Female Political Representation and Violence Against Women: Evidence from Brazil*

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Abstract

This paper studies the effect of female political representation on violence against women. Using a Regression Discontinuity design for close mayoral elections between female and male candidates in Brazil, we find that electing female mayors leads to a reduction in episodes of gender violence. The effect is particularly strong when focusing on incidents that occurred in public spaces, when the aggressor is the ex-husband/boyfriend, when victims experienced psychological violence, and in cases involving sexual harassment. The evidence suggests that female mayors might implement different policies from male mayors and therefore contribute to reduce gender violence.

Keywords: Gender, Political Economy, Elections, Violence
JEL codes: D72, J16, P16, I18, H75, K42.

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1 Introduction

Despite significant progress in the last decades, violence against women remains a relevant problem worldwide. According to the World Health Organization, 1 in 3 women have experienced sexual or physical violence worldwide (World Health Organization, 2013). Victims of sexual violence are more likely to suffer anxiety, depression, insomnia, reproductive and gastrointestinal problems (Martin, Macy, and Young, 2011). Violence against women also produces a significant economic burden, since governments need to expend in health, justice and security. UN Women (2016) estimates that only domestic violence generates a productivity loss of 1.2% of the GDP in Brazil. It is therefore relevant to understand the mechanisms that can help reduce gender violence.

This article provides new evidence on the role of elected female mayors on violence against women. Our study focuses on Brazil, where gender violence is widespread. In 2017 there were 606 cases of domestic violence reported each day and 1,133 femicides occurred during that year (Fórum Brasilero de Segurança Pública, 2018). This rate is 48 times larger than the rate in the United Kingdom (Waiselfisz, 2015). Female politicians have also suffered from this wave of violence. Marielle Franco, a city councilwoman for Rio de Janeiro, was assassinated on March 14, 2018. She was a gay black activist who rallied against police brutality. Her death sparked protests in Rio and in other cities in Brazil, and has motivated other female politicians to run for office.[1]

We use administrative data on gender violence from the Brazilian Ministry of Health, taking advantage of a law promulgated in 2003 that established mandatory notification of all episodes regarding confirmed or suspected gender violence. These data, spanning through years 2005–2016, give not only information on the number of victims in each municipality, but also provides information on the type of violence, place of occurrence, or relationship with the aggressor. Combining this dataset with a database of mayoral electoral outcomes, we are able to estimate the effect of electing a female mayor on gender violence during her mandate.

Estimating this model by ordinary least squares might provide a biased estimate of the true effect. Municipalities less tolerant of the role of women in society might be prone to more violence against women and also less likely to elect a female mayor. To overcome this identification problem we use a regression discontinuity design (RD), restricting the analysis to races where the female candidate won by a narrow margin to races where the

[1] "A Year After Her Killing, Marielle Franco Has Become a Rallying Cry in a Polarized Brazil", The New York Times, March 14, 2019.

male candidate won by a narrow margin. This strategy has been used by Brollo and Troiano (2016) in the context of Brazilian elections to estimate the effect of a female mayor on corruption. To the best of our knowledge, we are the first to document the effect of electing a female mayor on violence against women.

The results show a large discrepancy between the raw correlations and the RD estimates: While on average female mayors do not have an effect on violence against women, when looking at contested elections we find that female mayors reduce overall violence against women by between 4 and 11 incidents per 10,000 women. The effect is sizeable, as it accounts for a reduction in violence of about 52 percent. The effect is particularly strong when focusing on incidents that occurred in public spaces, when the aggressor is the ex-husband/boyfriend, when victims experienced psychological violence, and in cases involving sexual harassment.

There are at least two possible mechanisms through which female mayors can have a negative effect on violence against women. First, female mayors might differ in their preferences regarding the role of police and prevention of violence against women. Second, these mayors can have a role model effect on other women, changing their attitudes and self-confidence and empowering them to act (Iyer, Mani, Mishra, and Topalova, 2012). There is, however, a third mechanism, in which the increase in political power of women alienates men, who feel that their position in society is diminished, and that it turn could lead to an escalation in violence against women. This phenomenon, known as male backlash, arises when women behave counterstereotypically (Rudman, 1998; Rudman and Phelan, 2008).[2] Despite notorious cases such as the one of Marielle Franco mentioned above, in none of our specifications we find an increase in violence against women after a female mayor is elected.

The evidence we find supports the preferences hypothesis. First, we show that the effect of female mayors on violence against women is larger towards the end of their term, suggesting that policies take time to be implemented. Second, we find that the effect is larger when there are more women in the city council. This result is consistent with the findings of Gagliarducci and Paserman (2012), who show that female mayors in Italy are less likely to be voted out by the council when there are more female councilors.

[2] Evidence from male backlash can be found in experimental settings, such as in Gangadharan, Jain, Maitra, and Vecci (2016), who show that men contribute less to a public good when women are group leaders, instead of men. A decrease in female unemployment is associated with an increase in intimate partner violence due to backlash (Bhalotra, Kambhampati, Rawlings, and Siddique, 2021; Tur-Prats, 2021). Backlash might also reduce the likelihood of women running for office (Bhalotra, Figueras, and Iyer, 2018).

Consistent with the preferences hypothesis, more women in the council make policies to tackle violence against women more likely to be implemented. Finally, we do not find an effect on accidents or suicides for women, and no effect on homicides or overall violence against men.

Our paper contributes to various strands of the literature. First, it contributes to the literature analyzing the effect of selecting women leaders on various outcomes. The seminal work of Chattopadhyay and Duflo (2004) shows that women heads of village councils invest more money on public goods relevant to women. Evidence indicates that women politicians have an effect in reducing neonatal deaths (Bhalotra and Clots-Figueras, 2014) and increasing child immunization (Beaman, Duflo, Pande, and Topalova, 2007). In education, female representation leads to improvement on academic achievement in rural contexts (Clots-Figueras, 2012) and expands girls school attendance (Beaman et al., 2007). Brollo and Troiano (2016) find that female mayors are less corrupt than male mayors. To the best of our knowledge, we are the first to show that female mayors can have an effect in reducing violence against women.

Second, our paper contributes to the literature that analyzes the determinants of violence against women, as well as the policies to reduce it. Aizer (2010) shows that reductions in the gender wage gap increase female bargaining power, which is associated to higher domestic violence. Anderberg and Rainer (2013) show that the relationship between a woman's relative wage and domestic abuse follows an inverted U-shape, highlighting the non-monotonic relationship between female empowerment and domestic violence. Culture, in the form of more traditional gender norms, can influence the likelihood of reporting incidents of violence against women (Gonzalez and Rodriguez-Planas, 2020). Iyer et al. (2012) show that increased political power might raise reporting of crimes against women, but do not find an effect on the incidence of such crimes. In our setting this empowerment comes from electing female majors rather than through reserved seats, thus our paper highlights the importance of political leadership in reducing violence against women.

Regarding policies to reduce violence against women, the literature has analyzed the effect of women police stations (Perova and Reynolds, 2017; Kavanaugh, Sviatschi, and Trako, 2019; Jassal, 2020; Amaral, Bhalotra, and Prakash, 2021) and female police officers (Miller and Segal, 2019), divorce laws (Stevenson and Wolfers, 2006; Brassiolo, 2016; García-Ramos, 2021), panic buttons (Tumen and Ulucan, 2020) and mass media campaigns (Cooper, Green, and Wilke, 2020). Since our results points to female majors enacting policies that reduce violence, we contribute to this literature by showing that electing female majors can offer a path to reducing gender-based violence.

The rest of the article is organized as follows: Section 2 presents the data and discusses the institutional context. In Section 3 we introduce the empirical strategy used in the paper. In Section 4 we explore the results, present robustness checks and analyze the possible mechanisms. Finally, Section 5 concludes.

2 Data and Institutional Context

2.1 Elections

Brazil is a presidential country and it is organized by a federal government, states and municipalities. Citizens vote for representation in every level through periodic elections.[3] In regard to the local administration, Brazil has 5,567 municipalities that are ruled by a mayor (*prefeito*) and a legislative body (*Câmara de vereadores*) elected directly by citizens. In municipalities with more than 200,000 voters, mayors are elected through a majority run-off rule. If the municipality has less than 200,000 voters, the election is solved through a plurality rule. This cases represent more than the 97% of the municipalities in Brazil.[4]

It is important to mention that Brazil has high political and economical decentralization (Souza, 2002). Local governments can collect taxes, promulgate laws and decide how to allocate the federal transfers they receive. Municipalities are in charge of the provision of several public goods and investment projects, such as health, education and infrastructure. Moreover, mayors have to propose, annually, a budget for the implementation of different programs and public policies. However, the local council can veto part of the proposal, so the mayor can only develop the programs and amounts approved. The legislative body can also create municipal laws and supervise the mayor's performance.

In this article, we focus on mayoral elections in 2008 and 2012 that were defined in the first round.[5] The elections' data and candidates' information come from the Superior Electoral Court (*Tribunal Superior Eleitoral*), the most important body in the brazilian electoral system.

[3] At a federal level, people vote for the president and for a federal parliament every four years. Moreover, each state has a legislative assembly voted periodically.
[4] See Fujiwara et al. (2011) to understand the effects of these rules in brazilian mayoral elections.
[5] The municipal mandates are: 2005-2008, 2009-2012 and 2013-2016.

2.2 Violence against women

The law 10,778 was promulgated during 2003 and establishes the compulsory notification of gender-based violence cases reported by either public or private health institutions. This same year the National Secretary of Politics for Women was created to improve legislation for women. In 2005, it introduced a phone line for gender violence victims (*Ligue 180*) available 24 hours a day. In 2006, the law *María da Penha* was promulgated to increase penalties, generate instruments for prevention and systematize the data on gender-based violence. In addition, the law 13,104 of 2015 establishes femicide as a crime.

Figure A1 in the Appendix shows trends in violence against women for each of the 5 regions in Brazil. In all regions we see that the number of cases reported per 10,000 women have increased over time, particularly for the Southeast. It is possible that reporting incidents of violence improved over time because of the law *María da Penha* described above. However, because the law implemented mandatory notification of cases, the increase in cases should come from those relatively less severe. Figure A2 in the Appendix shows trends over time by the type of violence. We see that psychological violence experienced a threefold increase, which is consistent with an increase in the likelihood of reporting. Physical violence, the most common type of violence, also experienced a threefold increase. Sexual violence has remained below 2 cases per 10,000 women since 2009, and relatively stable over the period.

The data on gender-based violence comes from the Ministry of Health's TABNET platform, where administrative data regarding morbidity, diseases and vitals statistics can be found. Within this platform, the Information System for Notification of Deseases, SINAN (*Sistema de Informação de Agravos de Notificação*) provides individual-level data on compulsory notification cases. We construct measures of violence against women such as physical and sexual violence, threats or harassment at the municipality level. The available data includes the municipality in which the case was notified and has information about the victim, like age, marital status and race. In addition, the database provides data on the suspected perpetrator, like relationship to the victim and alcohol use.

Data on female homicides were obtained from SIM (*Sistema de Informações sobre Mortalidade*) for years 2005-2016. It includes all homicides, and not only femicides. However, we consider the deaths caused by assault that are included in the categories X85-Y09[6] of the International Statistical Classification of Diseases and Related Health

[6] This category includes deaths caused by injuries inflicted by another person with intent to injure or kill, by any means (World Health Organization, 2016).

Problems (ICD-10).

3 Empirical Strategy

3.1 Identification

This paper studies the impact of female political representation on violence against women. So, we need to compare municipalities headed by women with municipalities headed by men and see if there are differences on violence outputs. However, the election is endogenous to local characteristics, thus comparing female mayors with male mayors will give bias estimations. For instance, voters can have attitudes towards women that benefit the triumph of a female mayor and, at the same time, that affect gender violence.

In order to find the effect of a female mayor on gender violence, we first estimate the following equation through Ordinary Least Squares (OLS):

$$Y_{it} = \alpha + \beta F_{it} + \mu_t + \varepsilon_{it}, \tag{1}$$

where Y_{it} is the average violence outcome in municipality i and time t, F_{it} equals 1 if the mayor is female, μ are time fixed effects and ε_{it} is the standard error clustered by municipality. Y_{it} is measured as the rate of hospital attention for violence per 10,000 women. This specification will give us the correlation between the gender of the mayor and violence against women, but it does not represent a causal effect. This is because, as mention earlier, the mayor's gender is correlated with the error term, giving bias estimation caused by relevant variables omission.

To estimate the average treatment effect (ATE) we use a Regression Discontinuity Design (RDD) and estimate the following equation:

$$Y_{it} = \alpha + \beta F_{it} + f(MVF_{it}) + \mu_t + \varepsilon_{it}, \quad \forall \quad MVF_{it} \in (-h, h), \tag{2}$$

where $f(MVF_{it})$ is a continuous function in both sides of the threshold and h is the optimal bandwidth estimated using the methodology by Calonico, Cattaneo, and Titiunik (2014). The function $f(\bullet)$ is an order one polynomial, as high order polynomials are not recommended on RDD (Gelman and Imbens, 2018).

3.2 Sample Selection

To estimate using a RDD, we consider only mixed mayoral races, in other words, races where the two first places were filled with a female candidate and a male candidate.[7] We include elections with only two candidates and elections with more than two candidates.[8] For the last case, we consider the races in which the third place had less than 15% of the vote share. Finally, our sample consists on 806 races where women is winner in 334 of them. The number of races on the sample increases between 2008 and 2012, suggesting a growth on female political participation.[9]

RDD implementation requires certain assumptions to be met. Firstly, it is important to analyze the continuity of MVF_{it} around the threshold to prove that there is no cutoff manipulation. We employ McCrary's test to study MVF_{it} density around zero (McCrary, 2008). Panel (a) on Figure 2 shows, graphically, the result of McCrary's Density Test. We can see that the female margin of victory is continuous around zero, which implies that there is no manipulation of the threshold. When we replicate the test for each year separately, we do not see manipulation on any election.

The histogram on panel (b) from Figure 2 presents the density of MVF_{it}. We can notice that there is lower density on the right side of zero, which means that there is less proportion of female winners compared to male winners. We can conclude that, around zero, the variable's density does not change, that is, MVF_{it} is continuous around the threshold. Both graphics allow us to deduce that there is no cutoff manipulation.

Secondly, we need to test the continuity of observable characteristics. If they are discontinuous, the treatment effect can be confound with the impact that these variables have on gender violence[10]. Table 1 shows descriptive statistic for municipal and mayoral characteristics according to the mayor's gender. Column (5) shows that pre-treatment municipal characteristics are statistically equal between both groups. Regarding mayoral characteristics, age and incumbency are statistically different between municipalities with female mayors and male mayors. These differences will be analyzed with more detail below. We can conclude that treatment and control groups are comparable in most of

[7] We exclude supplementary elections, elections resolved in a second round and elections where the two first places were filled with same gender candidates.

[8] Mixed races with two candidates represent a 62.8% of our sample.

[9] On 2008, 9.12% of the winners where women, whereas 11.9% of female candidate won on 2012.

[10] Recent evidence suggests that RDD assumptions do not hold on parliamentary elections in the United States (Grimmer, Hersh, Feinstein, and Carpenter, 2011; Caughey and Sekhon, 2011). However, Eggers, Fowler, Hainmueller, Hall, and Snyder Jr (2015) conclude that the assumptions hold on several elections, including mayor elections in Brazil.

the observable characteristics.

We are interested to see what happens near $MVF_{it} = 0$, because if there is a jump in observable characteristics when a women wins the election, the effect of the treatment will be biased. Panel (a) in Figure 3 shows the characteristics' discontinuities around the threshold. Electricity, sewer system and absenteeism do not have statistically significant differences on both sides of the cutoff. However, it is not clear what happens with the rest of the characteristics. This will be explored in Table 2. When we analyze geographic distribution, panel (b) shows that there are no significant differences in Brazilian macro-regions. Panel (a) and panel (b) on Figure 4 allow us to conclude that mayoral characteristics and political parties do not present discontinuities around the threshold. That is, there are no significant differences between female mayors and male mayors when analyzing these variables around $MVF_{it} = 0$.

Table 2 gives municipal and mayoral characteristics' discontinuities around the cutoff. Coefficients should be zero if these variables are continuous. We can observe that there is a statistically significant effect on three variables: population, urban and water access. These characteristics could confound the effect of a female mayor on gender violence, so they will be included as covariates in the estimation. Results interpretation should be more careful, since differences around the cutoff can bias the estimations. Regarding other variables, there are no discontinuities around the threshold. This implies that municipalities on each side of $MVF_{it} = 0$ are comparable after controlling by population, urban and water access.

4 Results

4.1 Female mayors and gender violence

Table 3 shows the effect of electing a female major on reported cases of violence per 10,000 women. Columns 1 and 2 show OLS estimates of Equation 1. The results show a negative coefficient that is not statistically significant at conventional levels. Considering the estimates when covariates are included (column 2), electing a female major reduces violence in 1 case per 10,000, which translates in a reduction of 8.5 percent.

Columns 3 and 4 show the RDD estimates of Equation 2. Our results show a negative and significant effect of electing female mayors. The effect is sizeable: when a woman wins a close race to a male candidate, the average rate of reports decreases on 6.97 cases per 10,000 women, which translates to a reduction of 54 percent. Figure 5 shows the RDD plot where we show local linear estimates using the specification and optimal bandwidth of column 3. The figure confirms the results seen in Table 3, with a large and significant decrease in violence against women at the cutoff.

The rest of the columns in Table 3 show alternative specifications. In columns 5 and 6 we implement the RDD strategy using half (column 5) and double (column 6) the optimal bandwidth. The point estimate is larger and remains statistically significant when we reduce the bandwidth to half. This is reassuring since we oberve an effect even for very close elections (elections decided by a margin of less than 7 percent). The results in column 6 are consistent with a smaller and statistically insignificant effect when Equation 2 is estimated using OLS. Columns 7 and 8 show the estimates of Equation 2 assuming that the control function is a second and third order polynomial, respectively. Coefficients increase in magnitude and statistical significance compared to results on column (3), so this effect is robust to different specifications.[11]

4.2 Heterogeneity

Violence can be exercised in different ways and contexts, so Table 4 shows the effect of electing a female mayor on various categories of violence against women. Odd columns show OLS estimates, while even columns present the corresponding RDD estimates. Excluding some coefficients, OLS estimations are not statistically significant; therefore, we will not discuss them in detail. However, it is interesting to notice that the effect of a female mayor occurs locally, that is, when the female candidate wins a close race.

Panel A reports the results according the type of violence reported by the victim. We can see a weak impact on sexual violence, we find a significant and negative effect on psychological violence.[12] Panel B reports the effect of a female mayor on different types of sexual violence. We can see a smaller rate of hospital attention for harassment and assault in municipalities with a female mayor when we estimate through RDD, with results that are statistically significant at 10%. Moreover, we can see a negative and significant effect on other type of sexual violence. This category includes child pornography, sexual exploitation and other cases. The impact on different types of sexual violence is, in

[11] As mentioned before, Gelman and Imbens (2018) discourage the use of high-order polynomials in RDD.

[12] A woman can report suffering physical and sexual violence or only one of them. In this case, we are considering women that report physical violence, sexual violence and/or psychological violence, that means that the dependent variables are not exclusive. For instance, someone can report physical and psychological violence, in which case it will be consider under columns (1) and (2) and columns (5) and (6). The same occurs with panels B, D, E, F (Death), and G.

average, 84% of the cases.

Panel C in Table 4 shows that when a woman wins a close election, the rate of hospital attention for violence that occurred at home has a decrease of 73%. Moreover, hospital attention for violence occurred in the street reduces in 80.4%. The number of cases occurred in a public place[13] reduces, but it is not statistically significant. Although these results are interesting, they do not allow us to understand the channel through which female political representation affects gender violence. While column (2) may suggest role model, column (4) indicates that the negative effect may be caused by an increase on public good and investment, such as more security and street lighting. In conclusion, the results in panel C do not help us to elucidate the mechanisms.

Panel D shows that there is a significant effect of a female mayor on violence, independent of the suspected perpetrator[14]. However, it appears to be that cases committed by the victim's partner or the ex-partner have a stronger decrease when a female candidate wins the election. We also explored the cases in which the perpetrator is a stranger or unknown. No effect is found in either case.

When we analyze the means used to exercise violence in panel E, we can see that a female mayor reduces the cases of physical aggression and gun aggression, but there is no statistically significant effect on violence exercised with an object. Panel F shows no effect of a female mayor on gender violence according to the severity. Lastly, panel G shows that a female mayor elected on a close race reduces the rate of hospital attention of cases when violence includes threats by 92.2%. Moreover, we find a 59% decrease on the cases in which alcohol use is suspected.

It is important to mention that the results in Table 4 remain similar when we include covariates and estimate through different specifications. The details can be seen on the Appendix, from Table A3 onward.

In addition to studying violence against women, we analyze the impact mayors' gender on female homicide. Panel H in Table 4 presents the effect of a female mayor on the homicide rate per 10,000 women and shows that there is no statistically significant effect. However, Table A9 indicates that the effect is a negative impact on female homicide when we include covariates in column (4), that is, controlling by three municipal covariates. The results suggest that municipal characteristics bias our estimations. When we control for

[13] Public place includes: schools, bars, shops, stadiums and others.

[14] "Partner or ex-partner" includes the husband or ex-husband and boyfriend or ex-boyfriend. "Relatives" includes: father, stepfather, brother and son. "Other" includes: friend, boss, carer, policeman, person with an institutional relationship (doctor, priest, etc) and other cases that cannot be classified using these categories.

these covariates, we see a significant and negative effect of a female mayor on homicides.

When analyzing the effect on violence against women by age group in Figure 8, we can see that a strong impact for teen women between 15 and 19 years old. The estimated beta is 15.4 and the mean around the threshold is 17.7 cases per 10,000 women, so the impact represents a decrease of 87% of the cases. In addition, there is a significant effect for women between 30 and 39 years old. The decrease on the number of female attention for women aged between 30 and 39 years is 85%. Moreover, we estimated the effect on violence against men by age. There is no significant effect for any group.

4.3 Robustness checks

In order to strengthen the results founded, we present some robustness checks recommended by the literature on RDD (Imbens and Lemieux, 2008; Lee and Lemieux, 2010).

We realize a falsification test with six placebos: female death caused by a car accident, female death caused by a tumor and female death caused by an infection; male homicide, male homicide at home and hospital attention for male violence. Panel A and B in Table 5 indicate that there is no effect of a female mayor on female nor male placebos, reinforcing our previous results.

Our sample includes elections with more that two candidates when the third place obtained 15% or less of the vote share. Therefore, we perform a falsification test to see how the effect changes when we move this percentage. Table 6 show different share of votes of the third candidate, considering column (6) as our main specification. We can see that the effect on violence against women persists when we expand the sample to those elections in which the third place obtained 25% and 20% and when we reduce the sample to those elections in which the third place obtained 10% of the vote share or less. However, the significance is lost when we reduce the sample to a 5% vote share (column 6) and when we use only elections with two candidates (column 12). We find no effect when we estimate through OLS.

In conclusion, when a female candidate wins a close race, the average rate of hospital attention for violence against women is reduced in 62%, which is robust to the inclusion of covariates and different specifications. Nevertheless, it is important to mention that these results only apply in contexts that are similar to the one studied here. When we analyze Table A2, we can observe that the sample is significantly different to other races in Brazil. Our sample consists in closed and mixed races, but these conditions do not hold on other elections. This is why the results of our investigation may not be replied on other situations.

4.4 Mechanisms

To explore more deeply the effect founded in column (3) on Table 3, we estimate the female mayor' impact for each year of the mayoral term. In Table 7 we can see the effect of a female mayor on the first, second, third and forth year of mandate. Columns (1) to (4) show that there is no statistically significant effect during the first two years of the mayoral term. On the other side, we can see, in columns (6) and (8), that a female mayor has a negative impact on gender violence in the last years of her mandate. These results suggest that female mayors implement public policies and goods that decrease violence against women on the medium term. If female mayors have a role model effect on other women, we should expect to see effects during the first years of mandate as well. Hence, these results are consistent with the public policy channel.

In addition, we estimate the effect of female mayors on violence against women according to the proportion of women in the local council. As discussed in Section 2, councilors have an impact on what public policies mayors can implement, because they have veto power on the mayoral annual budget proposal. Therefore, female proportion on the council might help female mayors to apply public policies oriented to women. Columns (1) and (2) in Table 8 give the estimations on municipalities where the female proportion in the local council is less or equal that the median: 11.1%, while columns (3) and (4) include municipalities where the proportion is above the median. We can see that in both cases there is no effect when estimating by OLS. When we use a Regression Discontinuity Design, we find a negative and statistically significant effect of a female mayor on violence when the local council has large female representation. In other words, a female mayor reduces violence against women in 72.1% when the female representation in the local council above 11.1%. These results are consistent with Gagliarducci and Paserman (2012).

5 Conclusions

In this article, we study the relationship between female political representation and violence against women. Specifically, we analyze if a female mayor leads to lower rates of gender violence at a municipality level in Brazil. We use data of hospital attention for violence from the Ministry of Health and electoral information from the Electoral

Superior Court of Brazil. Because the mayor election is endogenous to observable and non-observable municipal characteristics, we employ a Regression Discontinuity Design strategy for mayoral elections. Our sample consists in 1,033 mixed and close races between 2008 and 2012.

The estimations' results show that female political representation reduces violence against women. In particular, a female mayor decreases the average rate of hospital attention for gender violence in 62%. This effect concentrates on the cases of psychological violence and sexual harassment, and we find no effect on physical violence. In addition, the impact of a female mayor is produced on the last two years of mayoral mandate.

Moreover, the results suggest that a female mayor reduces violence cases exercised at home and in public places and in cases of physical aggression and gun aggression. Lastly, the estimations show that there is an impact in the less serious cases of violence, since we find statistically significant effects on cases of ambulatory attention only.

When studying what happens with female homicide when a woman wins the elections, we find no significant effects. That is, the mayor's gender has no impact in female deaths caused by aggression. The results can be explained because the data includes all the cases of female homicide, including those that are not directly related to the victim's gender. We do not have municipal data on femicides, so the estimations may have negative biases. It would be interesting to analyze, in future studies, the effect of female political representation on femicides.

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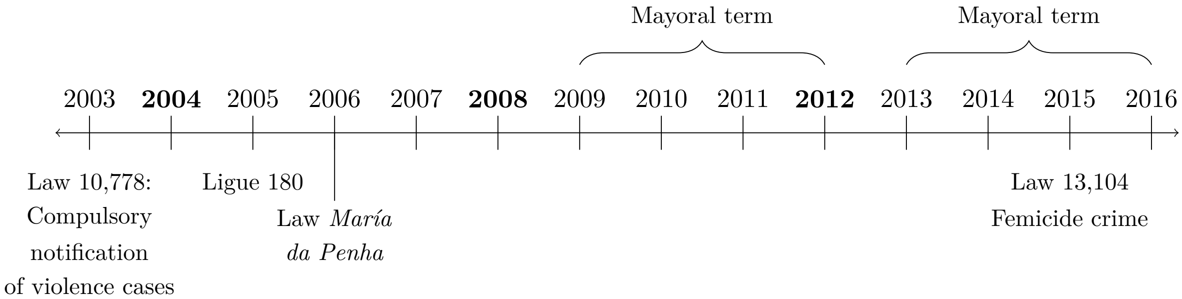
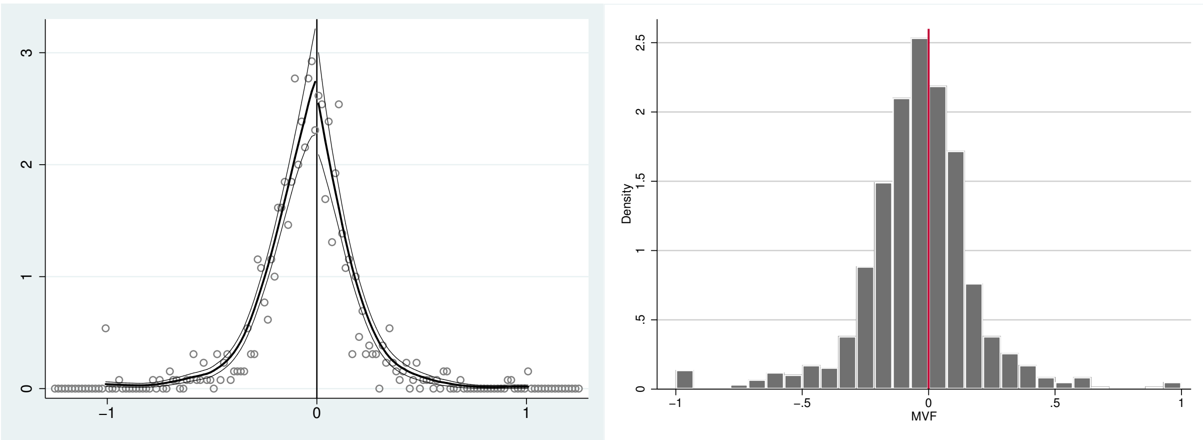
Tables and figures

Figure 1
Laws against gender violence



Notes: Years in bold indicate municipal elections.

Figure 2
Continuity on MVF



(a) **McCrary's Test** (b) **Histogram**

Notes: Female margin of victory of 2008 and 2012. (a) McCrary's test is a kernel estimation of the log density of MVF_{it}. The discontinuity estimation is -0.074 and the standard error is 0.122 (b) The bandwidth is 0.05.

Table 1

Descriptive statistics - Municipalities with a female mayor vs. municipalities with a male mayor

	(1) Female	(2) Obs.	(3) Male	(4) Obs.	(5) p-value
Municipal characteristics					
Population	14,536	334	13,255	472	0.094*
Income per capita (R$)	467	334	455	472	0.415
Literacy rate	0.783	334	0.783	472	0.951
Urban	0.638	334	0.620	472	0.229
Income ratio	0.801	334	0.786	472	0.199
Occupied men	0.513	334	0.507	472	0.488
Secondary education	0.166	334	0.164	472	0.568
Absenteeism	0.126	334	0.127	472	0.797
North	0.072	334	0.085	472	0.506
Noreast	0.323	334	0.326	472	0.931
Center	0.081	334	0.100	472	0.365
South	0.225	334	0.214	472	0.721
Southeast	0.299	334	0.275	472	0.458
Mayoral characteristics					
Age	48	334	48	472	0.807
Primary education	0.036	334	0.038	472	0.871
Secondary education	0.254	334	0.297	472	0.190
College	0.692	334	0.636	472	0.099*
Married	0.662	334	0.678	472	0.628
Incumbent	0.101	572	0.075	797	0.090*
PMDB	0.207	334	0.199	472	0.796
PT	0.117	334	0.100	472	0.437
DEM	0.060	334	0.064	472	0.831
PSDB	0.144	334	0.133	472	0.678
Dependent variables					
Violence against women	12.823	334	12.507	472	0.820
Physical violence	9.256	334	8.974	472	0.781
Sexual violence	1.156	334	1.486	472	0.064*
Psychological violence	6.025	334	5.041	472	0.324
Harassment	81.546	334	74.226	472	0.493
Assault	81.798	334	74.478	472	0.493
Threat	3.263	334	2.845	472	0.541
Recurrent violence	5.772	334	4.949	472	0.250
Violence at home	8.349	334	7.802	472	0.589
Violence on a public place	1.539	334	1.834	472	0.249
Partner	5.671	334	4.988	472	0.353
Ex-partner	0.267	572	0.233	797	0.424
Physical agression	7.998	334	8.001	472	0.997
Gun agression	0.123	334	0.158	472	0.245
Object agression	1.453	334	1.705	472	0.178
Ambulatory attention	5.078	341	4.562	477	0.435
Hospitalization	1.008	175	1.028	258	0.894
Violence resulting in death	0.625	46	0.610	62	0.934
Female homicide	0.517	307	0.556	457	0.395
Female homicide at home	0.195	307	0.246	457	0.106

Notes: Columns (1) and (3) show the variables' average on municipalities with female mayors (treatment group) and male mayors (control group). Columns (2) and (4) show the number of observations for each case. Column (5) displays the p-value of a mean difference test. Dependent variables are measured as the rate per 10,000 women. More detail on the variables in Table A1. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

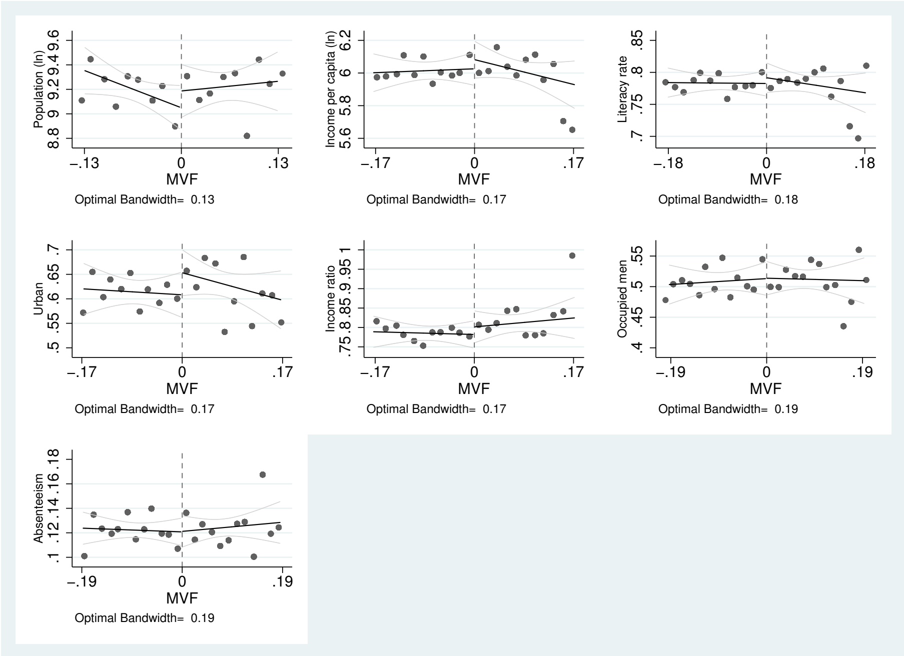
Table 2
Discontinuities on municipal and mayoral characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Municipal characteristics	Population	Income	Literacy	Urban	Income ratio	Occupied	Secondary	Absenteeism
Female	0.142	34.003	0.009	0.046	0.019	0.001	0.008	-0.000
	(0.146)	(39.585)	(0.016)	(0.034)	(0.031)	(0.021)	(0.009)	(0.008)
Optimal bandwidth	0.13	0.17	0.18	0.17	0.17	0.19	0.19	0.19
Observations	465	546	567	546	554	592	574	581
Panel B: Brazilian macro-regions	North	Northeast	Center	South	Southeast			
Female	-0.065	0.028	-0.006	-0.007	0.088			
	(0.045)	(0.085)	(0.047)	(0.069)	(0.067)			
Optimal bandwidth	0.16	0.15	0.16	0.19	0.18			
Observations	529	500	529	581	573			
Panel C: Mayoral characteristics	Age	Primary	Secondary	College	Married	Incumbent		
Female	0.274	-0.043	-0.025	0.048	0.080	-0.064		
	(1.489)	(0.035)	(0.081)	(0.085)	(0.082)	(0.068)		
Optimal bandwidth	0.15	0.13	0.13	0.13	0.14	0.16		
Observations	517	477	467	474	488	537		
Panel D: Political parties	PMDB	PT	DEM	PSDB				
Female	0.028	0.011	-0.038	0.010				
	(0.068)	(0.054)	(0.041)	(0.055)				
Optimal bandwidth	0.17	0.15	0.15	0.12				
Observations	543	501	518	444				

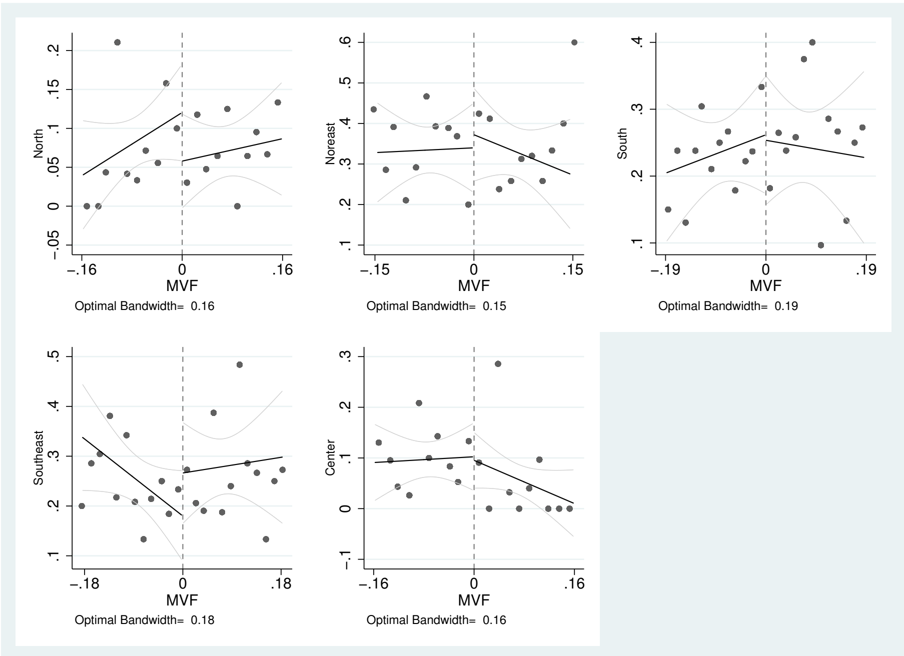
Notes: All columns include year fixed effects. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014). ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Figure 3

Balance tests - Municipalities



(a) **Municipal characteristics**

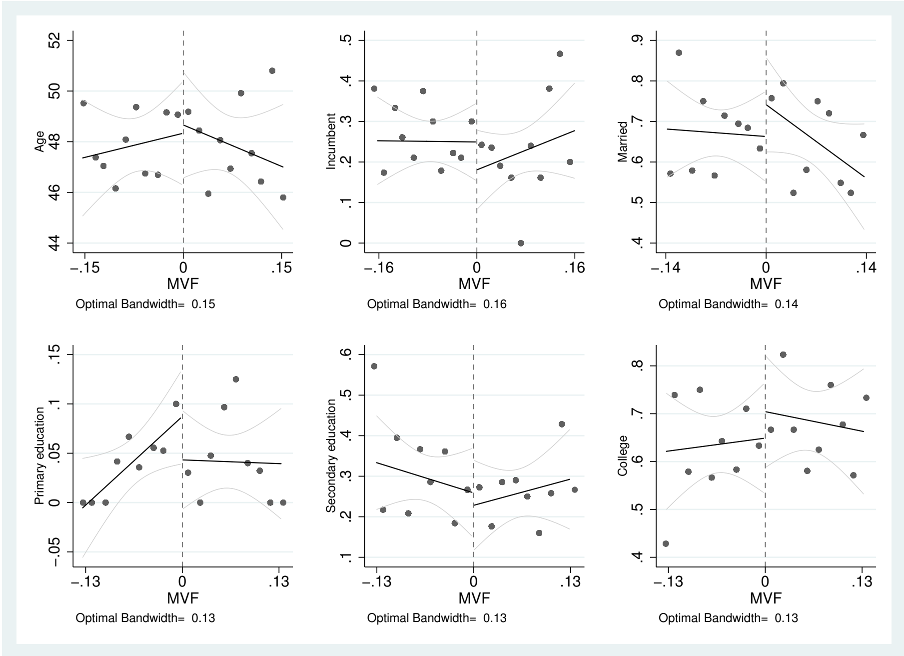


(b) **Brazilian macro-regions**

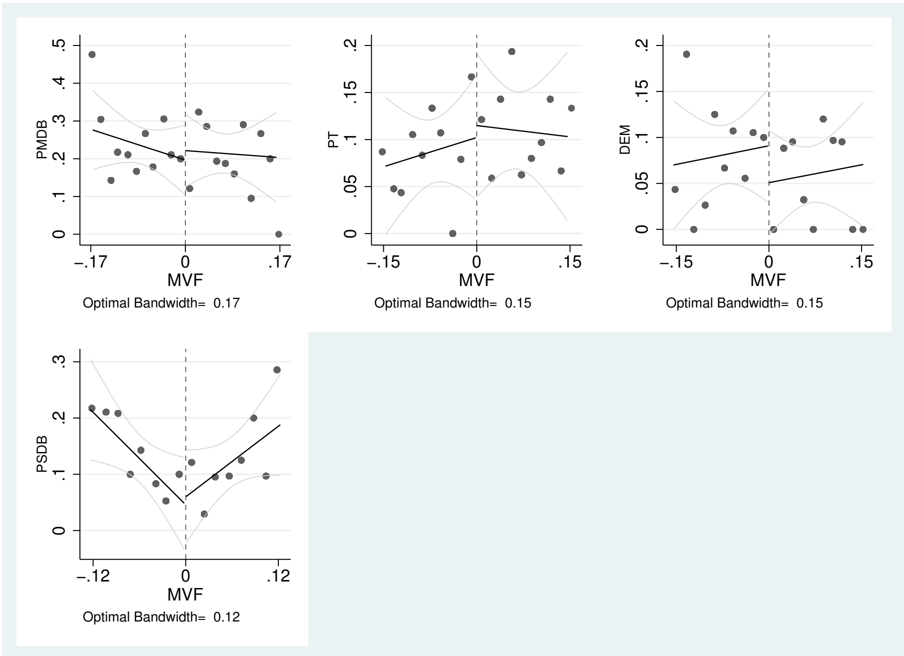
Notes: Pre-treatment characteristics from year 2010. Population and income are measured in thousands. The solid lines represent predicted values of a linear polynomial smoothing, while the dotted lines show the confidence interval at 95%.

Figure 4

Balance tests - Mayors



(a) **Mayoral characteristics**



(b) **Political parties**

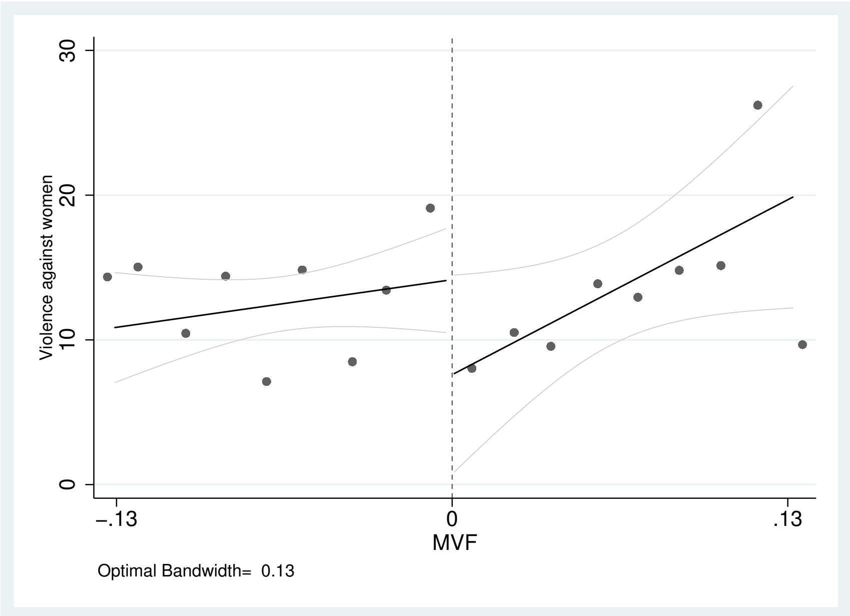
Notes: Pre-treatment characteristics from years 2008 and 2012. Population and income are measured in thousands. The solid lines represent predicted values of a linear polynomial smoothing, while the dotted lines show the confidence interval at 95%.

Table 3
The effect of a female mayor on violence against women

	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.31	-1.08	-6.97**	-6.34**	-9.37**	-1.69	-12.43***	-13.42***
	(1.77)	(1.67)	(3.20)	(2.87)	(3.74)	(1.97)	(3.80)	(4.07)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.13	0.13	0.07	0.26	0.15	0.24
Output mean	12.64	12.64	12.88	12.88	12.02	12.18	12.70	12.25
Observations	806	806	472	472	257	669	518	648

Notes: The dependent variable is cases of violence against women per 10,000 women. All columns include year fixed effects. In columns 2 and 4 municipality controls are log of population, income, literacy, urban, income ratio, occupied, secondary, absenteesim, North, Northeast, Midwest, South, Southeast, and mayoral controls are age, primary education, high-school, college, married, incumbent, PMDB, PT, DEM and PSDB. All variables are defined in table A1 in the Appendix. Optimal bandwidth estimated using the methodology by Calonico et al. (2014). Robust standard errors clustered at the municipality level in parenthesis. ***, ** and * indicate statistical significance at the 1%, 5% and 10%, respectively.

Figure 5
The impact of a female mayor on violence against women: Main result



Notes: The black lines represent predicted values of a linear prediction model, while the grey lines show the confidence interval at 95%.

Table 4

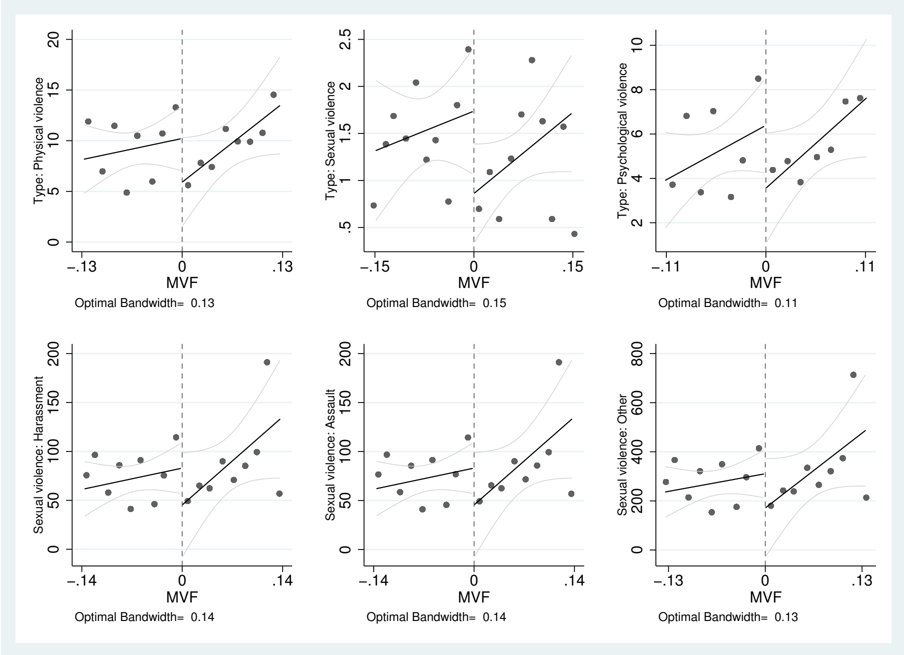
The effect of a female mayor on violence against women

	OLS (1)	RDD (2)	OLS (3)	RDD (4)	OLS (5)	RDD (6)
Panel A: Type of violence	Physical		Sexual		Psychological	
Female	-0.44	-4.62*	-0.44*	-0.88*	0.95	-3.08*
	(1.34)	(2.42)	(0.23)	(0.48)	(1.34)	(1.67)
Output mean	9.09	9.34	1.35	1.40	5.45	5.31
Observations	806	457	806	506	806	414
Panel B: Type of sexual violence	Harassment		Assault		Other	
Female	4.14	-41.06*	4.02	-40.97*	13.76	-149.62*
	(14.12)	(22.76)	(14.13)	(22.78)	(52.69)	(86.73)
Output mean	77.26	78.67	77.51	78.94	289.94	293.56
Observations	806	482	806	482	806	478
Panel C: Place	Home		Street		Public place	
Female	0.36	-4.83**	-0.69**	-0.64	0.20	-0.97
	(1.35)	(2.06)	(0.31)	(0.45)	(0.33)	(0.71)
Output mean	8.03	7.92	1.71	1.57	1.33	1.41
Observations	806	420	806	554	806	426
Panel D: Perpetrator	Partner or ex-partner		Relative		Other	
Female	0.15	-4.37**	0.42	-1.32	-0.31	-1.90**
	(0.98)	(1.93)	(0.38)	(0.81)	(0.47)	(0.84)
Output mean	5.27	5.38	1.88	2.04	2.91	2.89
Observations	806	434	806	430	806	371
Panel E: Means	Physical aggression		Gun		Object	
Female	-0.68	-3.09*	-0.07*	-0.19***	-0.53**	-1.09*
	(1.22)	(1.84)	(0.04)	(0.07)	(0.25)	(0.59)
Output mean	8.00	8.00	0.14	0.15	1.60	1.69
Observations	806	509	806	466	806	460
Panel F: Other characteristics	Recurrent		Threat		Alcohol use	
Female	0.85	-3.24*	0.26	-2.47**	0.21	-3.80**
	(0.97)	(1.91)	(0.92)	(1.03)	(0.85)	(1.77)
Output mean	5.29	5.57	3.02	2.81	4.69	4.82
Observations	806	440	806	420	806	433

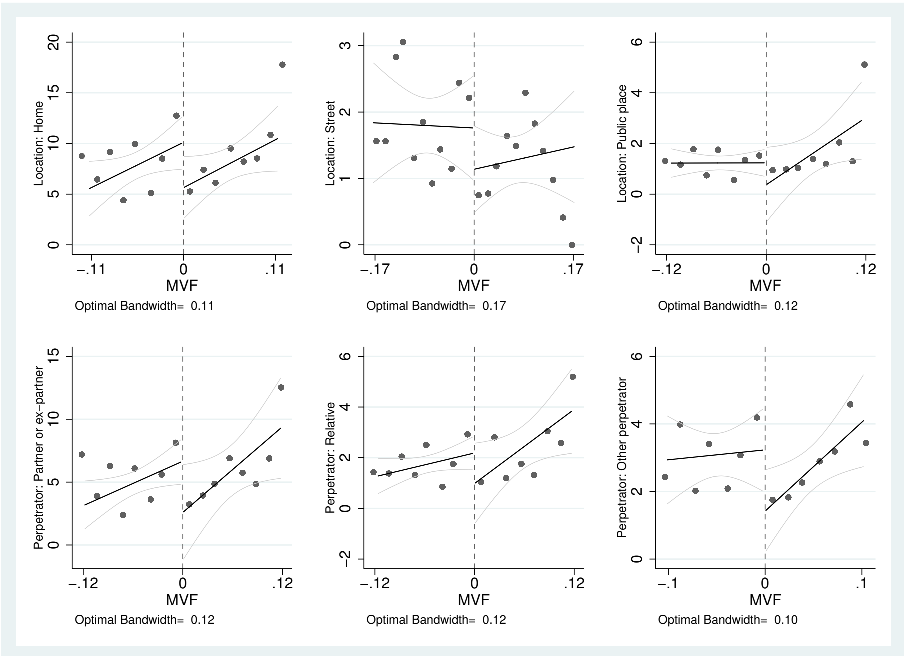
Notes: The dependent variable is cases of violence against women per 10,000 women. All columns were estimated without covariates, include year fixed effects and are estimations of a first-order polynomial. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014). ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Figure 6

The impact of a female mayor on different violence-related outcomes



(a) **According to type of violence**

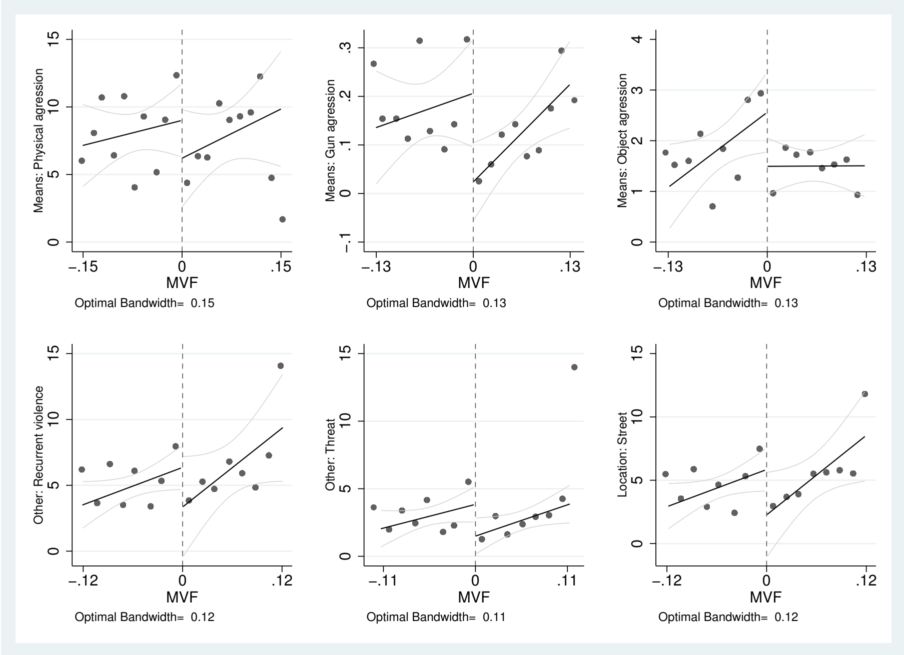


(b) **According to place or perpetrator**

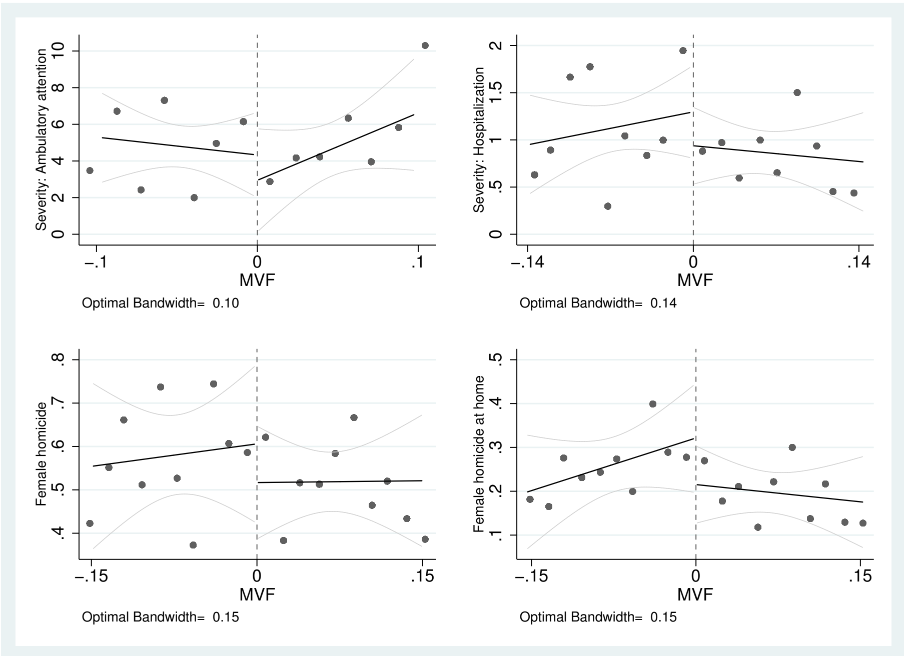
Notes: The solid lines represent predicted values of a linear polynomial smoothing, while the dotted lines show the confidence interval at 95%.

Figure 7

The impact of a female mayor on different violence-related outcomes



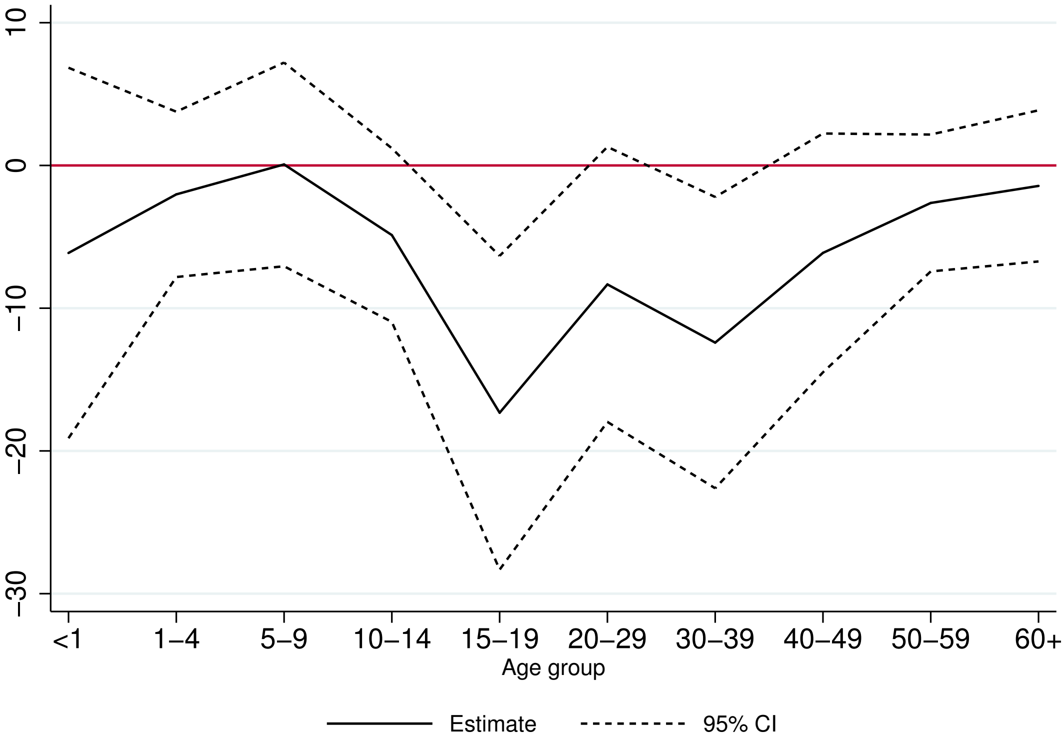
(a) **According to means or other characteristics**



(b) **According to severity or female homicide**

Notes: The black lines represent predicted values of a linear prediction model, while the grey lines show the confidence interval at 95%.

Figure 8
Violence against women by age group



Notes:

Table 5
Falsification test - Placebos

Panel A: Women	Death caused by a car accident		Death caused by a tumor		Death caused by an infection	
	OLS	RDD	OLS	RDD	OLS	RDD
	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.14	0.02	0.26	0.74	0.02	-0.24
	(0.21)	(0.23)	(0.35)	(0.62)	(0.16)	(0.29)
Covariates	No	No	No	No	No	No
Polynomial order	1	1	1	1	1	1
Optimal bandwidth		0.21		0.16		0.14
Output mean	1.48	1.48	8.10	8.22	2.42	2.42
Observations	678	508	804	536	749	457

Panel B: Men	Homicide		Homicide at home		Sexual violence	
	OLS	RDD	OLS	RDD	OLS	RDD
	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.35	0.89	-0.03	-0.01	-0.08	-0.31
	(0.33)	(0.62)	(0.14)	(0.22)	(0.14)	(0.27)
Covariates	No	No	No	No	No	No
Polynomial order	1	1	1	1	1	1
Optimal bandwidth		0.13		0.15		0.12
Output mean	3.92	3.92	1.13	1.12	0.59	0.57
Observations	747	427	543	354	237	133

Notes: Coefficients represent the rate per 10,000 women or men, depending on the panel. All columns were estimated without covariates, include year fixed effects and are estimations of a first-order polynomial. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014). ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Table 6

Share of votes of third candidate

	25%		20%		15%		10%		5%		0%	
	OLS	RDD	OLS	RDD	OLS	RDD	OLS	RDD	OLS	RDD	OLS	RDD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Female	-0.88	-8.81***	-0.57	-6.69**	-0.44	-6.97**	-0.71	-6.75**	-0.96	-9.42**	-0.25	-7.36**
	(1.63)	(3.39)	(1.70)	(3.02)	(1.82)	(3.20)	(1.90)	(3.15)	(2.09)	(4.37)	(2.55)	(3.58)
Covariates	No	No	No	No	No	No	No	No	No	No	No	No
Polynomial order		1		1		1		1		1		1
Optimal bandwidth		0.12		0.13		0.13		0.14		0.12		0.10
Output mean	12.49	12.46	12.46	12.77	12.64	12.88	12.63	12.96	12.89	13.39	13.67	13.76
Observations	924	498	876	510	806	472	755	452	676	370	527	240

Notes: The dependent variable is cases of violence against women per 10,000 women. All columns were estimated without covariates, include year fixed effects and are estimations of a first-order polynomial. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014). ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Table 7

The effect of a female mayor on violence against women: Tenure

Years after election:	$t = 1$		$t = 2$		$t = 3$		$t = 4$	
	OLS	RDD	OLS	RDD	OLS	RDD	OLS	RDD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	2.83	-3.55	1.11	-7.26*	-0.92	-9.68**	-0.64	-12.41**
	(2.42)	(3.95)	(3.30)	(4.07)	(3.62)	(4.58)	(3.10)	(5.81)
Covariates	No	No	No	No	No	No	No	No
Polynomial order		1		1		1		1
Optimal bandwidth		0.13		0.11		0.10		0.11
Output mean	17.51	14.60	16.28	14.22	15.76	15.53	14.78	16.89
Observations	385	230	439	238	513	262	600	302

Notes: Dependent variable is cases of violence against women per 10,000 women. All columns were estimated without covariates, include year fixed effects and are estimations of a first-order polynomial. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014): a bandwidth equal to 10 represents sample elections where MVF_{it} is between -10% and 10%. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Table 8

The effect of a female mayor on violence against women: Other women in city council

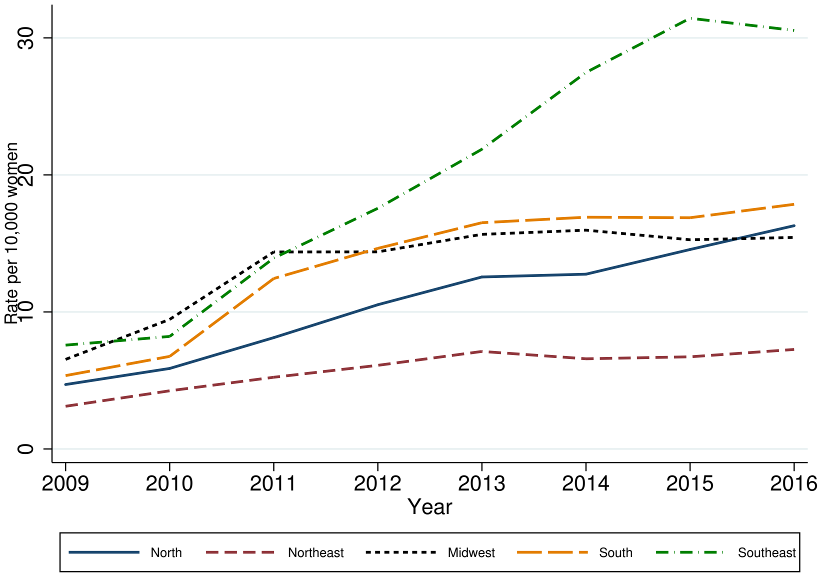
Share women in city council:	Under 11.1%		Above 11.1%	
	OLS	RDD	OLS	RDD
	(1)	(2)	(3)	(4)
Female	-0.79	-4.69	0.31	-7.39**
	(2.05)	(3.91)	(3.32)	(3.26)
Covariates	No	No	No	No
Polynomial order		1		1
Optimal bandwidth		0.12		0.11
Output mean	13.10	12.76	12.01	11.50
Observations	464	259	342	166

Notes: Dependent variable is cases of violence against women per 10,000 women. All columns were estimated without covariates, include year fixed effects and are estimations of a first-order polynomial. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014): a bandwidth equal to 10 represents sample elections where MVF_{it} is between -10% and 10%. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Appendix

Figure A1

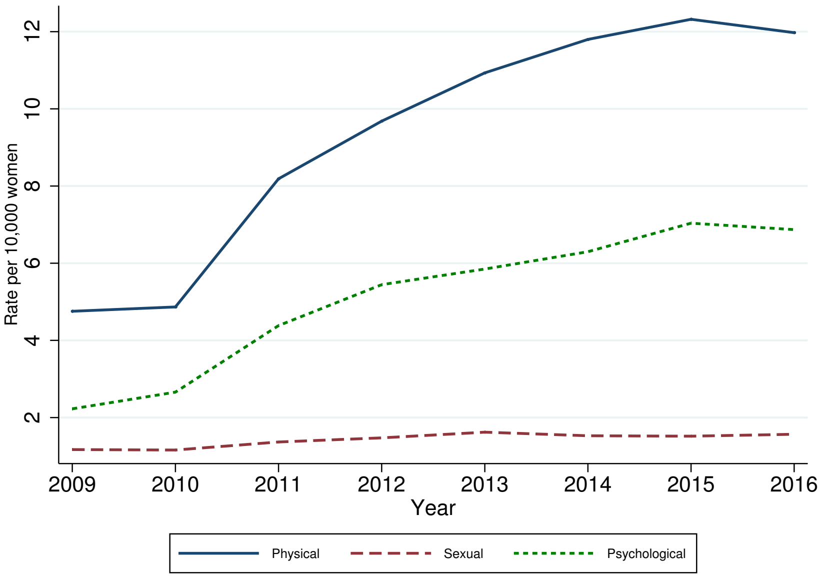
Evolution of cases of violence against women by macroregions



Notes: Own elaboration using information from the Health Ministry and 2010 census.

Figure A2

Evolution of cases of violence against women by type



Notes: Own elaboration using information from the Health Ministry and 2010 census.

Table A1
Description of variables

Municipal characteristics	
Population	Number of inhabitants.
Income	Per-capita income in Brazilian *reais*.
Literacy rate	Share of people above age 20 that can read and write.
Urban	Share of people who live in urban areas.
Income ratio	Ratio between female and male wages for people 15-65 years old.
Occupied men	Share of men between 15 and 65 years old with an occupation.
Secondary education	Share of people with secondary education.
Absenteeism	Share of voters that did not vote.
North	Share of households located in the northern region of Brazil.
Northeast	Share of households located in the northeastern region of Brazil.
Center	Share of households located in the central region of Brazil.
South	Share of households located in the southern region of Brazil.
Southeast	Share of households located in the southeastern region of Brazil.
Mayoral characteristics	
Age	Age of mayor in election year.
Primary	Mayor has primary education.
High school	Mayors has high-school education.
College	Mayor with college education.
Married	Mayor is married.
Incumbent	Mayor is in his/her second consecutive electoral period.
PMDB	Mayor belongs to *Movimento Democrático Brasileiro.*
PT	Mayor belongs to *Partido dos Trabalhadores.*
DEM	Mayor belongs to *Democratas.*
PSDB	Mayor belongs to *Partido da Social Democracia Brasileira.*
Dependent variables	
Violence against women	Cases of violence per 10,000 women.
Physical violence	Cases of physical violence per 10,000 women.
Sexual violence	Cases of sexual violence per 10,000 women.
Psychological violence	Cases of psychological violence per 10,000 women.
Harassment	Cases of harassment per 10,000 women.
Assault	Cases of assault per 10,000 women.
Threat	Cases of reported threats per 10,000 women.
Recurrent violence	Cases of recurrent violence per 10,000 women.
Violence at home	Cases of violence in the victim's household per 10,000 women.
Violence in a public place	Cases of violence occured in the street, school, sport center, pub or commerce per 10,000 women.
Physical aggression	Cases of physical aggression per 10,000 women.
Gun aggression	Cases of gun aggression per 10,000 women.
Object aggression	Cases of heavy, hot or sharp object aggression per 10,000 women.
Ambulatory attention	Cases of ambulatory attention for violence per 10,000 women.
Hospitalization	Cases hospitalized for violence per 10,000 women.
Violence resulting in death	Cases of death because of violence per 10,000 women.
Female homicide	Women murdered.
Female homicide at home	Women murdered at home.

Table A2

Descriptive statistics - Mixed races vs. Other races in Brazil

	(1) Sample	(2) Obs	(3) Other races	(4) Obs	(5) p-value
Municipal characteristics					
Population	21,741	8696	16,183	8654	0.000***
Income per capita (R$)	609	8696	685	8654	0.000***
Literacy rate	0.725	8696	0.768	8654	0.000***
Urban	0.574	8696	0.564	8654	0.004***
Water system	0.553	8696	0.552	8654	0.723
Electricity	0.842	8696	0.859	8654	0.000***
Sewerage system	0.476	8696	0.521	8654	0.000***
Absenteeism	0.125	8696	0.117	8654	0.000***
North	0.085	8696	0.081	8654	0.355
Noreast	0.441	8696	0.281	8654	0.000***
Center	0.083	8696	0.084	8654	0.902
South	0.157	8696	0.253	8654	0.000***
Southeast	0.234	8696	0.302	8654	0.000***
Mayoral characteristics					
Age	51	7292	49	6905	0.000***
Primary education	0.083	8696	0.114	8654	0.000***
Secondary education	0.316	8696	0.341	8654	0.000***
College	0.514	8696	0.427	8654	0.000***
Married	0.741	8696	0.805	8654	0.000***
Incumbent	0.043	8696	0.076	8654	0.000***
PMDB	0.198	8696	0.200	8654	0.770
PT	0.091	8696	0.097	8654	0.138
DEM	0.052	8696	0.048	8654	0.198
PSDB	0.136	8696	0.138	8654	0.728
Dependent variables					
Violence against women	8.522	4692	8.798	4560	0.442
Physical violence	6.041	4692	6.388	4560	0.187
Sexual violence	0.655	4692	0.541	4560	0.000***
Moral violence	3.938	4692	4.062	4560	0.570
Harassment	0.401	4692	0.362	4560	0.080*
Assault	0.648	4692	0.569	4560	0.005***
Threat	2.254	4692	2.333	4560	0.597
Recurrent violence	3.847	4692	4.007	4560	0.358
Violence at home	5.904	4692	6.221	4560	0.217
Violence on a public place	1.753	4692	1.815	4560	0.472
Physical agression	5.930	4692	6.354	4560	0.092*
Gun agression	0.126	4692	0.114	4560	0.128
Object agression	0.310	4692	0.314	4560	0.737
Ambulatory attention	2.632	4692	2.802	4560	0.137
Hospitalization	0.328	4692	0.320	4560	0.623
Violence resulting in death	0.039	4692	0.035	4560	0.348
Female homicide	0.486	7568	0.447	7364	0.000***
Female homicide at home	0.189	7568	0.178	7364	0.085*

Notes: Columns (1) and (3) show the variables' average in mixed races and other races. Columns (2) and (4) show the number of observations for each case. Column (5) displays the p-value of a mean difference test. Dependent variables are measured as the rate per 10,000 women. More detail on the variables in Table A1. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Table A3

The effect of a female mayor on violence against women according to type of violence

Panel A: Physical violence	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	0.08	-0.14	-3.37*	-2.93*	-5.42**	-0.85	-6.57***	-7.26***
	(1.09)	(1.01)	(1.81)	(1.66)	(2.45)	(1.26)	(2.37)	(2.56)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.14	0.14	0.07	0.27	0.17	0.26
Output mean	6.24	6.24	6.48	6.48	5.92	5.87	6.17	5.89
Observations	987	987	583	583	326	835	660	812

Panel B: Sexual violence	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.21	-0.22	-0.84*	-0.58	-1.10*	-0.23	-1.39**	-1.55**
	(0.21)	(0.21)	(0.45)	(0.48)	(0.61)	(0.32)	(0.59)	(0.63)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.14	0.14	0.07	0.28	0.18	0.26
Output mean	1.24	1.24	1.28	1.28	1.18	1.24	1.23	1.26
Observations	704	704	437	437	236	599	505	580

Panel C: Psychological violence	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	1.02	0.82	-2.91**	-2.46*	-2.84	-0.12	-5.52**	-3.37
	(1.22)	(1.13)	(1.46)	(1.44)	(2.55)	(1.06)	(2.45)	(2.73)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.11	0.11	0.06	0.23	0.17	0.20
Output mean	4.29	4.29	4.22	4.22	3.88	4.21	4.53	4.33
Observations	875	875	457	457	235	685	588	642

Notes: Coefficients represent the rate of female hospital attention per 10,000 women. All columns include year fixed effects. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014): a bandwidth equal to 10 represents sample elections where MVF_{it} is between -10% and 10%. Covariates on column (8) are population, urban and water system. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Table A4

The effect of a female mayor on violence against women according to type of sexual violence

Panel A: Harassment	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.08	-0.13	-0.71*	-0.57	-1.14**	-0.28	-1.22**	-1.45**
	(0.19)	(0.20)	(0.39)	(0.42)	(0.56)	(0.27)	(0.52)	(0.60)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.13	0.13	0.06	0.25	0.19	0.27
Output mean	0.83	0.83	0.90	0.90	0.79	0.86	0.85	0.86
Observations	451	451	256	256	141	365	326	378

Panel B: Assault	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.20	-0.18	-0.63*	-0.38	-0.91*	-0.28	-1.09**	-1.38***
	(0.17)	(0.18)	(0.38)	(0.40)	(0.51)	(0.27)	(0.49)	(0.51)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.14	0.14	0.07	0.29	0.19	0.24
Output mean	0.88	0.88	0.92	0.92	0.87	0.87	0.89	0.88
Observations	604	604	376	376	199	518	429	480

Panel C: Exploitation	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	0.03	0.10	-0.20	0.01	0.03	-0.17	-0.11	0.39
	(0.12)	(0.11)	(0.19)	(0.27)	(0.20)	(0.15)	(0.25)	(0.28)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.12	0.12	0.06	0.24	0.16	0.18
Output mean	0.36	0.36	0.38	0.38	0.27	0.35	0.36	0.35
Observations	155	155	85	85	41	126	104	109

Notes: Coefficients represent the rate of female hospital attention per 10,000 women. All columns include year fixed effects. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014): a bandwidth equal to 10 represents sample elections where MVF_{it} is between -10% and 10%. Covariates on column (8) are population, urban and water system. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Table A5

The effect of a female mayor on violence against women according to place of aggression

Panel A: Residence	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	0.97	0.72	-4.27*	-3.78*	-4.51*	-0.16	-5.43**	-4.49*
	(1.10)	(1.04)	(2.20)	(1.93)	(2.40)	(1.18)	(2.31)	(2.41)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.12	0.12	0.06	0.24	0.16	0.31
Output mean	5.52	5.52	5.84	5.84	5.13	5.34	5.59	5.37
Observations	987	987	539	539	285	791	656	863

Panel B: Public place	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.47	-0.48	-1.37**	-1.21**	-2.15**	-0.38	-2.45***	-3.02***
	(0.35)	(0.34)	(0.62)	(0.57)	(0.87)	(0.47)	(0.81)	(0.89)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.13	0.13	0.07	0.26	0.17	0.26
Output mean	1.79	1.79	1.75	1.75	1.67	1.66	1.66	1.66
Observations	651	651	370	370	194	531	442	532

Notes: Coefficients represent the rate of female hospital attention per 10,000 women. All columns include year fixed effects. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014): a bandwidth equal to 10 represents sample elections where MVF_{it} is between -10% and 10%. Covariates on column (8) are population, urban and water system. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Table A6

The effect of a female mayor on violence against women according to means

Panel A: Physical agression	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	0.06	0.06	-2.56*	-2.56*	-4.73**	-0.70	-4.60***	-4.56***
	(0.72)	(0.72)	(1.31)	(1.31)	(1.94)	(0.90)	(1.65)	(1.75)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.10	0.10	0.05	0.20	0.16	0.26
Output mean	3.98	3.98	3.86	3.86	3.47	3.78	3.99	3.69
Observations	1,369	1,369	628	628	340	1,018	896	1,148

Panel B: Gun	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.03	-0.03	-0.09***	-0.09***	-0.11**	-0.06**	-0.09**	-0.11**
	(0.02)	(0.02)	(0.03)	(0.03)	(0.05)	(0.03)	(0.04)	(0.05)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.13	0.13	0.07	0.27	0.23	0.24
Output mean	0.07	0.07	0.07	0.07	0.06	0.07	0.07	0.07
Observations	1,369	1,369	804	804	456	1,162	1,101	1,112

Panel C: Object	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.25	-0.31	-0.46	-0.51	-0.77	-0.47	-0.94*	-1.21*
	(0.19)	(0.19)	(0.35)	(0.32)	(0.54)	(0.31)	(0.54)	(0.64)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.17	0.17	0.09	0.35	0.20	0.28
Output mean	1.22	1.22	1.25	1.25	1.30	1.24	1.23	1.24
Observations	685	685	466	466	273	615	499	571

Notes: Coefficients represent the rate of female hospital attention per 10,000 women. All columns include year fixed effects. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014): a bandwidth equal to 10 represents sample elections where MVF_{it} is between -10% and 10%. Covariates on column (8) are population, urban and water system. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Table A7

The effect of a female mayor on violence against women according to gravity

Panel A: Ambulatory attention	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.39	-0.57	-1.77	-0.54	-4.44***	-0.28	-5.06***	-4.56**
	(0.88)	(0.85)	(1.35)	(1.35)	(1.60)	(1.07)	(1.78)	(1.81)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.10	0.10	0.05	0.19	0.14	0.20
Output mean	4.78	4.78	4.72	4.72	3.95	4.64	5.05	4.64
Observations	818	818	376	376	198	606	505	618

Panel B: Hospitalization	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.25	-0.31	-0.45	-0.42	-0.95**	-0.37	-0.69	-0.99*
	(0.19)	(0.19)	(0.31)	(0.33)	(0.47)	(0.24)	(0.46)	(0.56)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.14	0.14	0.07	0.29	0.17	0.20
Output mean	1.02	1.02	1.02	1.02	0.99	0.99	0.97	0.99
Observations	433	433	268	268	157	370	296	316

Panel C: Death	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	0.25	0.20	0.60	0.55	0.72	0.71	0.42	0.52
	(0.26)	(0.22)	(0.49)	(0.52)	(0.66)	(0.48)	(0.64)	(0.55)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.17	0.17	0.08	0.34	0.18	0.16
Output mean	0.62	0.62	0.61	0.61	0.77	0.66	0.60	0.59
Observations	108	108	69	69	31	90	70	67

Notes: Coefficients represent the rate of female hospital attention per 10,000 women. All columns include year fixed effects. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014): a bandwidth equal to 10 represents sample elections where MVF_{it} is between -10% and 10%. Covariates on column (8) are population, urban and water system. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Table A8

The effect of a female mayor on violence against women according to other characteristics

Panel A: Recurrent	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	1.00	0.89	-1.86	-1.49	-3.00	0.09	-3.67**	-3.79**
	(0.83)	(0.82)	(1.21)	(1.16)	(1.89)	(0.93)	(1.77)	(1.88)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.11	0.11	0.06	0.23	0.18	0.25
Output mean	3.90	3.90	3.95	3.95	3.67	3.88	4.00	3.84
Observations	923	923	480	480	253	729	636	747

Panel B: Threat	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	0.17	0.13	-2.20**	-1.54	-3.85**	-1.32**	-4.64***	-3.25*
	(0.90)	(0.87)	(0.97)	(0.96)	(1.67)	(0.66)	(1.75)	(1.71)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.10	0.10	0.05	0.21	0.17	0.19
Output mean	2.64	2.64	2.41	2.41	2.18	2.71	2.81	2.72
Observations	794	794	370	370	190	584	542	576

Notes: Coefficients represent the rate of female hospital attention per 10,000 women. All columns include year fixed effects. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014): a bandwidth equal to 10 represents sample elections where MVF_{it} is between -10% and 10%. Covariates on column (8) are population, urban and water system. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Table A9

The effect of a female mayor on female homicides

Panel A: Female homicide	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.05	-0.03	-0.10	-0.06	-0.16	-0.11	-0.12	-0.11
	(0.06)	(0.06)	(0.11)	(0.12)	(0.16)	(0.08)	(0.13)	(0.18)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.15	0.15	0.07	0.30	0.24	0.23
Output mean	0.54	0.54	0.55	0.55	0.55	0.53	0.53	0.54
Observations	764	764	486	486	267	666	615	606

Panel B: Female homicide at home	OLS		RDD					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.07	-0.05	-0.11	-0.09	-0.09	-0.11*	-0.10	-0.09
	(0.04)	(0.04)	(0.07)	(0.08)	(0.10)	(0.06)	(0.09)	(0.11)
Covariates	No	Yes	No	Yes	No	No	No	No
Polynomial order			1	1	1	1	2	3
Optimal bandwidth			0.15	0.15	0.08	0.31	0.21	0.27
Output mean	0.23	0.23	0.23	0.23	0.25	0.23	0.23	0.23
Observations	764	764	497	497	274	670	590	642

Notes: Coefficients represent the rate of female homicide per 10,000 women. All columns include year fixed effects. Robust standard errors clustered at the municipality level on parenthesis. Optimal bandwidth estimated using the methodology by Calonico et al. (2014): a bandwidth equal to 10 represents sample elections where MVF_{it} is between -10% and 10%. Covariates on column (8) are population, urban and water system. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.