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Saved by the bell? The effect of schooling on crime against women

Salvas pelo gongo? Efeitos da escolaridade nos crimes contra mulheres

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Resumo: O Brasil está entre os cinco países com altas taxas de homicídios femininos. Cerca de um terço desses homicídios ocorrem dentro de casa. A maioria dos estudos investiga a relação entre educação e a criminalidade do ponto de vista do criminoso. Nossa proposta destaca os efeitos da escolaridade de homens e mulheres sobre a taxa de homicídios femininos. Realizamos uma análise de painel com 645 municípios do estado mais rico do Brasil, São Paulo, de 2003 a 2018. Os resultados indicam que um aumento de um ponto percentual na escolaridade masculina diminui a taxa de homicídio feminino em 0,27 pontos percentuais. A escolaridade feminina diminui essa taxa em 0,21 pontos percentuais. Encontramos ambos os efeitos em municípios pequenos, onde as taxas de matrícula escolar são menores, e nos grandes, onde as taxas de homicídios femininos são maiores.

Palavras-chave: Crime; homicídio feminino; Educação.
Classificação JEL: K42; O12; J16.

Abstract: Brazil is among the five countries with high female homicide rates. About a third of these homicides occur inside the household. Traditionally, studies have investigated the relation between education and criminality from the criminal's point of view. This study highlights the effects of male and female educations on the female homicide rate. Increasing their schooling helps to improve women's access to paid employment and to knowledge of their rights. We conduct a panel analysis with 645 municipalities in the richest Brazilian state, São Paulo, from 2003 to 2018. Our estimative shows that an increase of one percentage point in male schooling decreases the female homicide rate by 0.27 percentual points, while female schooling decreases that rate by 0.21 percentage points. We find both effects in small municipalities in which school enrollment is lower and large ones in which female homicides rates are higher.

Keywords: Crime; Female Homicide; Education
JEL Classification: K42; O12; J16.

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1. Introduction

Brazil ranks among the top five countries with elevated rates of female homicides among the 83 nations investigated by the World Health Organization (WHO). The country records a homicide rate of 4.8 per 100,000 women, with approximately one-third of these incidents occurring within their homes. Instances of aggression, fatalities, and violence against women have persisted throughout history in nearly every country, sometimes being sanctioned by societal structures and legislation. In the early years of the republic, Brazilian law deemed the killing of women acceptable in cases of adultery, while male adultery was viewed as commonplace concubinage. The Civil Code of 1916 eventually amended this legal stance, although the evolution of social norms and customs took additional time (Blay, 2003). Consequently, the government enacted the Maria da Penha Law in 2006 and the Feminicide Law in 2015 to safeguard women from domestic violence.

According to Waiselfisz (2015), a mere 14.3% of male homicides occur within the home, compared to a substantial 41% for women. Men are more likely to encounter violence related to armed conflict and criminal activities, whereas women face a higher risk of harm from individuals in close proximity, such as partners.

Despite the existence of the field of the economics of crime, there has been minimal research dedicated to comprehending or identifying the reasons and origins of violence against women, particularly in the context of female homicides. Even though this type of crime holds significant importance, empirical studies remain scarce. To our knowledge, this study addresses a gap in the literature by investigating the impact of both male and female education on female homicides in a country with a high incidence rate. Furthermore, Brazil, as an emerging economy, has directed resources towards poverty alleviation through conditional cash transfer programs linked to children's school attendance and the implementation of mandatory basic education (Pires, 2013).

The theoretical frameworks introduced by Becker (1968) and Ehrlich (1975) have sparked the development of new avenues in empirical research, aiming to delve into the socioeconomic determinants of crime and their impact on economic development. Within the economics of crime models, individuals are posited to engage in criminal activities when the anticipated benefits outweigh the associated costs. The literature within this domain has extensively explored how varying socioeconomic statuses influence the perceived benefits and costs of crime, with the ultimate goal of formulating policies to curtail crime rates.

Ehrlich (1975) holds the distinction of being the first scholar to underscore the connection between education and crime. His research uncovers a statistically significant and positive correlation between the average number of years of education completed by the adult population over 25 and property crimes in the United States in 1960. Other contributors to the exploration of the relationship between crime and education include Lochner (1999), Lochner (2004), and Lochner and Moretti (2004).

Lochner (2004) highlights notable progress in the theoretical literature concerning the link between education and crime, while Lochner and Moretti (2004) extend similar

commendation to the empirical literature. A noteworthy innovation in their empirical approach is the identification strategy employed. These authors utilize changes in the education laws of individual American states, specifically alterations in the mandatory minimum age for school attendance, as an instrumental variable for education. This strategic choice in identification enables the study to overcome endogeneity issues associated with schooling and to derive causal effects of education on criminal behavior.

Lochner (2007) delineates four distinct pathways through which education can either diminish the perceived benefits or amplify the anticipated costs of engaging in criminal activities: (i) by elevating the opportunity cost of committing crimes through increased expected wages; (ii) by directly influencing the financial or psychological returns of criminal behavior; (iii) by altering risk preferences; and (iv) by shaping individuals' social networks and circles of friendship. Nevertheless, the impact of education on crime remains ambiguous. Lochner (2007, 2011) suggests that education has the potential to increase individuals' productivity, thereby enhancing income and raising the opportunity costs of committing crimes.

Scholars have explored the relationship between education and crime by concentrating on its effects on the decision-making process leading to criminal behavior. Some researchers, adopting a gender-oriented approach, analyze how women's and men's education uniquely influences their likelihood of engaging in criminal activities. Urbina and Locher (2019), for instance, discover that the effects of education on female crime are intertwined with changes in marital opportunities and family formation. They argue that increases in mandatory schooling laws and improvements in school quality can significantly reduce female arrest rates and the probability of incarceration for violent and property crimes, excluding white-collar crimes.

Our study addresses a different perspective: we investigate whether the rate of female homicides is influenced not only by the years of study of women but also by the years of study of men. Does education impact the risk of a woman becoming a homicide victim? Education not only empowers women by increasing employment opportunities, knowledge, and access to women's rights but is also a prerequisite for expanding overall opportunities. Women's access to education diminishes their deprivation and enhances their agency in society (Nussbaum, 2011; Robeyns, 2006; Sen, 1980, 2000).

To assess the effects of education on female homicides, we conduct a panel analysis encompassing the 645 municipalities in the state of São Paulo from 2003 to 2018. Municipalities represent the most detailed level of data available on crime. Our analysis controls for the inherent characteristics of each municipality, considering measures such as economic performance, employment opportunities, urbanization levels, the percentage of young people, overall crime rates, and apprehension rates. By controlling for municipal economic performance, we mitigate potential biases in the results stemming from the correlation between education and income (Fajnzlber and Araújo Jr., 2001), although the positive relation is associated with property crimes that demand more sophisticated criminal skills.

Our findings indicate that increasing levels of both male and female education have the potential to reduce the female homicide rate. This contribution to the crime literature underscores the significance of gender-specific education in influencing female homicides and reinforces the role of education as a mitigating factor in crime reduction. While previous studies in Brazil have used aggregate information indicating an inverse relationship between the education of the population and crime rates (Becker, 2012; Fajnzlber and Araújo Jr., 2001; Scozarfave and Soares, 2009), our study disaggregates education by gender to demonstrate its impact on both offenders and victims, thereby providing a nuanced perspective on the role of education in crime prevention.

2. The relation between education and crime

Studies have used the human capital approach as a reference to analyze the effect that education has on an individual's life. The Theory of Human Capital (Mincer, 1958; Schultz, 1988) considers education as an investment that increases the productivity of the individual that can also make a difference in the standard of living of the population. The premise is that the capital invested in education will guarantee better opportunities in the labor market and will ensure better remuneration.

Becker's (1968) approach assumes that individuals with higher levels of formal education are less prone to criminal involvement. The idea that education is one of the determinants of crime is not new. Becker (1968), Ehrlich (1973), and Ehrlich (1975) are all seminal studies on the Economic Crime Theory in which education is already present in the modeling of criminal behavior.

Education could affect crime rates through many channels like the effect of income, time, risk aversion, social interactions, and economic and psychological returns. These channels can be direct or indirect (Silva, 2014), the first acting directly on actions that modify an individual's behavior by changing preferences, and the second indirectly by changing individuals' opportunities. Education can also change preference rates over time by increasing patience and risk aversion (Becker and Mulligan, 1997). Patient and risk-averse individuals find the punishment of wrongdoing more costly. However, the literature recognizes the ambiguous effect that education can have on an individual's decision-making.

Lochner's (2004) primary contention asserts that due to the fact that human capital enhances the marginal returns of lawful employment more significantly than those derived from engaging in criminal activities, investments in human capital, particularly through education, ought to result in a reduction of crime rates. This argument implies that public policies targeting an elevation in the educational attainment of the population could effectively diminish specific categories of crimes. Lochner's study provides empirical support for this argument, demonstrating that variations in education levels indeed correlate with noticeable reductions in crime rates, thus validating the potential efficacy of public policies aimed at enhancing education in curbing certain types of criminal activities.

So, a higher educational level could increase the opportunity cost of committing a crime; an individual with higher levels of education has better returns in the labor market than for crime, therefore the opportunity cost of committing crime increases. The incarceration for this individual can be more costly because it could keep the criminals out of the legal labor market for a long time.

Calvó-Armengol and Zenou (2004) also identify the negative effect of education on crime. The authors develop a model based on decision games on the Theory of Crime that assume there is a peer effect on learning crime. Through a peer-centered analysis, they show that education generates social connections such as schooling, learning, and the labor market. The authors argue that social networks connect people. These connections discourage crime and encourage social networks without criminals.

The positive relation is related to the cost of planning and executing the criminal activity (Becker and Kassouf, 2017), while the individual's efficiency in the planning and execution grows as the level of education increases that then lowers the cost. In aggregate terms, a region with higher education generally has the highest per capita income that makes it potentially more attractive to criminals (Fajnzylber and Araujo Jr., 2001). The positive relation would then be associated with crimes against property (Lochner, 2004; Soares, 2007). Further, empirical studies have found that the positive relation between education and crime has an effect on thefts and robberies or white-collar crimes.

Urbina and Lochner (2019) point out that there are reasons to believe that education has a different effect on men and women on the opportunity cost of engaging in criminal activity: (i) crime is more personal for women; (ii) the women are more involved in domestic activities than in the labor market, therefore they have a lower opportunity cost of educating themselves; and (iii) women's low employment rates indicate that the return on education may be less relevant in deciding to engage in crime.

According to Robeyns (2006), education can assume a greater role than simply increasing returns in the labor market, as indicated by the human capital approach. The author argues that through education, the individual can find a job and be less vulnerable. Also, education enables the expansion of people's minds that allows them to recognize opportunities and to provide alternatives beyond just following their parents.

3. Violence against women

The popular understanding of violence consists of acts of physical aggression, but it is also understood as a break from any form of the victim's integrity: physical, psychic, sexual, or moral (Ricoldi and Artes, 2016).

Gender-based violence is the acts of physical, psychological, or verbal abuse between people because they are male or female. However, according to Khouri (2012), the expression of gender violence is almost synonymous with violence against women, since these are the most common victims of the incidents.

The WHO has considered violence against women a public health problem since 1990. According to Meneghel and Hirakata (2011), the deaths of women resulting from gender conflicts are called femicides or feminicides. These crimes are usually committed by men and result from situations of home abuse, threats or intimidation, sexual violence, or situations in which women have less power or resources than men (WHO, 2013). Therefore, not every murder of a woman is characterized as a feminicide. This specific crime only occurs when the woman is the victim of homicide only because of her gender.

In Brazil, statistics on offenses are even scarcer than for other crimes. Despite the scarcity of the data, we can verify that the occurrences of female homicides, although declining, are still at alarming levels and the country lives in a culture of violence as a conflict resolution (Waiselfisz, 2015).

The Maria da Penha Law, sanctioned in August 2006, established respect, and equality by creating mechanisms to curb domestic and family violence. Ferraz and Schiavon (2020) find that the legal reform reduced female homicides by 9%; thus, it had a significant effect on protecting women.

Bott et al. (2012) summarizes the numerous consequences of violence against women: (i) a major cause of injury and disability as well as a risk factor for physical, mental, and sexual problems; (ii) causes long-term intergenerational problems for the health, development, and well-being of the children of women who have been victims; and (iii) has negative social and economic consequences for society as a whole.

Education provides an equal opportunity in work and an economic resource to women and men as well as being a desirable goal of economic development (Duflo, 2012). But education also has an instrumental value once it is used to exercise the power of agency. In this sense, the years of schooling completed could be an indicator of functions that increase this power that results in the ability to choose and the choice's effectiveness. Moreover, if a person can exercise choice, then that person can change power relations. Therefore, having resources and improving active agency are related. (Kabeer, 2003, p.171-174).

As pointed out by Beltrão and Alves (2009), since the 1980s women have been more educated than men, when considering the number of years of schooling, and are also the majority in the proportion of graduating enrollments. This increase in the educational level of women could be associated with the increase of their presence in prominent positions that induces their appreciation outside the domestic environment. There is a possibility, therefore, of education being a channel that affects the violence against women since they could find themselves in situations of greater exposure and risk.

4. Method and data

4.1. Methodological procedure

We use the model in this study to try to better understand whether a higher level of educational can reduce female homicides. Few studies have investigated the causes of violence against women, especially in Brazil. We fill the gap in the literature by exploring the effect of male and female educations on female homicides. By separating both types of education, we can identify the channels through which men are offenders from those through which women are either offenders or victims.

The empirical strategy uses a panel analysis of the 645 municipalities in the state of São Paulo from 2003 to 2018. The estimated equation to investigate the impact of education on violence against women can be represented by the equation (1) below. The dependent variable and explanatory variables will be addressed and justified in the following section.

$$y_{i,t} = \beta_o + \beta_1 Educ_{i,t} + \beta_2 X_{i,t} + \mu_{i,t} \tag{1}$$

The panel analysis is the best strategy for studies that investigate the determinants of crime, which usually present unobservable heterogeneity among individual units (Dos Santos and Kassouf, 2008). The presence of unobserved effects on violence among municipalities is confirmed by the Hausman test on a fixed-effects model. By controlling for fixed effects, we remove any bias from our estimates that is due to unobserved variables that are time fixed (Lochner and Moretti, 2004). We expect that culture and criminal incidence are unobserved factors that do not vary over the period of our sample (Silva, 2014). We also control for measures of the economic performance of the municipality.

4.2. Data

The proxy for violence against women is the rate of female homicides per 100,000 women. This crime has more reliable records, because people report murder more frequently than a crime against property since the police only generate a report when strong evidence exists, like a corpse (Hartung, 2009).

The variable source is the DATASUS Mortality Information System (SIM). However, DATASUS has no classification for feminicides, so all female homicides are used to represent this variable. Homicide codes are defined by the 10th International Classification of Disease (ICD 10), and the X85 to Y09 codes cover all types of aggressions in this study. This variable is constructed according to the equation (2) below and the other variables used in the model are presented in Table 1.

$$female\ homicides = \frac{women's\ homicides\ in\ the\ municipality}{women\ in\ the\ municipality} \ x\ 100.000 \tag{2}$$

The numerator of the equation above for the construction of the dependent variable considers all women in the municipality, without restricting to any age, since female homicides can occur at any age.

The empirical model uses some control variables to minimize the bias of the omitted variable since this variable can be correlated with the violence proxy. The measure used for the education of municipalities is represented by the equation (3) below:

$$education\ rate = \frac{N.\ of\ school\ age\ enrolled}{N.\ of\ school\ age\ enrolled\ residents}\ x\ 100.000 \tag{3}$$

We use the enrollments from the first year of schooling until high school, so we shape the rate with the nine years of fundamental school and the three years of high school. We refer to these 12 years as regular schooling. The number of school-age enrollments come from the Educational Census collected and disseminated by the Anísio Teixeira National Institute for Educational Research (INEP). The enrollment data has a 10-year lag for each year of homicide information. With this strategy, the education rate expresses the average access to education of the adult population in each analyzed year with registered homicides. The age-population data come from the Brazilian Institute of Geography and Statistics (IBGE) in population counts and are based on the 2000 and 2010 Population Census.

The municipal educational level represents the degree of social and economic development and may be associated with demographic, economic, and social factors. The control variables can be separated into three groups of determinants: socioeconomic, demographic, and criminal justice.

Table 1: Variables used in estimations.

Variable	Description	Source	Expected signal
Violence	Female homicides (cases per one hundred thousands)	DATASUS	-
Education	The ratio of enrollment and school-age population with 10-year lag.	INEP[2]	Negative
GDPpc	GDP per capita	SEADE[1]	Negative
Urban Pop.	Percentage of population living in urban areas	SEADE	Positive

Young Pop.	15 to 24 years old	SEADE	Positive
Apprehensions	Theft apprehensions	SSP[3]	Positive
Detention Rate	Relation with number of homicide prisoners	SSP	Negative
Workforce	Percentage of employed women of working age	RAIS[4]	Ambiguous

[1] State Data Analysis System Foundation; [2] INEP -National Institute of Educational Studies and Research Anísio Teixeira; [3]Secretariat of Public Security of the State of São Paulo; [4]Annual List of Social Information.

The GDP per capita of the State Data Analysis System (SEADE) is one of the socioeconomic determinants. Municipal GDP per capita is used as a proxy to capture the effects of income changes due to crimes against individuals. We can analyze this variable from two perspectives: according to Becker's (1968) model of the rational utility theory, agents condition the utility of committing a crime to factors that would increase the opportunity cost. However, as local income increases, the benefits associated with crime increase that generates potential gains for the criminal. Thus, the effect of income on crime is ambiguous. The values of the municipal GDP per capita were deflated by the implicit deflator of GDP for the year 2015. Kume (2004), Hartung (2009), and Silva (2014) have all used this variable.

The proxies for the demographic determinants are the percentage of young people and the urban population of each municipality, both obtained from the SEADE. The percentage of young people refers to the ratio of the number of people in the municipality's population aged 15 to 24 years old to the total population of the municipality. According to Kume (2004), urban areas are responsible for the rising crime rate because the most crowded environments make identifying the criminals difficult that facilitates their escape.

The detention rate is the likelihood of apprehension, and it is the proxy for criminal justice. Insofar as a larger likelihood of detention makes the cost of choosing an illegal activity greater. The detention rate is similar to that used by Gaulez et al. (2018). It is the ratio between the number of prisoners and the number of homicides lagged in a period. If the proportion of arrested individuals increases, others will refrain from committing crimes because of the probability of being punished. The number of apprehensions for vehicle thefts is a variable to control for the city's crime. This information was extracted from the São Paulo Public Security Bureau.

An analysis of the percentage of women in the workforce can be approached from two complementary perspectives. On one hand, the growing presence of women in the labor market potentially exposes them to greater vulnerability and susceptibility to conditions of violence. On the other hand, this participation can also result in an increase in their income. The understanding that women with higher financial earnings have the potential to contribute to the reduction of violence is grounded in various factors. The financial autonomy and economic independence of women, when enhanced, positively impact their ability to make meaningful decisions about their lives.

The descriptive statistics for the variables are presented in Tables 2 and 3. Table 2 shows the statistics for the panel analysis, while Table 3 presents of the statistics for the variables in all periods.

This is an unbalanced panel, meaning that information is not available for all years of the observed variables, including the education years for men and women. The construction of the detention rate, for instance, is based on a lag of one period, justifying the disparity in the number of observations between the variables.

Table 2: Descriptive statistics for the municipalities of São Paulo. 2003-2018.

Variable		Average	DP	Min	Max	Obs.
Violence	*overall*	1.85	6.62	0.00	139.59	N = 10320
	between		3.92	0.00	53.03	n = 645
	within		2.33	- 51.18	88.41	T = 16
Female Educ.	*overall*	0.76	0.12	0.00	1.00	N = 5805
	between		0.08	0.42	1.00	n = 645
	within		0.08	0.24	1.18	T = 9
Male educ.	*overall*	0.77	0.12	0.00	1.00	N = 5805
	between		0.08	0.41	1.00	n = 645
	within		0.08	0.27	1.23	T = 9
Urban Pop.	*overall*	0.84	0.14	0.22	1.00	N = 10320
	between		0.13	0.25	1.00	n = 645
	within		0.03	0.32	1.35	T = 16
Young Pop.	*overall*	0.08	0.01	0.05	0.25	N = 10320
	between		0.01	0.06	0.22	n = 645
	within		0.01	- 0.00	0.12	T = 16
Detention rate	*overall*	0.26	0.36	0.00	1.00	N = 9675
	between		0.17	0.00	0.71	n = 645
	within		0.01	- 0.43	1.19	T = 15
Workforce	*overall*	0.21	0.13	0.00	1.00	N = 10320
	between		0.11	0.01	0.95	n = 645
	within		0.07	-0.72	1.04	T = 16

Source: see Table 1,

Table 3: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Violence	10320	1.85	6.618	0	139.60
Male Educ.	5805	0.77	0.12	0.00	1.00
Female Educ.	5805	0.76	0.18	0.00	1.00
Urban Pop.	10320	0.84	0.14	0.22	1.00
Young Pop.	10320	0.09	.012	0.05	0.25
Detention Rate	9675	0.26	0.36	0.00	1.00
Workforce	10320	0.21	0.13	0.00	1.00
GDPpc	9675	20595.14	20509.03	2606.15	401303.95

Source: see Table 1,

4. Method and data

Some tests were performed to verify the best behavior of the data and the functional form: First, the Breusch-Pagan was tested to evaluate if the errors were homoscedastic. The null hypothesis was rejected that indicated the presence of heteroscedasticity, so robust errors were adopted. Second, the Hausman test was applied to evaluate which panel data should be used. The test indicated the use of the fixed-effects method to corroborate the Brazilian literature that did not disprove the unobserved fixed effects hypothesis. Third, the multiple linear restriction F tests performed for each regression rejected the null hypothesis that indicated the variables were statistically significant together with a value of p equal to zero.

The results of the fixed-effects panel are shown in Table 4. The first column estimates the effect of women's access to education on their homicides, the second column aims to verify the effect of male education, and the third column presents the effect of male and female educations. In all specifications, education is lagged for 10 years to identify the effect of access to education on young people.

The results show a negative relation between homicides and education that indicates greater access to education decreases the homicide rates of women in the municipalities. A one percentage point increase in women's education rate reduces the female homicide rate by 0.21 points when we consider only the women's education or when we consider the men's too (Models 1 and 3). In the same way, an increase of one percentage point in the male education rate decreases the female homicide rate by 0.27 points.

Our results are in accordance with other scholars who find a negative relation between crime and education (Becker and Kassouf, 2017; Kume, 2004; Santos, 2009). Most studies on the economics of crime use education to explain the costs and benefits of criminality, but not as an explanatory variable for homicide (Cerqueira and Lobão, 2003; Ervilha and Lima, 2019; Hartung, 2009). Our distinctive point is the inclusion of the 10-year lag enrollment rate to shape the education variable that highlights the importance of the first 12 years of regular schooling. Additionally, our results show a decrease in the homicide rate due to education, not as a result of an individual choice changed by education. Through the results presented in Table 4, some of the control variables are not statistically significant, although they keep the same sign and similar magnitudes regardless of the specification.

Table 5 presents the regressions that segregate the small cities from the medium and large ones. There are no significant changes in the results, and the effects go in the same direction. We find larger effects of schooling on female homicides in small cities.

Table 4: Regressions of female homicide cases per 100,000 on the education rate and controls - EF Estimates.

VARIABLES	(1) Female Education	(2) Male Education	(3) Female and Male Education
Female Educ.	-0.214*		-0.213*
	(0.115)		(0.115)
Male Educ.		-0.339**	-0.277**
		(0.113)	(0.113)
Apprehensions	-0.000241***	-0.000250***	-0.000242***
	(7.36e-05)	(7.35e-05)	(7.36e-05)
Urban Pop.	-0.109	-0.0756	-0.105
	(0.806)	(0.806)	(0.806)
Young Pop.	-1.440	-1.002	-1.524
	(2.704)	(2.713)	(2.727)
Detention Rate	0.0350	0.0349	0.0349
	(0.0309)	(0.0309)	(0.0309)
Female Workforce	-0.196	-0.236	-0.194
	(0.336)	(0.336)	(0.337)
GDP per capita	-9.96e-07	-1.10e-06	-9.89e-07
	(8.95e-07)	(8.93e-07)	(8.95e-07)
Constant	0.512	0.596	0.495
	(0.755)	(0.757)	(0.759)
Observations	5,805	5,805	5,805
R-squared	0.004	0.003	0.004
Number of code	645	645	645

Note: We analyze whether the coefficient of women and men is statistically significant and obtain a p-value of 0.00. Standard errors are in parentheses; *** $p<0.01$, ** $p<0.05$, and * $p<0.1$ denote significance. Robust standard errors are used in all cases.

Table 5: Regressions of female homicides cases on the education rate and controls, by city size.

VARIABLES	(1) Female Education in Medium and Large cities	(2) Female Education in Small cities	(3) Male Education in Medium and Large cities	(4) Male Education in Small cities	(5) Female and Male Educations in Medium and Large cities	(6) Female and Male Educations in Small cities
Female Educ.	-0.099*	-0.213*			-0.070*	-0.229*
	(0.019)	(0.067)			(0.219)	(0.167)
Male Educ.			-0.097*	-0.309*	-0.0709*	-0.241*
			(0.373)	(0.152)	(0.373)	(0.152)
Apprehensions	-6.73e-05*	-0.000195*	-6.83e-05*	-0.000215*	-6.73e-05*	-0.00200*
	(7.45e-05)	(0.000156)	(7.45e-05)	(0.000155)	(7.46e-05)	(0.00156)
Urban Pop.	-0.297	-0.106	-0.472	-0.0633	-0.325	-0.0772
	(0.343)	(1.059)	(0.497)	(1.060)	(.518)	(1.060)
Young Pop.	35.66***	2.710	34.99***	-2.890	35.71***	-3.106
	(11.33)	(3.620)	(11.44)	(3.634)	(11.67)	(3.645)
Detention Rate	0.0574	0.0327	-0.0777	0.0321	-0.0580	0.0322
	(1.110)	(0.0402)	(1.109)	(0.0402)	(1.112)	(0.0402)
Female Workforce	0.889	-0.399	0.916	-0.407	0.888	-0.388
	(1.141)	(0.452)	(1.140)	(0.452)	(1.144)	(0.453)
GDP per capita	-1.24e-06	-7.58e-07	-1.19e-06	-7.84e-07	-1.25e-06	-7.31e-07
	(4.17e-06)	(1.19e-06)	(4.17e-06)	(1.19e-06)	(4.18e-06)	(1.19e-06)
Constant	-11.14*	0.795	-11.31*	0.771	-11.16*	0.700
	(6.307)	(0.984)	(6.431)	(0.985)	(6.452)	(0.990)
Observations	675	5,130	675	5,130	675	5,130
R-squared	0.032	0.001	0.032	0.001	0.032	0.001
Number of codes	75	570	75	570	75	570

Note: Each column corresponds to a different regression estimated by the size of the municipality. The first is the effect of the lagged education for women in medium and large cities and the second for small cities; in the third column has the effect of the lagged education of men in medium and large cities and in the next column with small cities; the final two columns analyze the effect of the lagged education of men and women for medium and large cities and medium and small cities, respectively. Standard errors are in parentheses; the *** p<0.01, ** p<0.05, and * p<0.1 denote significance.

Final Remarks

In this study, we analyze the effect of education on female homicides in the municipalities of São Paulo from 2003 to 2018. We use the literature to investigate the channels through which education has an effect on crime. One focus of this study is the

influence of education on the decision to commit or not to commit a criminal action as reflected by the opportunity cost. However, the effect of education can also empower women by giving them the means to leave a relationship that could put them in a dangerous situation. By separating male and female educations, we verify the existence of these two channels. In this way, this study fills a gap in the literature on violence against women.

Using a panel analysis for all municipalities in the state of São Paulo, we estimate the effect of the educations of men and women on female homicides, our measure of violence against women. By using 10-year lagged school enrollments as a measure of education, we verify the effect of young people's access to school on violence as adults.

Our results are in line with the literature on the economics of crime from the perspective of the opportunity cost of committing a crime; a higher level of schooling for boys decreases crime against women when they are adults. As we predicted, a higher education reduces the crime against women. The channel for women's access to education decreases violence against them through empowerment. The increase of one percentage point in the enrollment rate of men reduces the rate of female homicides by 0.27 points and the increase of one percentage point in the enrollment rate of women reduces them by 0.21 percentage points. The difference between the coefficients is statistically significant that indicates the male education has a greater effect on reducing violence against women.

Regardless of the channel through which education promotes a reduction in violence against women, the results show that educational inclusion is necessary. Therefore, policies that keep children enrolled at school as well as those that allow women to get as much of an economic benefit from schooling as men do would be beneficial.

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