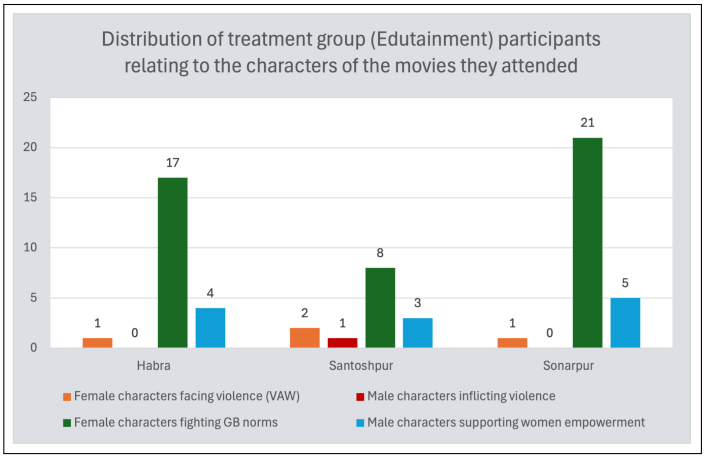

Figure A3.1.8: Bar-graph showing distribution of treatment group (Edutainment) participants (main sample of 123) relating to the characters of the movies

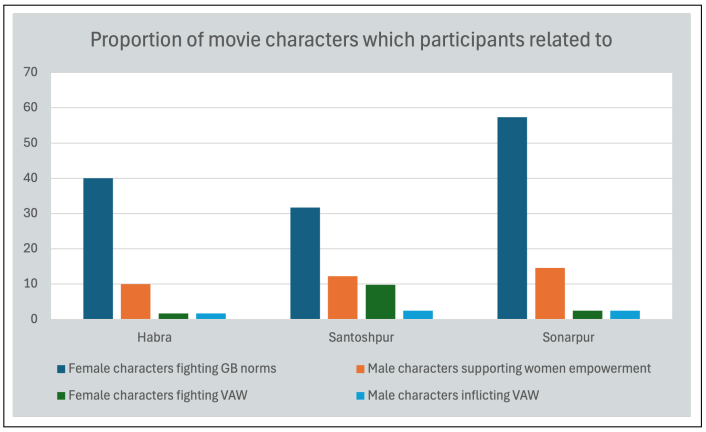

Figure A3.1.9: Bar-graph showing distribution of treatment group (Edutainment) participants in the larger sample of 183 relating to the characters of the movies

A3.2. Registration Form used in the Field

Registration Questionnaire

Please answer the following questions as part of the registration process before the movie screening.

* Indicates required question

1. Email *

2. Which of the following age-groups do you belong? *

Mark only one oval.

- 18-22
- 23-28
- 29-35
- 36-42
- 43-50
- 50-60
- 60-70
- >70
- Prefer not to say

3. What gender do you identify with? *

Mark only one oval.

- ◯ Female
- ◯ Male
- ◯ Prefer not to say
- ◯ Transgender
- ◯ Other: ___

4. If your response is "Other" in the previous question, please indicate what below, if possible.

_____

5. What is your mother language? *

Mark only one oval.

- ◯ Bengali
- ◯ Hindi
- ◯ English
- ◯ Prefer not to say
- ◯ Other: ___

6. If your mother language is "Other" in the previous question, please mention what language in the field below.

_____

7. Which language are you most comfortable to read and write in? *

Mark only one oval.

- ◯ Bengali
- ◯ Hindi
- ◯ English
- ◯ Prefer not to say
- ◯ Other: ___

8. If your response is "Other" in the previous question, please mention what language in the field below.

_____

9. What is your marital status?

Mark only one oval.

- ◯ Married
- ◯ Not married
- ◯ Divorced
- ◯ Widowed
- ◯ Prefer not to say
- ◯ Other: ___

10. If your response is "Other" in the previous question, please mention what below.

_____

11. What religion do you identify with? *

Mark only one oval.

- Hinduism
- Islam
- Sikhism
- Christianity
- Buddhism
- Don't subscribe to any religion
- Prefer not to say
- Other: ____

12. If your response is "Other" in the previous question, please mention what below.

_____

13. Which caste were you born to? *

Mark only one oval.

- General
- SC/ST
- OBC
- Prefer not to say
- Other: ____

14. If your response is "Other" in the previous question, please mention what below.

_____

15. Would you consider yourself as: *

Mark only one oval.

- ◯ Employed
- ◯ Student
- ◯ Self-employed
- ◯ Unemployed
- ◯ Informally employed
- ◯ Prefer not to say
- ◯ Looking for a job
- ◯ Other: ____

16. If your response is "Other" in the previous question, please mention what below.

_____

17. Which income group does your family belong to? *

Mark only one oval.

- ◯ No income
- ◯ < Rs. 10,000 per month
- ◯ 10,000-20,000 per month
- ◯ 20,001-35,000 per month
- ◯ 35,001-55,000 per month
- ◯ 55,001-75,000 per month
- ◯ 75,001-1,00,000 per month
- ◯ 1,00,000-1,50,000 per month
- ◯ > 1,50,000 per month
- ◯ Prefer not to say
- ◯ Other: _____

18. If your response is "Other" in the previous question, please specify below.

_____

19. Who is the main bread-earner in your family? *

Mark only one oval.

- ◯ Myself
- ◯ My husband
- ◯ My wife
- ◯ My father
- ◯ My mother
- ◯ Both my parents
- ◯ Both me and my spouse
- ◯ My sibling(s)
- ◯ Prefer not to say
- ◯ Other: _____

20. If your response is "Other" in the previous question, please mention who below, if possible.

_____

21. What is your current education level? *

Mark only one oval.

- None
- <= Class 5
- Class 6-10
- Passed Class 10/ Madhyamik
- Class 11-12
- Passed Class 12/ Uchhamadhyamik
- Polytechnique
- Undergraduate/ Bachelors
- Didn't complete bachelors degree
- Postgraduate/ Masters
- Didn't complete masters degree
- pursuing M.Phil, M.Phil
- pursuing PhD, research assistantship
- >= PhD
- Prefer not to say

22. How well can you read and write in your main language? *

Mark only one oval.

- Not at all
- Can read but not write
- Basic reading and writing
- Proficiently read and write
- Reading and writing difficulty due to disability
- Prefer not to say

23. What is your primary occupation? *

Mark only one oval.

- Student
- Service in industry
- Domestic help
- Cleaning
- Government/ Law enforcement official
- Business professional
- Greengrocer
- Doctor
- Nurse
- Aayah
- School-teacher
- Grocer
- Tailoring
- Teaching in Higher education level
- Farming
- Research
- Prefer not to say
- Other: ___

24. If your response is "Other" in the previous question, please mention what below.

_____

25. How would you describe the locality type where you reside in? *

Mark only one oval.

- ◯ Rural
- ◯ Urban
- ◯ Suburban
- ◯ Prefer not to say
- ◯ Other: _____

26. If your response is "Other" in the previous question, please mention what below.

_____

27. What do you like to do to entertain yourself? *

Tick all that apply.

- ☐ Watch TV
- ☐ Read storybook
- ☐ Listen to music
- ☐ Browse social networking sites like Facebook, Twitter, Instagram etc.
- ☐ Watch videos on Youtube etc.
- ☐ Watch movies/ web-series on OTT platforms like Netflix, Prime etc.
- ☐ Play outdoor games like football, badminton etc.
- ☐ Play indoor games like ludo, chess, cards, scrabble, antakshari etc.
- ☐ Singing/ playing instrument
- ☐ Dancing
- ☐ Working out at home/ gym, Yoga etc.
- ☐ Travel
- ☐ Go to the theatre/ cinema
- ☐ Go to a cultural programme, like music/ dance show etc.
- ☐ Prefer not to say
- ☐ Other: _____

28. If your response is "Other" in the previous question, please mention what below.

Thank you!