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Own Goal: Impact of Soccer Matches on Domestic Violence in Brazil

Gol contra: Impacto do futebol sobre a Violência Doméstica no Brasil

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Domestic Violence in Brazil**

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Doméstica no Brasil**

Dissertação apresentada ao Programa de Pós-Graduação em Economia do Departamento de Economia da Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo, como requisito parcial para a obtenção do título de Mestre em Ciências.

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Abstract

Domestic violence (DV) is the most common form of violence against women (VAW) and is a major public health issue. Eliminating such violence is a key objective of the sustainable development goals. Some theories investigate the importance of emotional cues or “visceral factors” in eliciting DV. This paper examines the link between emotional shocks induced by unexpected soccer results and domestic violence (DV) in Brazil. To establish the unanticipated results, we analyzed data from the pregame betting markets of 3,800 match results of Brazil’s primary football competition, *Campeonato Brasileiro*, from 2015 to 2019. We argue that the risk of DV incidents can be affected by the gain-loss utility of soccer games around a rationally expected reference point. Our analysis focuses on two major states of Brazil: *Rio de Janeiro* and *São Paulo*, and we use two quantifiable measures of daily occurrences of DV: calls to a domestic violence helpline, *Ligue 180*, and police reports from 2015 to 2019. Our results indicate that an increase of one standard deviation (SD) in the number of people experiencing a negative emotional shock as a result of the outcomes of soccer matches increases the expected number of DV-related police reports after the match by approximately 7.6%. We found no impact when we use our other source of DV data, calls to a domestic violence helpline. We found a significant impact of games with opponents from the same city that take place from Monday through Friday; an increase of one SD in the negative emotional shock increases the expected numbers of DV police reports by 66%, and increases calls to the Ligue 180 helpline by 41%.

Key words: Domestic violence, Emotional cues, Soccer, Brazil

JEL Classification: J12; D02; D91

Resumo

A Violência Doméstica é a forma mais comum de violência contra a mulher. Eliminar tal violência é um dos focos principais dos Objetivos de Desenvolvimento Sustentáveis (*UN Sustainable Development Goals*.) Há um framework teórico que busca investigar a importância de *emotional cues* ou de fatores viscerais em impulsionar a violência doméstica. Esse trabalho estuda a ligação entre choques emocionais provocados por resultados inesperados no futebol e Violência Doméstica no Brasil. Para determinar tais resultados, utilizamos dados do mercado de apostas pré jogos de 3800 partidas do Campeonato Brasileiro, principal torneio do país, de 2015 até 2019. Nossa hipótese é a de que o risco da ocorrência de violência doméstica pode ser afetado por um resultado que saia do ponto de referência esperado. Nossa análise foca em dois dos maiores estados do país: Rio de Janeiro e São Paulo. Utilizamos dados diários de violência doméstica (ligações para o Ligue 180 e boletins de ocorrência) de 2015 até 2019. Nossos resultados indicam que o aumento em um desvio padrão no share de pessoas que recebem um choque emocional negativo aumenta o número esperado de boletins de ocorrência após a partir em aproximadamente 7.6%. Não encontramos efeito para as ligações ao Ligue 180. Encontramos um efeito significativo para partidas entre times da mesma cidade que ocorrem entre Segunda e Sexta: um aumento de um d.p. no choque emocional negativo aumenta em 66% o número esperado de boletins de ocorrência e em 41% o número de ligações para reportar crimes de violência doméstica para o Ligue 180.

Palavras Chaves: Violência Doméstica, Choques emocionais, Futebol, Brasil

Códigos JEL: J12; D02; D91

List of Figures

Figure 1 – The cycle of Domestic Violence	19
Figure 2 – Match Start Time by Weekday	24
Figure 3 – Geographic Distribution of Soccer Fan Base: Teams With the Most Likes	26
Figure 4 – Difference Between Timing of Report and Timing of Occurrence of DV Crimes, States of São Paulo and Rio de Janeiro, 2015 - 2019.	30
Figure 5 – Evolution of DV Calls and Police Reports, 2015 to 2019	34
Figure 6 – Geographic Distribution of Municipalities by Tercile of DV Rate per 100,000 Women - State of Rio de Janeiro, 2017	35
Figure 7 – Geographic Distribution of Municipalities by Quartile of DV Rate per 100,000 Women - State of São Paulo, 2017	35
Figure A.1–Percentage of ever-partnered women who ever suffered intimate partner physical and/or sexual violence, 2019.	58
Figure A.2–Perpetration of <i>Mapa das Curtidas</i>	59
Figure A.3–Relationship between victim and offender	60
Figure A.4–Geographic distribution of municipalities by tercile of DV rate per 100,000 women - State of Rio de Janeiro	61
Figure A.5–Geographic distribution of municipalities by quartile of DV rate per 100,000 women - State of Sao Paulo	62
Figure A.6–Histogram of $\sum_{k \in K} s_{k,m}$ Positive Shock $_{k,t}$	63
Figure A.7–Histogram of $\sum_{k \in K} s_{k,m}$ Negative Shock $_{k,t}$	63

List of Tables

Table 1 – Summary Statistics of Bet Data, Implicit Odds, 2015 - 2019	25
Table 2 – Summary Statistics - Soccer Fan Base: States of Rio de Janeiro and São Paulo	27
Table 3 – Difference Between Timing of Report and Timing of Occurrence according to distance from Neighbourhood of Occurrence and Police Station, 2015 - 2019.	31
Table 4 – Descriptive Statistics of DV Data, Police and Non-Police Reports, 2015- 2019, Rio de Janeiro and São Paulo	32
Table 5 – Impact of Emotional Shocks on DV Police Reports, States of Rio de Janeiro and São Paulo, 2015 to 2019	39
Table 6 – Impact of Emotional Shocks on DV Calls to <i>Ligue 180</i> , State of Rio de Janeiro and São Paulo, 2015 to 2019	40
Table 7 – Impact of Emotional Shocks on DV Police Reports, States of Rio de Janeiro and São Paulo, 2015 to 2019 - Heterogeneity by Timing of DV Crime	42
Table 8 – Impact of emotional shocks on DV Police Reports, States of Rio de Janeiro and Sao Paulo, 2015 to 2019 - Heterogeneity by Timing of DV Crime	43
Table 9 – Impact of Emotional Shocks on DV Police Reports by Distance to Police Stations, States of Rio de Janeiro and São Paulo, 2015 to 2019	44
Table 10 – Impact of Emotional Shocks on DV Police Reports, States of Rio de Janeiro and São Paulo, 2015 to 2019 - Heterogeneity by Race and Education	46
Table 11 – Impact of Emotional Shocks on DV Measures, State of Rio de Janeiro and São Paulo, 2015 to 2019 - Heterogeneity by Derby Matches	48
Table 12 – Impact of Emotional Shocks on DV Measures, State of Rio de Janeiro and São Paulo, 2015 to 2019 - Heterogeneity by Type of Violence	50

Table B.1 – Calls by type of violation - <i>Ligue 180</i> , States of Rio de Janeiro and Sao Paulo, 2015 to 2019	64
Table B.2 – Calls by type of violation - <i>Ligue 180</i> , 2015 to 2019	65
Table B.3 – Population size by geographic distribution and year - State of Rio de Janeiro and state of Sao Paulo	66
Table B.4 – Impact of emotional shocks on All Calls to <i>Ligue 180</i> , soccer matches, State of Rio de Janeiro and Sao Paulo, 2015 to 2019 . . .	67
Table B.5 – Impact of emotional shocks on DV Calls to <i>Ligue 180</i> on the same day, State of Rio de Janeiro and Sao Paulo, 2015 to 2019 . .	68

Contents

1	Introduction	10
2	Domestic Violence	15
	Potential Mechanisms	15
	Cycle of Domestic Violence	17
3	Sports and Violence	20
4	Data	23
	Soccer and Bet data	23
	Domestic Violence Data	28
	Police vs. Non-police Reports Data	33
5	Empirical specification	37
6	Results	39
	Main	39
	Timing of Domestic Violence Incidents	41
	Distance from Police Station	44
	Victim's profile	45
	Derby Matches	47
	Type of Domestic Violence	50
7	Discussion and Conclusions	52
	References	54
	Appendix A. Figures	58
	Appendix B. Tables	64

1 Introduction

Domestic violence (DV) can be triggered by a range of factors, including income shocks, exposure time to the offender, and emotional shocks. While the literature has extensively investigated some of these mechanisms, such as income (Aizer (2010), Anderberg et al. (2013), Baranov et al. (2021)) and exposure time (Dugan et al. (1999), Bhalotra et al. (2020)), there is less evidence on the link between emotional factors and DV, particularly in developing countries. Emotional factors can arise when partners use violence to express frustration or extreme anger due to a transient episode. Such emotional shocks are also referred to as “emotional cues” or “visceral factors” (Johnson (2009), Straus et al. (2017)). Evidence suggests that emotional cues may have long-term impacts Loewenstein (2000). Given that developing countries often experience higher rates of violence against women (VAW) compared to developed countries,¹ understanding the link between emotional cues and violence, with a focus on a developing country, could be crucial to advancing this literature.

In this paper, we study the effect of emotional shocks from soccer on DV in Brazil. The country is known as the country of soccer,² and the sport represents a significant emotional factor for the Brazilian population,³ especially men. Football is a national passion and the favorite sport of Brazilians.⁴ Rodrigues (2014) highlights the feeling of belonging and patriotism associated with soccer in Brazil. Additionally, he sheds light on the sport’s importance in people’s lives and how it can shape their behaviors and actions. Brazil is also one of the most dangerous countries for women, and domestic violence is a major issue and one of the highest challenges in the country. In 2021, the country registered 1,319 femicides, meaning that every seven hours, a woman was killed due to gender-based violence (Bueno

¹Figure A.1 shows that the percentage of women who have experienced intimate partner physical or sexual violence is higher in developing countries.

²Brazil is the most prosperous country in the World Cup, with five victories (1958, 1962, 1970, 1994, and 2002).

³Soccer is considered one of the main pillars of Brazil’s national identity. It is viewed as a way of cultural expression that guides the behavior of many Brazilians (Souza et al. (2011)).

⁴According to DNA TORCEDOR (2017), 110.4 million Brazilians support a soccer team. The sport generated US\$13.67 billion in revenue in 2018, equivalent to 0.7% of Brazilian GDP. See https://conteudo.cbf.com.br/cdn/201912/20191213172843_46.pdf

(2022)). Moreover, according Centre & OECD (2020), 33.5% of ever-partnered women had already suffered DV.

Because soccer can affect fans' behaviors and has considerable importance in the life of many Brazilians, it has the potential to trigger an episode of violence. Statistics show that Brazilian soccer can be associated with high rates of violent episodes. For example, fifteen violent cases took place in the country from January to March of 2022, including incidents such as field invasions, fights between the supporters of opposing teams, and attacks on buses. As those cases happened in public places with media and police coverage, they can be easier to track and measure than violent cases inside the household. So what about domestic violence and a possible trigger caused by soccer-related emotional shocks? Recent efforts have brought this possible relationship into the spotlight. For instance, in March of 2022, the state of São Paulo's Public Ministry and the Paulista Football Federation launched a campaign against DV in soccer stadiums. This initiative highlights the prevalence of this violence during soccer matches by demonstrating statistics about physical DV. Also, it informs one way that victims can report instances of DV.⁵

We examine the effect of emotional shocks associated with unexpected wins and losses by professional soccer teams on DV in two central states of Brazil: Rio de Janeiro and São Paulo, which represent 30% of the total population of Brazil in 2010. We use two different sources to measure occurrences of domestic violence: daily police reports and non-police reports of DV during the national competition. We collect individual daily data of calls to the national DV helpline, *Ligue 180*,⁶ from 2015 to 2019. Furthermore, we also gather information about DV police reports from 2015 to 2019. We also collect data on betting markets for 3,800 matches during Brazil's primary football competition, *Campeonato Brasileiro*, from 2015 to 2019. To identify the popularity of the primary soccer teams by municipality, we use data from *Mapa das Curtidas*; the geographic distribution of the soccer fan base is important to calculate the share of people experiencing emotional shocks in each municipality of Rio de Janeiro and São Paulo.

⁵The national helpline for DV is *Ligue 180*.

⁶This channel is a toll-free service administered by the Ministry of Women, Family and Human Rights. It has been operating as a channel for VAW reports since 2015. (Humanos (2016)). This national helpline is a non-police source of data.

Our empirical strategy is based on Corbi (2018) and Card & Dahl (2011): the use of pre-match expectations to construct a variable that will correspond to unanticipated results. We assume that the risk of violence can be affected by unexpected results: gain-loss utility associated with soccer match outcomes around a rationally expected reference point. The central hypothesis of identification is the independence between the results of the betting markets and the outcomes of soccer matches. We defined a negative shock as a worse-than-expected outcome: defeat or a draw when the team was predicted to win or a loss when the team was predicted to draw. Analogously, a positive shock happens when the outcome is better than anticipated: a win or draw when the team was expected to lose or a win when the team was expected to draw.

Our results indicate that an increase of one standard deviation in the share of people experiencing a negative emotional shock increases the expected number of DV police reports related to incidents at home occurring up to four hours after the match by approximately 7.6%. In contrast, we find no impact when we use our non-police source, calls to *Ligue 180*. For both sources, positive shocks do not significantly impact rates of domestic violence. We also find that the effect of a negative shock is higher on working days⁷ and with matches between soccer teams from the same city.⁸ When we examined this effect, both report channels seem to indicate a strong link between emotional cues and DV: we see an increase of 66% in the expected number of DV police reports in the four hours following a soccer match and a 41% increase in calls to the *Ligue 180* helpline the day following a match. We also further explore the type of domestic violence. Our results indicate that psychological violence drives the effect found on police reports: an increase in one standard deviation of a negative shock increases the expected number of DV police reports filed that describe instances of psychological violence for up to four hours following the match by approximately 29%.

Regarding the timing of DV incidents, we find no significant impact on DV reports during the match nor during the six-hour and eight-hour time windows after the match. Our results suggest that the spike in domestic violence is con-

⁷Monday through Friday.

⁸We will call these matches “derby matches”.

centrated in a narrow window following the end of a soccer match: four hours. This finding contributes to establishing public policies with preventive measures to combat the increase in post-match violence (Sachs & Chu (2000)). We also investigate how our main result change if we divide our sample into DV crimes that were reported in a nearby police station against those that were filled in a police station more distant from the neighborhood of occurrence. Our results show that an increase in one standard deviation of a negative shock provokes an increase of approximately 20% in the expected number of DV police reports that were reported in a nearby police station from the crime local. On the other hand, our estimates suggest no effect on DV reports related to crimes reported in a more distant police station.

By asking how transient emotional shocks— represented by unexpected outcomes in soccer matches— affect domestic violence in the states of Rio de Janeiro and São Paulo, this research contributes to the growing literature of empirical studies on behavioral economics (Loewenstein (2000); Kőszegi & Rabin (2006); Card & Dahl (2011); Corbi (2018)). We also contribute to the literature that investigates the determinants of domestic violence. Such literature has highlighted the effects of social controls (Johnson (2009); Straus et al. (2017)), time of exposure (Dugan et al. (1999); Bhalotra et al. (2020)), economic constraints (Aizer (2010); Anderberg et al. (2015); Baranov et al. (2021)), emotional factors (Angelucci (2008); Card & Dahl (2011); Dickson et al. (2016); Ivandic et al. (2021)) as possible triggers for DV. The empirical literature on emotional factors is still incipient and focused on developed countries (such as the U.S. and the U.K.). One of the reasons for this gap in the literature is the challenge of measuring and identifying emotional shocks. We argue that, due to the relevance of soccer in Brazil, we can overcome this challenge in order to be able to understand the effects of emotional shocks on DV in the context of a developing country. We also dialogue with the literature surrounding the general topic of the connection between sports and violence (Rees & Schnepel (2009); Lindo et al. (2018); Gantz et al. (2009); Card & Dahl (2011); Dickson et al. (2016); Ostrovski (2019); Ivandic et al. (2021)).

To our knowledge, ours is the first research to map the empirical relationship between unanticipated match outcomes in soccer— either a win or a loss when

the converse outcome was predicted— and domestic violence by type using data from our two channels of DV reports (calls to a DV hotline and police reports) in the states of Rio de Janeiro and São Paulo. We shed light on the importance of including different types and sources of DV data in the analysis. Moreover, we also analyzed our results according to the distance of the DV incident to the police station where the report was filed. Furthermore, an important caveat is the importance of designing policies to decrease the disincentives to file a complaint that DV victims face. Finally, similar to Card & Dahl (2011), we are also able to identify that violence stemming from a negative and unexpected outcome of a soccer match is concentrated in a narrow period of time following the end of the match.

This paper is organized as follows: Chapters 2 and 3 set up the background about the link between domestic violence and sports; Chapter 4 presents our data sources and some descriptive statistics; Chapter 5 explains the empirical strategy; Chapter 6 reports the main results and robustness checks; and lastly, Chapter 7 provides some concluding remarks.

2 Domestic Violence

Before discussing the potential channels that can impact violence against women (VAW), it is fundamental to briefly comment definitions in this area. Violence against women (VAW) is any act of gender-based violence that can result in different types of harm to women and girls.⁹ Domestic violence (DV), or intimate partner violence (IPV), is the most common form of VAW (WHO (2021), UN Women et al. (2021)). This violence refers to any behavior a relative uses to gain or maintain control over women. Furthermore, it can assume five forms:¹⁰ physical (to harm or injure using physical force, strength, or use of a weapon); psychological (to control, isolate, humiliate, or embarrass); sexual (to make or coerce a woman to engage in a sexual act without her consent); economic (to deny access to or control over economic resources); and moral (to dishonor or humiliate the woman before society with lies or insults). DV influences women's physical and emotional health (Coker et al. (2000); Coker et al. (2002); Ellsberg et al. (2008)), Productivity (Reeves & O'Leary-Kelly (2007); Duvvury et al. (2013)), and has been linked to psychological, social, emotional, and behavioral problems in children after exposure to DV (Graham-Bermann & Levendosky (2011); Wathen & MacMillan (2013)).

Potential Mechanisms

Several mechanisms can affect domestic violence, including intra-household bargaining power, cash transfers, emotional cues, social controls, and time of exposure.

Household bargaining models predict that male job loss should reduce domestic violence, and female job loss should induce the opposite effect. Aizer (2010)

⁹Such as domestic violence, femicide, sexual violence, human trafficking, female genital mutilation, and online or digital violence (UN Women et al. (2021)).

¹⁰In Brazil, the Maria da Penha Law, created in 2006 (Law No. 11,340, of August 7, 2006) defined these types. The law stipulates harsher punishments for aggressors, improved protection for victims, and accelerated procedures for handling VAW cases. It also determined the creation of specialized courts to deal specifically with crimes of domestic and family violence against women (Cunha & Pinto (2008)).

evaluate the impact of the gender gap on levels of domestic violence in the United States following a household bargaining model. To achieve this goal, she built a new measure for domestic violence based on administrative data: the number of female hospitalizations for assault. The results indicate that a decrease in the gender gap between women and men can explain 9% of the reduction in violence against women. Moreover, this impact supports a causal relationship between the relative labor market conditions and violence. Anderberg et al. (2013) also contribute to this theory by evaluating the relationship between unemployment and domestic violence in the United Kingdom. The empirical results confirmed what household bargaining models predict: a relative increase in male unemployment decreases intimate partner violence, while a relative increase in female unemployment increases domestic abuse.

With a similar motivation, Oliveira & Pereda (2021) evaluate this relationship in Brazil. The results go in the same direction as Aizer (2010): a narrowing of 1% in the gender wage gap can explain a decrease of approximately 1.3% in domestic violence cases in Brazil. Additionally, in the Brazilian context, the conclusions of Perova et al. (2021) show that a decrease in the gender wage gap also reduces occurrences of femicides. Regarding less severe forms of intimate partner violence, this reduction in the wage gap has different effects depending on the context: a reduction decreases DV reports in municipalities with police stations that are responsible for crimes against women but has the opposite effect in states with an absence of such police stations.

The literature also investigates the link between conditional cash transfers (CTs) and domestic violence. Baranov et al. (2021) show that the impact of CTs on DV in low and middle-income countries depends on how the violence is modelled.¹¹ This economic channel could increase, decrease, or have an ambiguous effect on DV.

As we will demonstrate in Chapter 4, most VAW incidents involve crimes in which the offender is an intimate partner or ex-partner of the victim. The victim's exposure time to the offender is considered a potential mechanism for domestic violence: more time spent confined with the offender could imply more

¹¹This also highlights the importance of using multiple sources of DV.

DV episodes. Dugan et al. (1999) discuss this pathway to domestic violence in the United States through the exposure reduction hypothesis; the results show a decline in intimate partner violence from 1976 to 1992. The study's authors argue that this finding can be attributed to a decrease in the number of marriages, the increased facility with which women can get a divorce, and an increase in women's overall economic status. All of these factors contribute to a decrease in the time of exposure the victim has to the potential offender. The results of Bhalotra et al. (2020) provide evidence to support this same theory in Brazil; they find that women's exposure time to the perpetrator of violence in the household is a potential mechanism for increased domestic violence when it is attached to relaxing income constraints.

Angelucci (2008) study the determinants of domestic violence and alcohol abuse by evaluating the program *Oportunidades* (Opportunities)¹² in rural Mexico. The estimates show that the program decreased husbands' alcohol abuse by 15%. In addition, results with heterogeneity by the transfer size and husband's characteristics show evidence that rejects household bargaining models. These results reveal that while small transfers decreased violence by 37% for all households, large transfers provoked an increase in the aggressive behavior of husbands who hold traditional views of gender roles. The male backlash theory predicts this behavior: an increase in women's income leads to an increase in violence (Aizer (2010)).

Cycle of Domestic Violence

Walker (1979) was one of the first to study the psychology of battered women as victims. Her book contributes to the discussion of intra-family violence as she identifies its patterns. She defines a battered woman as:

A battered woman is a woman who is repeatedly subjected to any forceful physical or psychological behavior by a man in order to coerce her to do something he wants her to do without any concern for her rights.

¹²*Oportunidades*(Opportunities) is a program developed in Mexico that combines cash transfers for women and investment in human capital.

When interviewing battered women, the author concentrated on commonalities expressed by the victims and then worked to generalize them in order to draw conclusions based on the data. Therefore, she systematized a sequence of acts of aggression committed in a marital context. These incidents of assault or battery take place in a cycle that repeats itself in three phases, which has become known as the cycle of violence. Phase 1 is defined as the tension-building stage. During this time, stress increases, and minor incidents occur. The aggressor tends to vent their frustrations to the victim and get triggered by minor situations that end in abusive behavior. The victim is frequently in denial that their partner is perpetrating violent behavior, often believing it is a one-off occurrence, or otherwise dismissing or denying that the abuse is taking place. This tension can last for days, months, or years. However, as the strain escalates, the situation will likely evolve to Phase 2: the battering incident.

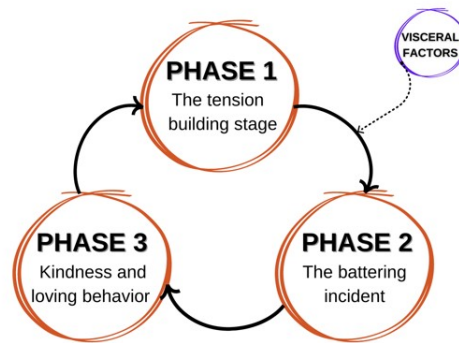
Phase 2 begins when the acute battering incident takes place. In this phase, there is an uncontrollable discharge of the tensions accumulated in phase one that leads to the violent act. This violence can be physical, psychological, sexual, patrimonial, or moral. As Walker pointed out, the violent incident can't be predicted or anticipated. Therefore, this phase has two central characteristics: the victims' lack of ability to foresee the incident, and their lack of control.¹³ After the incident takes place, victims often feel that it was a one-time situation that won't happen again.

Lastly, Phase 3 of the domestic violence cycle is known as the phase of kindness and contrite, loving behavior; or, the honeymoon phase. In this stage, the aggressor demonstrates regret and tries to regain the victim's trust.¹⁴ There is a relatively quiet period in which the aggressor makes efforts to improve or to repair trust with their partner, and makes transient changes. However, eventually, the tension starts to build again, and the cycle restarts.

¹³This anticipation can provoke high levels of psychological stress for the battered woman.

¹⁴It is essential to stress that the battered woman can feel pressured to maintain the relationship due to several reasons: social norms, financial dependence, children, and lack of support network.

Figure 1 – The cycle of Domestic Violence



Source: (WALKER, 1979). Own elaboration

Identifying where our interest effect could affect the cycle of violence is crucial to considering appropriate public policies to mitigate this crime. We hypothesize that visceral factors or emotional cues, represented by unexpected results in soccer matches, could represent an external situation that will often upset this delicate balance and accelerate Phase 1 to Phase 2, as shown in Figure 1.

3 Sports and Violence

Most research on the link between sports and violence has been done in the United States and tries to understand the impact of American football¹⁵ has on violence.

Using daily data from 26 police stations in the U.S. between 2000 and 2005, Rees & Schnepel (2009) investigates the effect of college football home matches on rates of vandalism, assaults, arrests for misconduct, and offenses related to the use of alcohol on game days. The results show that the city hosting the match recorded a substantial increase in assaults on game days. In addition, there is evidence that vandalism, alcohol abuse, and arrests for misconduct increase on match days, but there is nothing to indicate the same impact for matches taking place in the opponent's stadium. With a similar motivation, Lindo et al. (2018) use data from the National Incident-Based Reporting System to evaluate the impact of American football matches on rape rates in first-division league schools in the U.S. The results indicate that days with football matches saw an increase of 28% in rape reporting among women aged 17-24. When they investigate possible heterogeneity in the results between home matches and away matches, they find that reporting increased by 41% on home match days, compared with an increase of 15% for away matches. The authors argue that football matches intensify college students' parties, which can explain this negative impact.

Gantz et al. (2009) analyzes the link between professional football and rates of domestic violence in the U.S. They gather data from the NFL matches and DV dispatches between 1996 and 2002. The results suggest that the presence of a football match increases the expected number of DV police reports, and this effect is higher according to the importance of the match. They argue that this aggressive behavior by men occurs due to the feelings and tensions associated with the matches.

¹⁵Of the 50 largest audiences in the U.S., 34 are matches from the National Football League, the premier professional football league in the United States. See: <https://www.meioemensagem.com.br/home/midia/2019/01/04/das-50-maiores-audiencia-de-tv-dos-eua-34-sao-jogos-da-nfl.html>.

Card & Dahl (2011) are the first to examine the effects of football wins and losses in the U.S. relative to pre-match expectations. Their hypothesis is that the risk of family violence is affected by the gain-loss utility from match outcomes around a rationally expected reference point. As in our research, they also hypothesize that the betting market results do not influence the match's actual result. The authors analyze the impact of unexpected game results during professional football season¹⁶ on police reports of family violence on Sundays with matches. They find that upset wins¹⁷ had little impact on family violence, while on the other hand, upset losses¹⁸ causes an increase of 10% in violence committed by men against their partners at home.

With a similar motivation, Dickson et al. (2016) investigates if the disruption of expectations-based reference points can cause violent behavior by football fans in Glasgow, Scotland. More specifically, they evaluate the impact of unexpected results on levels of domestic violence. While matches with intense rivalry¹⁹ increase the expected numbers of DV reported by 36% regardless of the outcome, other matches did not have an impact on DV occurrences. Using DV call data from Greater Manchester, United Kingdom, Ivandic et al. (2021) evaluates the relationship between football, alcohol, and domestic abuse. They contribute to the literature by studying domestic violence incidents and time dynamics that follow a football match. Results highlight the role of alcohol and time of exposure to the perpetrator as primary triggers of DV in the aftermath of the game.

Ostrovski (2019) evaluate the impact of transient emotional shocks induced by unexpected results of soccer matches between 2006 and 2016 in Brazil on the violent behavior of individuals. Like Card & Dahl (2011) and Corbi (2018), his research also uses pre-match expectations and hypothesized the lack of correlation between the sports betting market and actual results observed in football matches. Estimates indicate that each increase in the percentage point of the number of people experiencing a negative shock²⁰ increases the expected number of deaths

¹⁶National Football League.

¹⁷A win when the team was predicted to lose.

¹⁸A defeat when the team was predicted to win.

¹⁹Celtic and Rangers.

²⁰An unexpected loss when the team was expected to win.

from aggression by 0.08%. Additionally, the results show that the number of female deaths occurring at home increased significantly in the face of these adverse shocks. This finding further drives the execution of our research.

Furthermore, in the Brazilian context, Cerqueira (2022) attempts to contribute to the lack of empirical work linking soccer and violence against women. He gathers data from soccer matches during *Campeonato Brasileiro* first division and VAW Police Reports from five states: Rio de Janeiro, São Paulo, Rio Grande do Sul, Pará, Bahia, and Minas Gerais. The author's goal is to test if there is a positive relationship between incidents of threats and assaults against women on days with a soccer match of a team from that municipality. The results indicate that on a day with a match featuring a soccer team from a specific city, the expected number of threat incidents reported to police stations increases by 23.7%, while physical harm crimes increases by 20.8%. Furthermore, the author filters the results into two categories: instances of violence in which the offender was a partner or ex-partner of the victim, and instances in which the offender and victim had no relationship. In the formerly restricted sample (offender and victim have or previously had a romantic relationship), the findings continue to show that the negative shock had a positive effect on occurrences of violence, i.e., violence increased on soccer match days. However, in the latter sample, the estimates were no longer statistically significant when the victim and offender did not know each other.

4 Data

Soccer and Bet data

We use data from two divisions of Brazil's primary soccer competition to identify emotional shocks: *Campeonato Brasileiro Serie A* and *Serie B*.²¹ In 2021 the International Federation of Football History and Statistics (IFFHS) chose this championship as the strongest national league in South America and the most dominant in the world. Campeonato Brasileiro Series A works on a system of promotion and relegation with the Campeonato Brasileiro Series B.²² Those two divisions include 20 teams and seasons usually last from May to December. The tournament follows a double round-robin system: each team plays against the others in two matches; once in their home stadium, and once in their opponents'. Hence, we have 38 soccer matches per division per year. At the end of each season, the champion is the team with the most points. Each soccer match lasts two hours on average. We collect data from all soccer matches from 2015 to 2019, for a total of 3,800 matches. From 2015 to 2019, there were 31 different soccer teams in the first division of the competition. As our analysis focuses on the states of Rio de Janeiro and São Paulo, it is essential to stress that 30% of the teams are from these states.

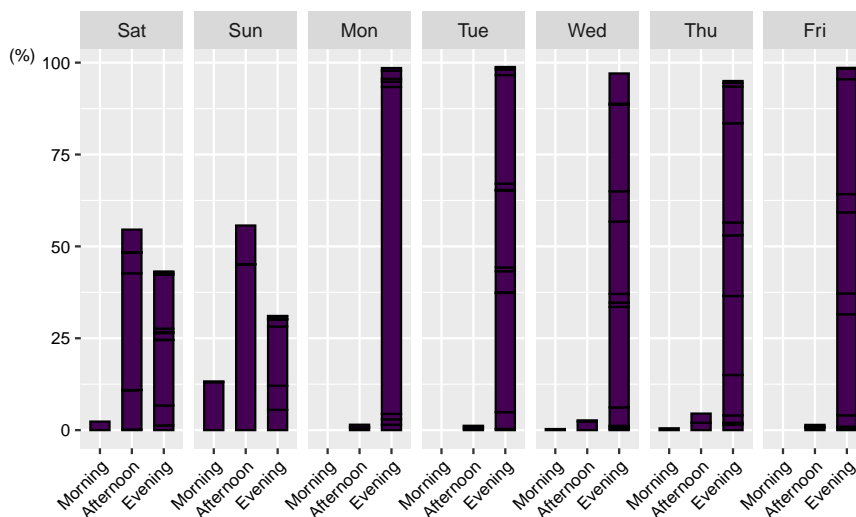
The soccer matches that take place during Campeonato Brasileiro's rounds are set on different days of the week. The majority of the matches take place on Saturdays and Sundays (55.4%), while the remainder takes place on Tuesdays, Wednesdays, and Thursdays (30%). However, as Figure 2 shows, the time of day that the match starts differs significantly between weekdays and weekends. We can see clearly that matches on weekdays are in the evening, while matches on the weekend are divided between both afternoon and evening start times. This pattern is essential for the definition of the lead of our dependent variable when we use

²¹In 2019, the TV station Rede Globo recorded an average rating of 24 points with the broadcasts of the Campeonato Brasileiro Series A matches in the states of São Paulo and Rio de Janeiro, obtaining a 43% share of the total audience. See: <https://www.lance.com.br/fora-de-campo/brasileirao-alcanca-maior-media-audiencia-globo-anos.html>.

²²The last four teams in Series A are relegated to Series B, and the top four teams in Series B go to Series A.

our non-police source as DV measure, which will be discussed in Chapter 4.

Figure 2 – Match Start Time by Weekday



Notes: Morning matches start at 11am. Afternoon matches start from 4pm to 5:30pm. Evening matches start from 6pm to 10:30pm.

We collect data from Brazilian Soccer betting markets— markets which are organized by large international online exchanges²³— to capture pre-match expectations. We obtained information about the average betting odds for each Campeonato Brasileiro soccer match for Series A and Series B from 2015 to 2019. Hence, we are able to associate each individual match with the average odds that a given team (either the home or away team) would win the said match. We define the implicit odds as the inverse of the given betting odds and established that teams that presented higher implicit odds had better chances of winning. For example, if the average market odds of Team A were 1.69, and the odds of Team B were 4.90, this indicates that the market predicted that Team A is most likely to win the match.²⁴ Table 1 shows that home teams were determined to have a

²³Data shows that betting markets have been growing significantly in Brazil: it is estimated that the betting market moved around R\$ 4 billion in Brazil in 2021. See <https://igamingbrazil.com/en/sports-betting-en/2021/10/27/sports-betting-continues-to-grow-in-the-brazilian-market/>.

²⁴<https://www.oddsportal.com/soccer/brazil/serie-a/internacional-flamengo-rj-xSSzSp1a> shows an example of how that information is displayed in our data.

clear advantage: they present, on average, higher implicit odds than away teams. Like Corbi (2018) and Card & Dahl (2011), we hypothesize that betting markets produce unbiased predictions of soccer match outcomes.

Table 1 – Summary Statistics of Bet Data, Implicit Odds, 2015 - 2019

	Implicit Odds	
	Home team	Away team
Series A	0.508	0.273
Series B	0.501	0.272

Notes: Matches from 2015 to 2019 of *Campeonato Brasileiro* Series A and Series B

To identify the popularity of the primary soccer teams in Brazil, we use data from *Mapa das Curtidas*. It was a joint effort made in 2017 between Facebook²⁵ and *Globo Esporte*.²⁶ This platform provides the number of supporters of the 64 main soccer teams²⁷ in all Brazilian municipalities with greater than 5,000 inhabitants.²⁸ Therefore, in our final sample, we only kept the municipalities with more than 5,000 inhabitants in our sample states, São Paulo and Rio de Janeiro.²⁹

The data shows the total number of likes per municipality and the distribution of likes per team, which enabled us to calculate the quantity of supporters for

²⁵This social network is made up of 122 million users in Brazil. See <https://ge.globo.com/futebol/noticia/como-foi-feito-o-mapa-de-curtidas-das-torcidas-do-brasil-no-facebook.ghtml>.

²⁶Globo Esporte is a Brazilian sports news portal maintained by the Globo.com portal, of Grupo Globo and under the guidance of Central Globo de Esportes, a subsidiary of the General Directorate of Journalism and Sport of Rede Globo.

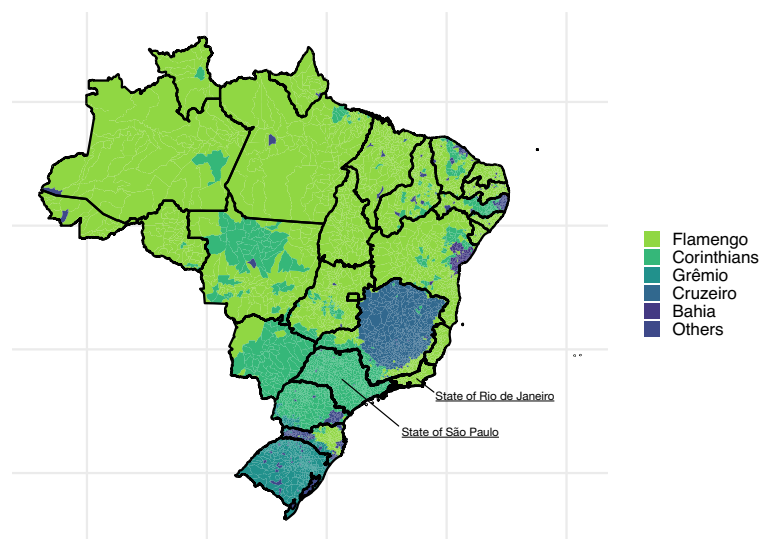
²⁷These are: ABC, América-MG, América-RN, ASA, Atlético-GO, Atlético-MG, Atlético-PR, Avaí, Bahia, Boa Esporte, Botafogo, Botafogo-PB, Botafogo-SP, Bragantino, Brasil de Pelotas, Campinense, Ceará, Chapecoense, Confiança, Corinthians, Coritiba, CRB, Criciúma, Cruzeiro, CSA, Cuiabá, Figueirense, Flamengo, Fluminense, Fortaleza, Goiás, Grêmio, Guarani, Internacional, Joinville, Juventude, Londrina, Luverdense, Mogi Mirim, Moto Club, Náutico, Oeste, Palmeiras, Paraná, Paysandu, Ponte Preta, Portugues, Remo, Salgueiro, Sampaio Corrêa, Santa Cruz, Santos, São Bento, São Paulo, Sergipe, Sport, Tombense, Treze, Tupi-MG, Vasco, Vila Nova, Vitória, Volta Redonda, Ypiranga-RS.

²⁸Data of these municipalities presents only the percentage of the micro-region where the municipality is located.

²⁹98% of São Paulo's population and 100% of Rio de Janeiro population.

each team. Figure 3 presents the geographic distribution of the soccer fan base in Brazil. The teams on the map have the biggest share of supporters in the municipalities, indicated by their respective colors. We can see that the two most popular teams are Flamengo, from Rio de Janeiro, and Corinthians, from São Paulo. The states of São Paulo and Rio de Janeiro are highlighted on the map. With this information, we are able to calculate the share of people who experience an emotional shock following an unexpected outcome in a soccer match according to the popularity of teams in each municipality. Appendix Figure A.2 shows the distribution of this platform across the country. First, we create a variable that is the fraction of the total number of likes per population of each municipality and then calculate the distribution of this variable. We can see that almost all locations in Rio de Janeiro and São Paulo are in the third and fourth quartiles.

Figure 3 – Geographic Distribution of Soccer Fan Base: Teams With the Most Likes



Source: *Mapa das Curtidas*, 2017

In Table 2, we provide summary statistics for the states of Rio de Janeiro and São Paulo. We select only the main soccer teams from those locations: Corinthians, São Paulo, Palmeiras, and Santos for São Paulo, and Flamengo, Vasco, Botafogo, and Fluminense for Rio de Janeiro. Column 1 shows the mean number of fans across municipalities, and Column 2 shows the standard deviation. We can see

that Corinthians and Flamengo are the teams with the most significant number of fans across the São Paulo and Rio de Janeiro municipalities, respectively. However, there is also an indicative share of the soccer fan base of the other primary soccer teams.

Table 2 – Summary Statistics - Soccer Fan Base: States of Rio de Janeiro and São Paulo

Main Soccer Teams	Share of supporters	
	(1) Mean	(2) S.d.
Panel A: São Paulo		
Corinthians	0.37	0.05
São Paulo	0.20	0.04
Palmeiras	0.13	0.03
Santos	0.08	0.05
Panel B: Rio de Janeiro		
Flamengo	0.44	0.04
Vasco	0.15	0.02
Fluminense	0.09	0.02
Botafogo	0.07	0.02

Notes: This table provides summary statistics from Mapa das Curtidas, 2017. Panel A shows the main soccer teams from the state of São Paulo, and Panel B from Rio de Janeiro. Column 1 shows the mean of share across municipalities and Column 2 the standard deviation. For the state of São Paulo, these indicators are calculated with the share of 645 municipalities and for Rio de Janeiro, 92.

Domestic Violence Data

One of the main challenges of studying violence against women is the prevalence of under-reporting (Miller et al. (2020)).³⁰ Therefore, we use two DV measures from police and non-police sources with different costs and forms of reporting that we will discuss here.

Police Reports: We use public and official information from police reports of domestic violence registered in the states of Rio de Janeiro and São Paulo.³¹ We have access to information for each crime reported with daily frequency from January 2015 to December 2019, with each report including information on the characteristics of the offender (gender, age, race, education, and relationship to the victim), the victim (gender, age, race, and education), and the incident (date, municipality, hour of incident, hour of report, and location). Additionally, we classified each incident³² into the five types of DV according to Maria da Penha Law's definitions. Therefore, we are able to obtain ample information about all DV incidents that were reported to police stations in the states of Rio de Janeiro and São Paulo. For example, given that we know where each crime happened (in the household, in public transportation, etc.), we can filter the sample to include only DV incidents at home and in which the offender was a partner or ex-partner of the victim. Thus, we can see the impact of unexpected results in soccer matches on DV crimes at home occurring in a specific time window after the match. When we restrict our data to only days with soccer matches and DV crimes at home, we observe 294,081 police reports.³³

Non-Police Reports: For our non-police DV source, we use public and official information from the calls to *Ligue 180* that the Ministry of Women, Family, and Human Rights collects. This toll-free service is available 24 hours a day, every day

³⁰Carvalho & Oliveira (2016) highlights the difficulty of researching violence against women in Brazil due to the absence of a national longitudinal database. Furthermore, they argue that statistics underestimate the reality women face in Brazil.

³¹Each state's Department of Public Security provides information acquired by LAI.

³²A single police report can have more than one incident. For example, if the man threatened and struck his partner, this crime will have two entries on our database: verbal threat and physical injury. Therefore, we would have two types of DV violence: physical and psychological.

³³128,506 for the state of Rio de Janeiro and 165,575 for the state of Sao Paulo.

of the year to report any DV. We have daily information for each call from January 2015 to December 2019 registered in Brazil. The data includes information about the municipality of occurrence, characteristics of the victim and offender,³⁴ the caller's relationship to the victim, the relationship between the victim and offender, and the type of violence being reported. As our focus is domestic violence reports, we filter our data set for only calls regarding this violation in municipalities in the states of São Paulo and Rio de Janeiro for days with soccer matches.³⁵ It is important to stress that, considering that it is a non-police source, calls to *Ligue 180* could capture reports of DV that otherwise might not have necessarily led to a police occurrence.³⁶ Furthermore, another advantage of this source is the nationwide coverage. Regarding police reports, each state's Department of Public Security has its own methodology to classify DV incidents.³⁷

Appendix Figure A.3 shows that approximately 75% of DV reports to the VAW national helpline involved crimes where the offender was an intimate partner or ex-partner of the victim. This statistic highlights the difficulty of researching VAW and DV because victims often live with the offenders or are in high contact with them. Therefore, it became essential to our research to understand how the mechanism of DV reporting works. For example, if the victim decides to report,³⁸ will they call the DV hotline? Will they go to a police station right after the crime to report it, or will they wait? Unfortunately, one of the limitations of the non-police source is that they do not provide the timing of the crime's occurrence nor the time of the call to report it. Therefore, we cannot see this time difference in order to further understand the reporting mechanism. However, data from DV police reports have this information and guide us in this analysis.

³⁴Gender, age, race, and education.

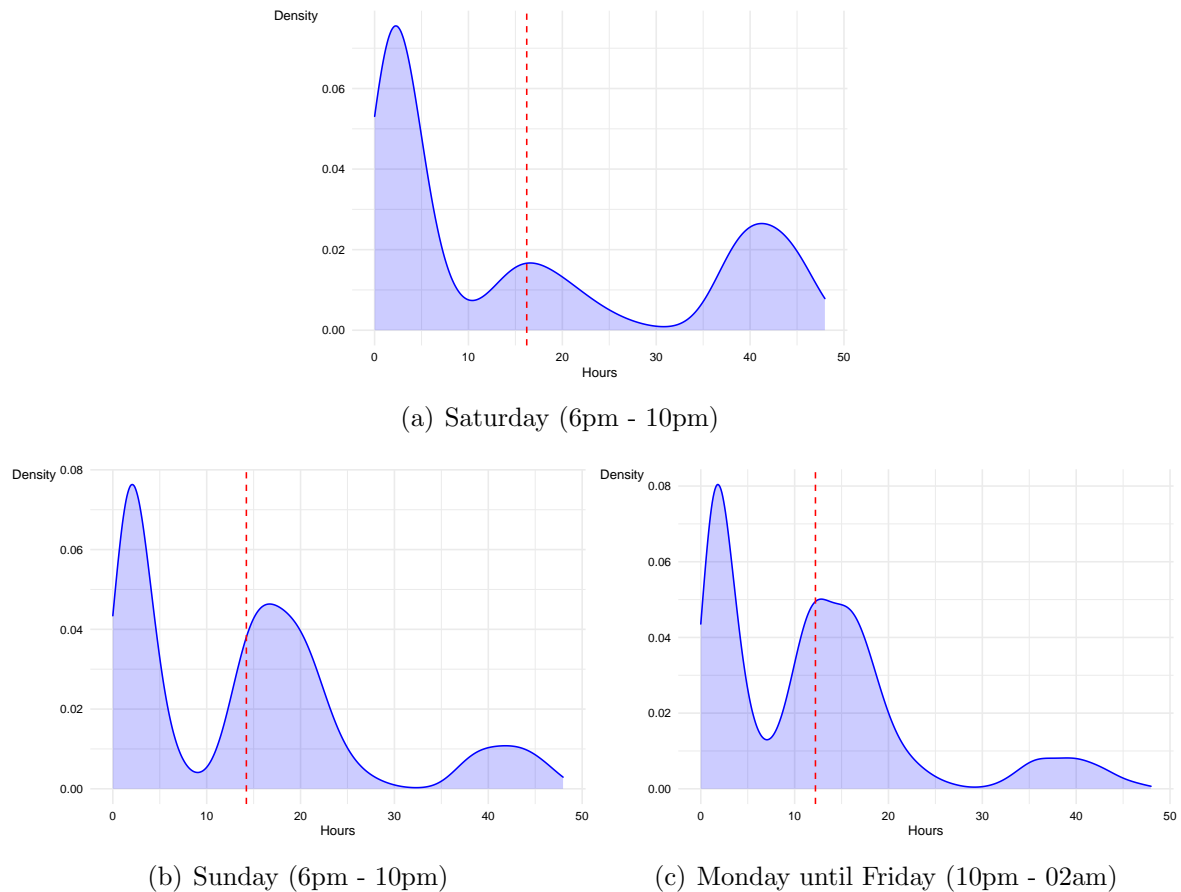
³⁵Appendix Table B.1 shows the total number of calls received by *Ligue 180* from 2015 to 2019 in the states of Rio de Janeiro and São Paulo, categorized by the type of violation reported. We can see that there were almost 176,000 reports, with approximately 74% of them reporting domestic violence. Appendix Table B.2 provides the same statistics nationwide. There were almost 600,000 reports, and approximately 72% of them were to make a report about DV.

³⁶Perez-Vincent et al. (2020) argue that the number of calls to report psychological violence could be more realistic since some of those incidents do not escalate to an actual police report.

³⁷Rio de Janeiro and São Paulo Departments have similar methodology and data organization.

³⁸Miller & Segal (2019) emphasize disincentives for women to report gender-based violence: fear of retaliation by the offender, psychological and emotional costs, absence of specialized services for women, and uncertainty about the outcome of the report.

Figure 4 – Difference Between Timing of Report and Timing of Occurrence of DV Crimes, States of São Paulo and Rio de Janeiro, 2015 - 2019.



Notes: We filter crimes that were reported up to 48 hours after the occurrence and that happened on match days.

Figure 4 displays the distribution of the difference in hours between when the report was filed and when the DV occurrence took place. As the soccer matches' start times differ depending on the day of the week, we split our analysis into three sections: (a) Saturday, (b) Sunday, and (c) Monday through Friday. Next, we define the most common match start time for these days, plot the density of the difference in hours between occurrences, and reported DV crimes that happened in the four hours after a soccer match. The data shows that for all days, we have an expressive mass that is reported only on the following day. Furthermore, data

from Saturdays shows a relevant group that waited almost two days to report the incident. This difference makes sense if we consider that most victims probably have to wait until Monday to be able to register a crime, as the offender is usually an intimate partner of the victim. Thus, we learned that if we want to assess the impact of unexpected results of soccer matches on levels of DV, we have to check our non-police reports the next day.

Table 3 – Difference Between Timing of Report and Timing of Occurrence according to distance from Neighbourhood of Occurrence and Police Station, 2015 - 2019.

Day of incident	Monday - Friday	Saturday	Sunday
Time of incident	10 pm - 2 am	6 pm - 10 pm	6 pm - 10 pm
Distance from Police Station			
Less than median distance	11.74	15.45	13.53
More than median distance	12.63	16,94	14.93

Notes: This table reports the difference between timing of report and timing of occurrence of DV crimes in Rio de Janeiro and São Paulo according to distance from Police Station. We filter crimes that were reported up to 48 hours after the occurrence and that happened on match days. Regarding crimes in the state of São Paulo, the median distance between the neighbourhood of occurrence and the Police Station is 2.07 kilometers, while this same measure for the state of Rio de Janeiro is 2.62 kilometers. Therefore, if a victim from São Paulo report a crime in a Police Station more than 2.07 km from the crime place, this incident is accounted in “more than median distance.”

Victims of DV face several disincentives to report a crime (Miller & Segal (2019)). The absence of specialized services for women and the distance from a Police Station are factors that can impact their decision to report or not. As our police data have information on the neighborhood of occurrence and the police station where the crime was reported, we can calculate this distance. In order to do that, we georeferenced all neighborhoods and police stations from our database and then measured their distance for each reported incident. We calculated the median distance for DV crimes in the states of São Paulo and Rio de Janeiro; the values are 2.07 kilometers and 2.62 kilometers, respectively.³⁹ Next, we classified each incident into less than median and more than median distances. Then we

³⁹We calculate separately due to geographic and demographic differences between those states.

calculated the average difference in hours between when the report was filed and when the DV occurred across those two groups.

Table 3 displays those averages; we split our analysis into different days and times like Figure 4. We can see that victims that reported crimes in police stations more distance from the neighborhood of the incident take longer to file a complaint in all cases. For instance, if we look at the difference regarding DV crimes that happened Saturday from 6 pm to 10 pm, we can see that it takes almost one hour and a half more to report than incidents closer to police stations. A critical discussion is if these values suggest only a difference in hours to report or if they indicate that when the victim has a nearby police station from the crime local, it can increase the incentives to report.

Table 4 – Descriptive Statistics of DV Data, Police and Non-Police Reports, 2015-2019, Rio de Janeiro and São Paulo

	Police Reports	Non-police Reports
	Daily DV rate 4-hours after match per 100,000 population	Daily DV rate 1-day after match per 100,000 population
Panel A: Type of Violence		
All types	0.125	0.111
Physical	0.058	0.036
Psychological	0.050	0.066
Panel B: Race and Education		
Low Education	0.052	
High Education	0.049	
White	0.069	0.041
Non-White	0.045	0.051
Panel C: Weekday		
Saturday	0.163	0.100
Sunday	0.174	0.126
Monday - Friday	0.10	0.111

Notes: This table reports summary statistics of our analysis sample. For DV police reports, the data shows the daily rate in the four hours after the end of the game for municipalities in Rio de Janeiro and São Paulo. For non-police reports, or DV calls to *Ligue 180*, the statistics provide the daily rate for days after soccer games for the same states. “Low education” refers to victims with any level of education lower than high school, and the opposite for “high education.” Panel A shows division by types of violence, Panel B by victim’s profile, and Panel C by weekday. We do not provide the daily rate by education for calls to the national helpline because this information is not well completed over the years.

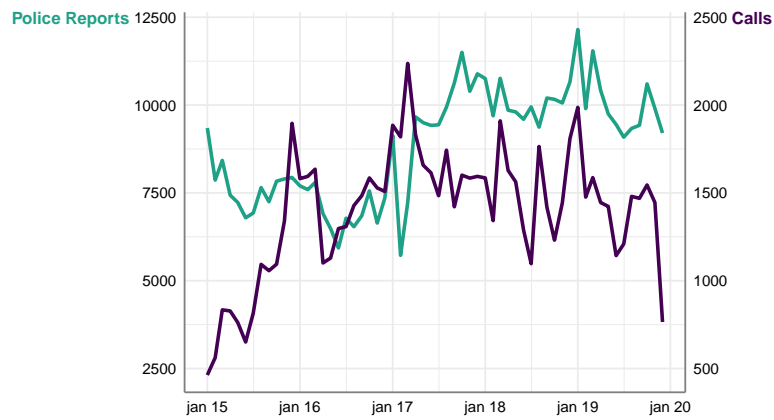
Table 4 shows the daily DV rate for both report sources: police and non-police (calls to *Ligue 180*). We can see that the overall daily rate of DV reports occurring up to four hours after a soccer match is 0.125 per 100,000 inhabitants. Regarding the non-police source, the overall daily rate for the day following a soccer match is 0.111 per 100,000 individuals, slightly less than the police reports. Panel A shows how this rate varies by type of DV: the rate for psychological violence is more significant than that of physical violence when we look at calls, while data from police reports show otherwise. Panel B reports another difference between the two sources: according to police reports, the daily rate of DV for white victims is more significant than for non-white victims, while data from calls to *Ligue 180* shows the opposite. Finally, Panel C narrows the focus to differences in rates according to the day of the week. Both measures report a higher rate on Sunday. However, there seems to be a difference between the other days of the week. It is important to stress that the police reports include the hour of occurrence, but with non-police report data we can only see the day that the crime was reported, and not the time. Therefore, we will explore the data differently based on the way women report, as shown in Figure 4.

Police vs. Non-police Reports Data

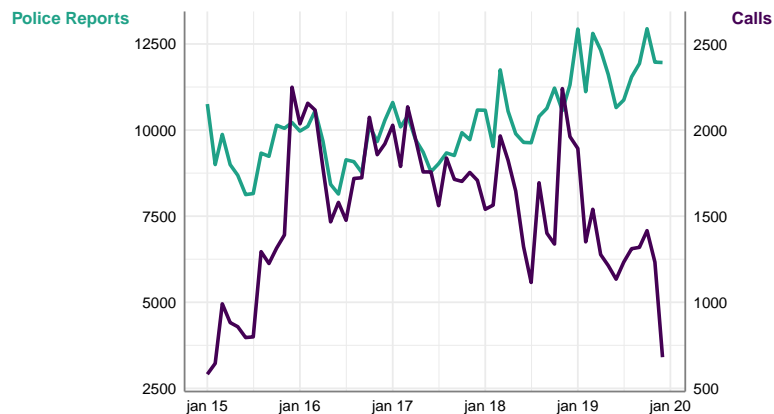
We plot both measures of DV reporting for the states of Rio de Janeiro and São Paulo to determine if DV calls and police reports present the same usage trends. Figure 5 reveals the monthly evolution of DV calls to *Ligue 180* and police reports between 2015 and 2019. The left axis represents the levels for police reports and the right axis for calls. Despite the absolute number of police reports being much higher than calls to the DV helpline, we can see that they follow a similar trend.⁴⁰ Therefore, this suggests that both measures similarly capture trends for domestic violence in each state.

⁴⁰Except for 2015, because it was the first year of *Ligue 180* as a channel for reporting DV.

Figure 5 – Evolution of DV Calls and Police Reports, 2015 to 2019



(a) State of Rio de Janeiro



(b) State of São Paulo

To determine if the municipalities with the highest rates of police reports are also the states with the highest rates of calls, we plot, year by year, the geographic distribution of terciles in Rio de Janeiro and quartiles in São Paulo.⁴¹ Hence, municipalities in the highest tercile/quartile registered the highest rates of DV measures in that specific year. Figure 6 and 7 shows a certain complementary between those channels of DV report⁴² for both states: most of the municipalities

⁴¹Due to the number of municipalities of each state: 645 in São Paulo and 92 in Rio de Janeiro.

⁴²Perez-Vincent & Carreras (2020) find a substitution in reporting channels of DV during the pandemic of COVID-19 in Buenos Aires.

with the highest rates of calls for *Ligue 180* are the same with the lowest rates for Police Reports.⁴³

Figure 6 – Geographic Distribution of Municipalities by Tercile of DV Rate per 100,000 Women - State of Rio de Janeiro, 2017

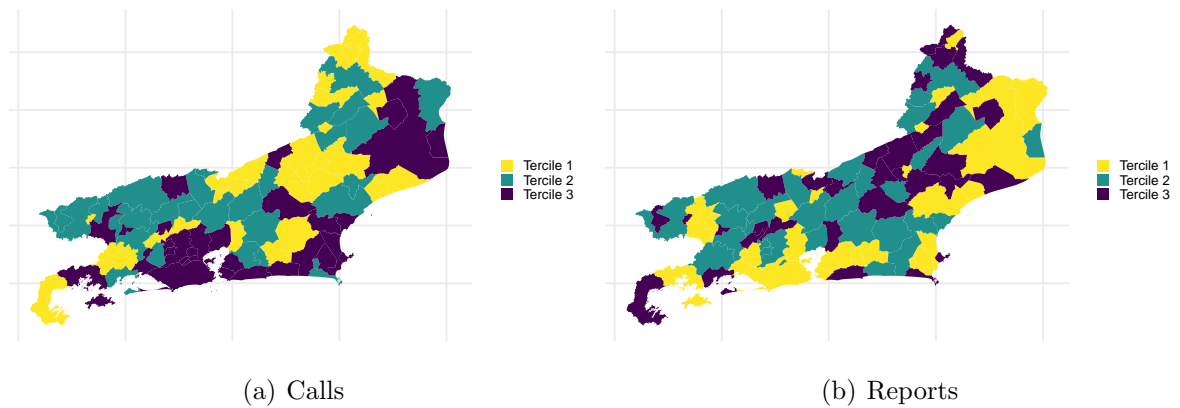
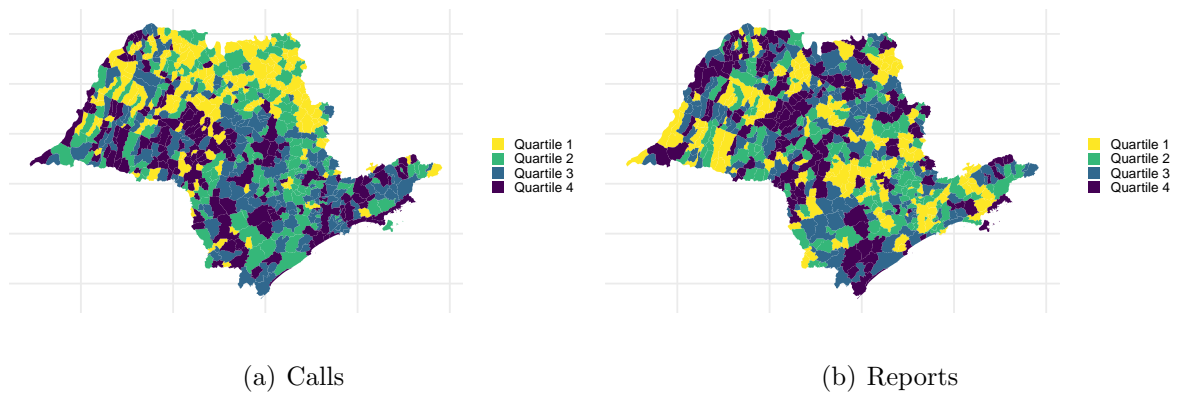


Figure 7 – Geographic Distribution of Municipalities by Quartile of DV Rate per 100,000 Women - State of São Paulo, 2017



⁴³Appendix Figures A.4 and A.5 plot these measures for 2015, 2016, 2018, and 2019.

Appendix Table B.3 presents the population size in tercile and quartile by DV measure and year. We can see that the municipalities with the highest rates of calls to *Ligue 180* have a more significant population than those with the highest police report rates in all years. This difference could suggest that more populous cities better accepted the new non-police report channel, *Ligue 180*. Indeed, this awareness is interesting because it could also suggest that smaller municipalities would benefit from more advertising for the national DV hotline.

5 Empirical specification

To assess if unexpected transitory emotional shocks have an impact on domestic violence, we follow our analytical approach based on Card & Dahl (2011) and Corbi (2018). We estimate the following Poisson count model⁴⁴, which is described subsequently:

$$\begin{aligned}
 DV_{m,t} = & \beta \sum_{k \in K} s_{k,m} \text{Positive Shock}_{k,t} + \gamma \sum_{k \in K} s_{k,m} \text{Negative Shock}_{k,t} \\
 & + \theta X_{m,t} + \delta_m + \gamma_{mt} + \varepsilon_{m,t}
 \end{aligned} \tag{1}$$

where the variable $DV_{m,t}$ represents two measures. The first is the expected number of calls to the *Ligue 180* in municipality m on the next day of the soccer match. The second measure is the expected number of incidents of DV reported to the police in a four-hour period after the end of the soccer match. The share of supporters of team k in municipality m is $s_{k,m}$. Our controls are in $X_{m,t}$: female population size, p_{kt}^{loss} , p_{kt}^{win} , and p_{kt}^{close} .⁴⁵ Additional components of our main model include municipality fixed effects, δ_m , and γ_{mt} represents Week-year fixed effects. We also added weekday fixed effects to accommodate fixed characteristics of days.

The coefficients of interest are β e γ , which will capture the positive and negative shock effects, respectively. Like Corbi (2018), these variables represent emotional cues that reflect the behavior affected by the gain-loss utility from match outcomes around a rationally expected reference point. Positive Shock $_{k,t}$ captures situations in which better-than-expected soccer outcomes occur. For example, results from the betting market indicate a loss for team k , but contrary to the prediction, team k wins. Similar, Negative Shock $_{k,t}$ captures situations where a win was expected from team k , but the actual result was a loss⁴⁶. Formally we define:

⁴⁴An advantage of a Poisson specification is that we can include fixed effects without incidental parameters problem as Cameron & Trivedi (2013) has shown (Agüero (2021)).

⁴⁵We describe these variables in this section.

⁴⁶The histogram of those variables are on Appendix Figure A.6 and Figure A.7.

$$\text{Positive Shock}_{k,t} = [\text{win}_{kt} + \text{draw}_{kt}]p_{kt}^{\text{loss}} + \text{win}_{kt}p_{kt}^{\text{draw}} \quad (2)$$

$$\text{Negative Shock}_{k,t} = [\text{loss}_{kt} + \text{draw}_{kt}]p_{kt}^{\text{win}} + \text{loss}_{kt}p_{kt}^{\text{draw}} \quad (3)$$

where draw_{kt} , win_{kt} , and loss_{kt} indicate whether team k draws, wins or loses a match, respectively. The variables p_{kt}^{draw} , p_{kt}^{win} , and p_{kt}^{loss} represent the pre-match expectations and indicate whether team k is predicted to draw, win or lose, respectively. We construct them like Corbi (2018) by using the implicit odds, which are the inverse of the odds from our bet data. We considered that a team is predicted to win if their implicit odds ($\text{Prob}(\text{win})$) are greater than 0.5. For example, if the average odds for team k are 1.69, their implicit $\text{Prob}(\text{win})$ would be 0.59, and they are predicted to win by pre-match betting market odds. Formally:

$$p_{k,t}^{\text{win}} = \begin{cases} 1, & \text{if } \text{Prob}(\text{win}) > 0.5 \\ 0, & \text{otherwise} \end{cases} \quad (4)$$

$$p_{k,t}^{\text{loss}} = \begin{cases} 1, & \text{if } \text{Prob}(\text{loss}) > 0.5 \\ 0, & \text{otherwise} \end{cases} \quad (5)$$

and we have $p_{k,t}^{\text{draw}} = 1 - \max\{p_{k,t}^{\text{win}}, p_{k,t}^{\text{loss}}\}$.

In conclusion, the interaction of $\sum_{k \in K} s_{k,m} \text{Negative Shock}_{k,t}$ and $\sum_{k \in K} s_{k,m} \text{Positive Shock}_{k,t}$ represents the share in each municipality of people that are experiencing a negative/positive emotional transient shock relative to their rational expectations for the matches outcomes. Therefore, we can see the impact of the increase of these shocks on domestic violence reports and calls to the DV helpline in municipalities in the states of Rio de Janeiro and São Paulo.

6 Results

Main

Our baseline specification examines the effect of unexpected results of soccer matches on DV at home in the four-hour period after the end of the match using police report data.

Table 5 – Impact of Emotional Shocks on DV Police Reports, States of Rio de Janeiro and São Paulo, 2015 to 2019

	DV Reports Occurring up to Four Hours After a Match				
	(1)	(2)	(3)	(4)	(5)
Positive Shock	0.583*** (0.0421)	0.0604 (0.0434)	-0.0255 (0.0449)	0.0681 (0.0546)	0.0780 (0.0590)
Negative Shock	0.585*** (0.0280)	0.144*** (0.0390)	0.0472 (0.0368)	0.0663* (0.0371)	0.0792** (0.0377)
Mean Dep. Variable	0.133	0.133	0.133	0.133	0.133
Mean Positive Shock	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)
Mean Negative Shock	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)
Observations	466286	466286	466286	466286	466286
<i>Fixed Effects</i>					
Controls	No	Yes	Yes	Yes	Yes
Municipality	No	No	Yes	Yes	Yes
Week	No	No	No	Yes	No
Week \times Year	No	No	No	No	Yes
Weekday	No	No	No	Yes	Yes
Year	No	No	No	Yes	No

Notes: This table reports the Poisson estimates of the impacts of positive/negative emotional shocks on domestic violence in the states of Rio de Janeiro and São Paulo. Our dependent variable is the number of DV police reports related to incidents at home occurring within the four hours following the match. Positive and negative shocks are calculated according to Equation 2 and 3 using data from the Brazilian national championship, betting markets, Facebook, and “Globo Esporte”. Each column reports coefficients from a different regression, depending on the fixed effects and controls. Controls are p_{kt}^{loss} , p_{kt}^{win} and p_{kt}^{close} , like Card & Dahl (2011), and log of female population size. Standard errors in parentheses are clustered by municipality. *** p<0.01, ** p<0.05, * p<0.1.

Table 5 presents the estimated coefficients of β and γ from Equation 1. We investigate the addition of controls and fixed effects: each column reports coefficients from a different regression. We start with a simpler model ignoring all

fixed effects and controls (Column 1). In this case, our estimation indicates that positive and negative shocks increase DV police reports at home. Expanding our model to include controls (Column 2) and state-specific trends (Column 3), we can see that only the impact of the negative shock remains significant. Column 5 includes time-specific trends and reports coefficients from our main specification. We can see that an increase in one standard deviation of a negative shock increases the expected number of DV police reports occurring within the four hours following the match by approximately 7.6%.⁴⁷ In contrast, a positive shock appears not to affect this measure.

Table 6 – Impact of Emotional Shocks on DV Calls to *Ligue 180*, State of Rio de Janeiro and São Paulo, 2015 to 2019

	<i>DV Calls_{t+1}</i>				
	(1)	(2)	(3)	(4)	(5)
Positive Shock	0.180*** (0.0579)	0.155*** (0.0445)	0.0339 (0.0439)	0.00432 (0.0412)	-0.0306 (0.0463)
Negative Shock	0.206*** (0.0436)	0.219*** (0.0616)	0.0902 (0.0667)	-0.0127 (0.0408)	-0.0183 (0.0439)
Mean Dep. Variable	0.125	0.125	0.125	0.125	0.125
Mean Positive Shock	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)
Mean Negative Shock	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)
Observations	441486	441486	441486	441486	441486
<i>Fixed Effects</i>					
Controls	No	Yes	Yes	Yes	Yes
Municipality	No	No	Yes	Yes	Yes
Week	No	No	No	Yes	No
Week × Year	No	No	No	No	Yes
Weekday	No	No	No	Yes	Yes
Year	No	No	No	Yes	No

Notes: This table reports the Poisson estimates of the positive/negative emotional shocks impacts on calls to *Ligue 180* in the states of Rio de Janeiro and São Paulo. Our dependent variable is numbers of calls on the next day of the soccer match to report DV incidents. Positive and negative shocks are calculated according to Equation 2 and 3 using data from the Brazilian national championship, betting markets, Facebook, and “Globo Esporte”. Each column reports coefficients from a different regression, depending on the fixed effects and controls. Controls are p_{kt}^{loss} , p_{kt}^{win} and p_{kt}^{close} , like Card & Dahl (2011), and log of female population size. Standard errors in parentheses are clustered by municipality. *** p<0.01, ** p<0.05, * p<0.1.

⁴⁷We multiply the negative shock’s SD (0.128) by our coefficient of interest (0.0792) and calculate the percentage of this value about our dependent variable mean (0.133).

Table 6 reports the same results for DV calls to *Ligue 180*. As we did not have access to the hour of occurrence in this data, we could not specify the time after the end of the match. Therefore, our dependent variable is the number of calls on the day after the soccer match, which is not at the level of accuracy we would have liked and were able to achieve with our police report data. In contrast to the results of Table 5, it seems that an emotional shock, positive or negative, does not significantly impact calls related to DV incidents to *Ligue 180*.

Appendix Table B.4 presents the same estimation, but for all calls to *Ligue 180* on the day following a soccer match. The results show the same trend as in Table 6: unexpected results in soccer matches do not significantly impact calls to the national VAW helpline on the next day. We do an additional exercise and repeat this estimation with a new dependent variable: calls to *Ligue 180* on the same day as the match. Appendix Table B.5 shows that an increase in one SD of people experiencing a negative shock decreases the expected number of DV calls on the same day by approximately 15%. However, it is unlikely that the victim will report the incident on the same day as the battering event, so we can not rely on this result.

Based on the pattern that Figure 4 shows, we will continue to investigate the impact of unexpected results in soccer matches on DV calls the day after the match with heterogeneity and extensions of our model. Nevertheless, one of our primary purposes is to understand the difference between those two channels of reporting domestic violence.

Timing of Domestic Violence Incidents

We hypothesize that the risk of DV incidents can be affected by the gain-loss utility of soccer matches around a rationally expected reference point. Therefore, we should not expect an increase in this crime during soccer matches. Table 7 shows heterogeneity results by the timing of DV incidents that were reported to the police. Specifically, each column represents the period that we are analyzing: Column 1 reports the estimate for crimes that happened during the two-hour

match,⁴⁸ Column 2 is our main result, Column 3 shows a six-hour time window, and Column 4 an eight-hour window after the end of the match.

Table 7 – Impact of Emotional Shocks on DV Police Reports, States of Rio de Janeiro and São Paulo, 2015 to 2019 - Heterogeneity by Timing of DV Crime

	DV Police Reports			
	During match	+ 4 hours	+ 6 hours	+ 8 hours
Positive Shock	-0.0729 (0.0776)	0.0780 (0.0590)	0.0653 (0.0472)	0.0595 (0.0462)
Negative Shock	-0.0125 (0.0598)	0.0792** (0.0377)	0.0463 (0.0310)	0.0328 (0.0292)
Mean Dep. Variable	0.076	0.133	0.175	0.213
Mean Positive Shock	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)
Mean Negative Shock	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)
Observations	453486	466286	469486	470286
<i>Fixed Effects</i>				
Municipality	Yes	Yes	Yes	Yes
Week × Year	Yes	Yes	Yes	yes
Weekday	Yes	Yes	Yes	Yes

Notes: This table reports the Poisson estimates of the positive/negative emotional shocks impacts on domestic violence reports in the states of Rio de Janeiro and São Paulo. Positive and negative shocks are calculated according to Equation 2 and 3 using data from the Brazilian national championship, betting markets, Facebook, and “Globo Esporte”. Each column reports coefficients from a different regression, depending on our dependent variable. Column 1 shows the results when our dependent variable is DV police reports for incidents that occurred during the game. Column 2 is the four-hour period following the game, Column 3 the six-hour period, and Column 4 the eight-hour period. Controls are p_{kt}^{loss} , p_{kt}^{win} and p_{kt}^{close} , like Card & Dahl (2011), and female population size. Standard errors in parentheses are clustered by municipality. *** p<0.01, ** p<0.05, * p<0.1.

As expected, there is no significant effect on DV police reports during the match. Furthermore, unexpected results in soccer matches did not impact the number of reports in the six-hour and eight-hour time windows following the match. Like Card & Dahl (2011), the data also suggests that the spike in domestic violence is concentrated in a narrow period following the end of the soccer match. As we

⁴⁸Most matches last two hours. Some may last longer but do not reach three hours in duration. Thus, we set the period to be two hours from the start of the match.

argue that an unexpected loss in a soccer match represents an emotional shock, we should anticipate this concentration in a limited time. Emotional cues are immediate emotions and transient, and in this case, the expression of this frustration can happen as a DV crime (Loewenstein (2000), Straus et al. (2017); Johnson (2009)).

To check the robustness of the results, we estimate the impact of emotional shocks on occurrences that happened before the soccer matches. Table 8 confirms what we expected: no significant effect on DV reports during the periods of four, six, and eight hours before the match.

Table 8 – Impact of emotional shocks on DV Police Reports, States of Rio de Janeiro and Sao Paulo, 2015 to 2019 - Heterogeneity by Timing of DV Crime

	DV Police Reports at home		
	- 4 hours	- 6 hours	- 8 hours
Positive Shock	-0.0185 (0.0624)	-0.0821 (0.0687)	-0.0519 (0.0710)
Negative Shock	-0.0915 (0.0781)	-0.0980 (0.0690)	-0.0795 (0.0859)
Mean dep. variable	0.113	0.158	0.205
Mean positive shock	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)
Mean negative shock	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)
Observations	463886	468686	468686
<i>Fixed effects</i>			
Municipality	Yes	Yes	Yes
Week \times Year	Yes	Yes	Yes
Weekday	Yes	Yes	Yes

Notes: This table reports the Poisson estimates of the positive/negative emotional shocks impacts on Domestic Violence reports in the state of Rio de Janeiro and Sao Paulo. Positive and negative shocks are calculated according to Equation 2 and 3 using data from the Brazilian national championship, betting markets, Facebook, and ‘‘Globo Esporte’’. Each column reports coefficients from a different regression, depending on the timing of reporting. Controls are p_{kt}^{loss} , p_{kt}^{win} and p_{kt}^{close} , like Card & Dahl (2011), and female population size. Standard errors in parentheses are clustered by municipality. *** p<0.01, ** p<0.05, * p<0.1.

Distance from Police Station

Female victims of gender-based violence have the decision to report a crime or not. Several factors can impact this decision. As pointed out by Miller & Segal (2019), we should expect a decision to report when the benefits of this action overcome the costs.

Table 9 – Impact of Emotional Shocks on DV Police Reports by Distance to Police Stations, States of Rio de Janeiro and São Paulo, 2015 to 2019

	DV Police Reports		
	(1) All Reports	(2) 1(Distance < Median)	(3) 1(Distance > Median)
Positive Shock	0.0780 (0.0590)	0.0443 (0.125)	0.0915 (0.0898)
Negative Shock	0.0792** (0.0377)	0.191*** (0.0726)	-0.0295 (0.0881)
Mean Dep. Variable	0.133	0.121	0.097
Mean Positive Shock	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)
Mean Negative Shock	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)
Observations	466286	316779	316779
<i>Fixed Effects</i>			
Municipality	Yes	Yes	Yes
Week × Year	Yes	Yes	Yes
Weekday	Yes	Yes	Yes

Notes: This table reports the Poisson estimates of the impacts of positive/negative emotional shocks on domestic violence in the states of Rio de Janeiro and São Paulo. In column (1) our dependent variable is the number of all DV police reports related to incidents at home occurring within the four hours following the match. In column (2) our dependent variable is the number of DV reports that were filed in a police station in a distance smaller from the neighborhood of the crime than the median of our sample. In column (3) we have the DV reports that were filed in a distance bigger from the neighborhood of the crime than the median of our sample. For municipalities in the state of São Paulo the median value is 2.07 kilometers and this same measure for the state of Rio de Janeiro is 2.62 kilometers. Positive and negative shocks are calculated according to Equation 2 and 3 using data from the Brazilian national championship, betting markets, Facebook, and “Globo Esporte”. Each column reports coefficients from a different regression, depending on the fixed effects and controls. Controls are p_{kt}^{loss} , p_{kt}^{win} and p_{kt}^{close} , like Card & Dahl (2011), and log of female population size. Standard errors in parentheses are clustered by municipality. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3 shows that DV incidents that were filed in a police station closer to the neighborhood of the incident present a smaller average in the difference in hours between when the report was filed and when the DV occurred. Therefore, we have the motivation to investigate how unexpected losses in soccer can affect DV

Police Reports related to incidents at home according to the distance to the police station where the occurrence was filed. Table 9 reports those results. Column 2 shows the estimation for incidents where the victim filed the complaint in a police station within a distance less than the median sample from the neighborhood of occurrence. Column 3 presents the same model but for crimes reported in a police station more distance from the incident place. We can see that an increase in one standard deviation of a negative shock provokes an increase of approximately 20% in the expected number of DV police reports related to crimes occurring in the four hours after the match inside the household and reported in a nearby police station from the crime local. On the other hand, we see no effect in DV reports related to crimes reported in a more distant police station.

We must be careful in our analysis and not jump to conclusions early. Our results do not imply that unexpected losses in soccer matches can increase gender-based violence only in places with police stations nearby. DV victims face several disincentives to report a crime, and our estimations could suggest that the distance from a police station is one of them. Moreover, to provide a safety net of protection for those victims to feel safe to report an incident, it is crucial to design policies to decrease the disincentives to file a complaint. For instance, most police stations are open only on working days during commercial hours. However, as data and evidence point out, most DV incidents happen inside the household and in the evening. In February of 2022, the state of São Paulo had only eleven women's police stations that work twenty-four hours. Examples of effective policies could be the increase in specialized services for women working all day and in the number of female officers in police stations.⁴⁹

Victim's profile

To determine if this violence is associated with the victim's characteristics, we grouped the number of DV police reports by municipality, day, and race or education. For race analysis, we created a dummy that assumes one if the victim is white, and zero for non-white victims. For education, we made an indicator

⁴⁹Miller & Segal (2019) shows how the increase of female officers improved police quality and also provoked a decrease in rates of DV.

that assumes one if the victim has an education level lower than high school, and zero otherwise. Therefore, we compiled our cross-section according to these two indicators, which is why our number of observations differs from the other result's tables.

Table 10 – Impact of Emotional Shocks on DV Police Reports, States of Rio de Janeiro and São Paulo, 2015 to 2019 - Heterogeneity by Race and Education

	DV Police Reports	
	Race	Education
Positive Shock	0.0329 (0.0751)	0.155 (0.100)
Negative Shock	0.0907 (0.0586)	0.213*** (0.0567)
White × Positive Shock	0.115 (0.117)	
White × Negative Shock	-0.00892 (0.0799)	
Low Education × Positive Shock		0.0673 (0.110)
Low Education × Negative Shock		-0.149* (0.0848)
Mean Dep. Variable	0.067	0.056
Mean Positive Shock	0.053 (0.115)	0.053 (0.115)
Mean Negative Shock	0.068 (0.129)	0.068 (0.129)
Observations	902676	888184
<i>Fixed Effects</i>		
Municipality	Yes	Yes
Week × Year	Yes	Yes
Weekday	Yes	Yes

Notes: This table reports the Poisson estimates of the positive/negative emotional shocks impacts on domestic violence reports in the states of Rio de Janeiro and São Paulo. Our dependent variable is the number of DV police reports related to incidents at home occurring within the four hours following the match. Positive and negative shocks are calculated according to Equation 2 and 3 using data from the Brazilian national championship, betting markets, Facebook, and “Globo Esporte”. Each column reports coefficients from a different regression, depending on the victim's characteristic (race or education). Controls are p_{kt}^{loss} , p_{kt}^{win} and p_{kt}^{close} , like Card & Dahl (2011), and female population size. Standard errors in parentheses are clustered by municipality. *** p<0.01, ** p<0.05, * p<0.1.

Table 10 shows no significant difference in results according to the victim's race. On the other hand, there seems to be a significant effect of a negative shock on DV for victims with a higher education level; we do not see this effect for victims with lower education levels. This demonstrates that there is a notable difference in results depending on the education level of the victim. This result could suggest that this type of DV trigger could be more common among more educated women. Furthermore, this result could indicate a correlation in the likelihood that women with a higher education level would report a DV crime compared with less educated women.

Derby Matches

Because our main goal is to understand the impact of unexpected results in soccer matches on DV in the states of Rio de Janeiro and São Paulo, we want to isolate the effect of this emotional shock. However, these shocks can have different effects depending on the importance of the match. For example, we expected that soccer matches between teams from the same city could have a greater impact on DV measures due to the increased rivalry between teams. We will refer to these matches as “derby matches”, and we will define them as the combinations of the main teams from Rio de Janeiro and São Paulo.⁵⁰

Another essential discussion arises about the day salient matches happen: do we expect the same effect on weekdays⁵¹ and weekends⁵²? Again, more potential factors like exposure time to the offender, alcohol consumption, and other mechanisms on weekend days can mislead our results. On the other hand, we could expect a higher impact on weekdays with derby matches because, for soccer fans, the whole day relies on this particular event. Therefore, we expand our model with the inclusion of two dummies. The variable “Weekend” assumes one for weekend days, and zero otherwise. Indicator “Derby Match” is one if there was a derby

⁵⁰Those are: *São Paulo X Palmeiras*; *São Paulo X Santos*; *São Paulo X Corinthians*; *Palmeiras X Corinthians*; *Palmeiras X Santos*; *Corinthians X Santos*; *Flamengo X Botafogo*; *Flamengo X Vasco*; *Flamengo X Fluminense*; *Botafogo X Vasco*; *Botafogo X Fluminense*; *Vasco X Fluminense*.

⁵¹Mondays, Tuesdays, Wednesdays, Thursdays, and Fridays.

⁵²Saturdays and Sundays.

match on that day, and zero otherwise.

Table 11 – Impact of Emotional Shocks on DV Measures, State of Rio de Janeiro and São Paulo, 2015 to 2019 - Heterogeneity by Derby Matches

	<i>Calls_{t+1}</i>		<i>PoliceReports_{4hour}</i>	
	(1)	(2)	(3)	(4)
Positive Shock	-0.0306 (0.0463)	0.0963 (0.0819)	0.0780 (0.0590)	0.133 (0.110)
Negative Shock	-0.0183 (0.0439)	-0.0623 (0.0812)	0.0792** (0.0377)	-0.0857 (0.0847)
Derby match × Positive Shock		-0.561** (0.235)		0.291 (0.272)
Derby match × Negative Shock		0.474** (0.202)		0.780*** (0.283)
Weekend × Derby match × Positive Shock		0.357 (0.285)		-0.0214 (0.272)
Weekend × Derby match × Negative Shock		-0.468** (0.214)		-0.726** (0.309)
Weekend × Positive Shock		-0.117 (0.102)		-0.134 (0.108)
Weekend × Negative Shock		0.0523 (0.0772)		0.153 (0.0999)
Mean Dep. Variable	0.125	0.125	0.133	0.133
Mean Positive Shock	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)
Mean Negative Shock	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)
Observations	441486	441486	466286	466286
<i>Fixed Effects</i>				
Municipality	Yes	Yes	Yes	Yes
Week × Year	Yes	Yes	Yes	Yes
Weekday	Yes	Yes	Yes	Yes

Notes: This table reports the Poisson estimates of the positive/negative emotional shocks impacts on Domestic Violence calls and reports in the state of Rio de Janeiro and São Paulo. Positive and negative shocks are calculated according to Equation 2 and 3 using data from the Brazilian national championship, betting markets, Facebook, and ‘‘Globo Esporte’’. Each column reports coefficients from a different regression, depending on the addition of the dummies Derby Match and Weekend. Controls are p_{kt}^{loss} , p_{kt}^{win} and p_{kt}^{close} , like (CARD; DAHL, 2011), and female population size. Standard errors in parentheses are clustered by municipality. *** p<0.01, ** p<0.05, * p<0.1.

Table 11 reports the estimation of Equation 1 for DV calls (Column 1) and DV reports (Column 3) and the estimate of the expansion with our dummies for weekend days and derby matches. The results are intriguing. We can see that both police and non-police sources registered a significant increase in DV complaints on weekdays with an emotionally salient match which had an unexpected negative result. To examine this effect, we have to do a linear combination of parameters Negative Shock and Derby match \times Negative Shock. Regarding the non-police source, the data shows that an increase of one standard deviation in the number of people who experience a negative emotional shock increased the expected number of DV calls by 41% on weekdays with derby matches.⁵³ We can see that this effect for DV police reports is even higher: the data shows that the expected number of complaints in the four-hour period following the end of the match increased by 66% on weekdays with derby matches.⁵⁴

This result suggests some important policy implications: days of the week with derby matches should advertise more about VAW and the different channels for reporting violence against women. For instance, the campaign against VAW in soccer stadiums launched by the state of São Paulo's Public Ministry together with the Paulista Football Federation only highlights statistics about physical DV and only one way that victims can report instances of DV.⁵⁵ Therefore, increasing this campaign with additional information about the five types of DV and other report channels for VAW would be essential.

⁵³The linear combination of parameters is 0.411 with a p-value of 0.042. We multiply 0.411 by the SD of the negative shock, 0.128. Then, we calculate the relation of this value with our dependent variable mean (0.125).

⁵⁴The linear combination of parameters is 0.694 with a p-value of 0.015. We multiply 0.694 by the SD of the negative shock, 0.128. Then, we calculate the relation of this value with our dependent variable mean (0.133).

⁵⁵*Ligue 180.*

Type of Domestic Violence

Table 12 – Impact of Emotional Shocks on DV Measures, State of Rio de Janeiro and São Paulo, 2015 to 2019 - Heterogeneity by Type of Violence

	<i>Calls_{t+1}</i>			<i>PoliceReports_{4hour}</i>		
	(1) All Types	(2) Psychological	(3) Physical	(4) All Types	(5) Psychological	(6) Physical
Positive Shock	-0.0306 (0.0463)	-0.0492 (0.0755)	-0.0522 (0.0544)	0.0780 (0.0590)	0.106 (0.0712)	0.111 (0.0815)
Negative Shock	-0.0183 (0.0439)	-0.0797 (0.0923)	-0.0125 (0.0519)	0.0792** (0.0377)	0.153** (0.0605)	0.0581 (0.0727)
Mean Dep. Variable	0.125	0.050	0.079	0.133	0.066	0.063
Mean Positive Shock	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)
Mean Negative Shock	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)
Observations	441486	383093	420005	466286	459179	453486
<i>Fixed-effects</i>						
Municipality	Yes	Yes	Yes	Yes	Yes	Yes
Week × Year	Yes	Yes	Yes	Yes	Yes	Yes
Weekday	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the Poisson estimates of the positive/negative emotional shocks impacts on Domestic Violence calls and reports in the state of Rio de Janeiro and Sao Paulo. Positive and negative shocks are calculated according to Equation 2 and 3 using data from the Brazilian national championship, betting markets, Facebook, and “Globo Esporte”. Each column reports coefficients from a different regression, depending on the type of violence and source. Controls are p_{kt}^{loss} , p_{kt}^{win} and p_{kt}^{close} , like Card & Dahl (2011), and female population size. Standard errors in parentheses are clustered by municipality. *** p<0.01, ** p<0.05, * p<0.1.

Table 12 shows how the results change by breaking down calls and police reports by the type of domestic violence reported. We can see relevant differences between our two sources. Data from police reports show that our main result is driven by psychological violence: an increase in one standard deviation of a negative shock provokes an increase of approximately 29% in the expected number of psychological DV police reports related to crimes taking place in the four-hour period after the match inside the household. However, the fact that reports of physical violence do not drive our main result is not what we expected.

We could expect that the odds of DV victims going to police stations to file a complaint are more prominent if they suffer physical violence rather than psychological one.⁵⁶ Nevertheless, those estimates could be influenced by the way

⁵⁶Perez-Vincent et al. (2020) argue that the number of calls to report psychological violence

that an occurrence is filled in the stations: A single police report can have more than one incident. For instance, if the man intimidated, threatened, and attacked his partner, this crime will be related to three injuries: intimidation, verbal threat, and physical injury. Therefore, we would have two types of DV violence: psychological (two entries) and physical. Thus, the classification of each DV crime can impact our results. Our hypothesis is that an upset loss in a soccer match affects both psychological and physical DV.

To conclude, it seems that our main result for DV calls to *Ligue 180* does not differ between psychological or physical violence: Columns 1 through 3 show no significant effect.

could be more realistic since some of those incidents do not escalate to an actual police report. Tabooing might be more considerable in the case of psychological violence (Delker et al. (2020)).

7 Discussion and Conclusions

Several channels can impact domestic violence and the importance of understanding what triggers this violence has been pushed to the forefront of research. This effort is fundamental, especially in a country like Brazil, where domestic violence is a significant problem. Additionally, there is also a broad body of literature investigating the link between sports and violence.

In this paper, we studied the empirical relationship between unexpected outcomes (wins or losses) in soccer matches and domestic violence in two central states of Brazil: Rio de Janeiro and São Paulo. We also worked to understand the difference between two channels of DV reporting: calls to a national domestic violence helpline and police reports. Finally, we shed light on the importance of understanding the main disincentives that DV victims face to report a crime.

Our main result indicates that an increase in one SD in the share of people experiencing a negative emotional shock due to an unexpected outcome in a soccer match increased the expected number of police reports filed for instances of DV occurring in the four hours following the match by approximately 7.6%. We also found that the effect of this shock was greater when matches with soccer teams from the same city take place from Monday to Friday: we observed an increase of 66% in the expected numbers of DV police reports in the four hours after the match, and an increase of 41% in DV calls to Ligue 180 on the next day.

Regarding the reporting time, our results suggest that the spike in domestic violence is concentrated in a narrow window following the end of the soccer match: four hours. We also found an increase of approximately 20% in the expected number of DV police reports related to crimes occurring inside the household and filled in a nearby police station by the crime local.

Our findings have important policy implications. On weekday derby matches, there should be more advertising about the available channels to report VAW. Additionally, on all days of the week with soccer matches, ideally, we would increase public security measures in the hours after the match ends (Sachs & Chu (2000)). Furthermore, our results suggest that emotional cues can trigger psychological vio-

lence. However, as Carvalho & Oliveira (2016) highlighted, many battered women do not see themselves as victims of violence and do not understand the different forms that DV can take. Therefore, explaining the five forms of DV and the cycle of DV in this context is fundamental in efforts to alleviate this problem. Furthermore, it is crucial to design policies to decrease the many disincentives that DV victims face to file a complaint. Examples of effective policies could be the increase in specialized services for women working all day and in the number of female officers in police stations.

Additionally, it would be crucial to have more information about data from our non-police source—for instance, the hour of the incident, the report, and the crime location. Thus, we would be able to analyze the reporting mechanism for this data source and compare it with data from police stations.

We can extend our work in several ways. One way would be to include another source for domestic violence in our analysis: hospitalization data from the *Sistema de Informação de Agravos de Notificação* (SINAN). Furthermore, we could assess if our results change when we look into third-party reported DV data. Regarding the data we used in this investigation, one crucial extension could be exploring the difference across DV types and reporting behaviors. We could provide this contribution by looking into victims' attributes and types of violence to check if there is a pattern between women who reported psychological offenses and women who reported physical incidents. In addition, we could also explore the possible link between emotional shocks and alcohol: the consumption of alcohol may intensify the effects of emotional cues (Exum (2002)) and increase DV (Klostermann & Fals-Stewart (2006)). However, to do that, we would have to gather hospitalization data related to alcohol consumption at a municipality level from DATASUS.⁵⁷

Finally, it could be interesting to create an alternative shift-share for our measure that identifies the popularity of the primary soccer teams in Brazil as a robustness exercise. One way would be to gather Twitter data from the major soccer teams and check where their followers are geolocated to build a share for each municipality in Rio de Janeiro and São Paulo.

⁵⁷IT department of the Unified Health System in Brazil.

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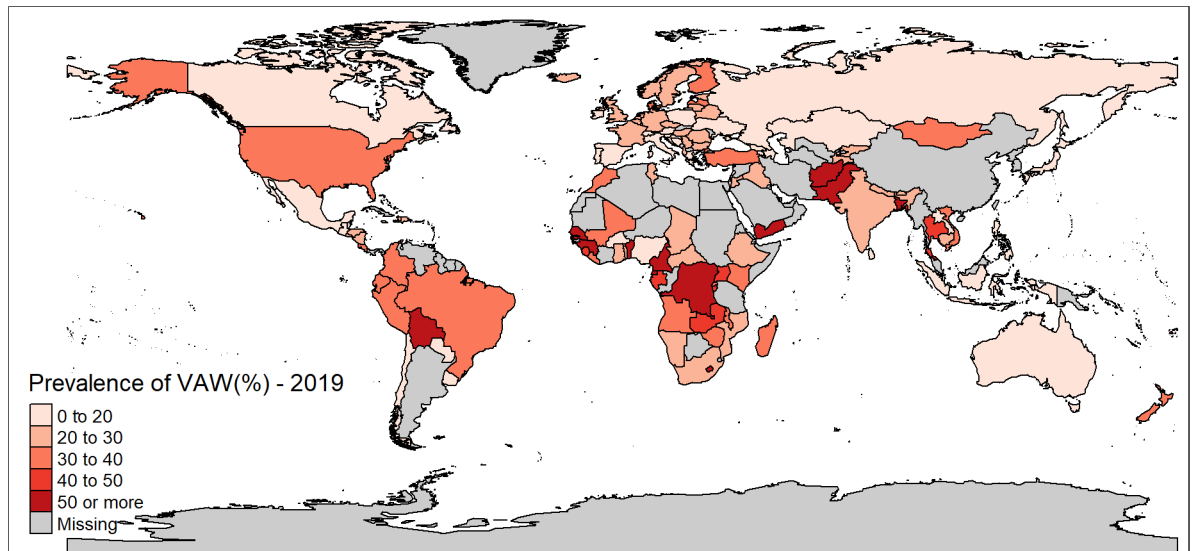
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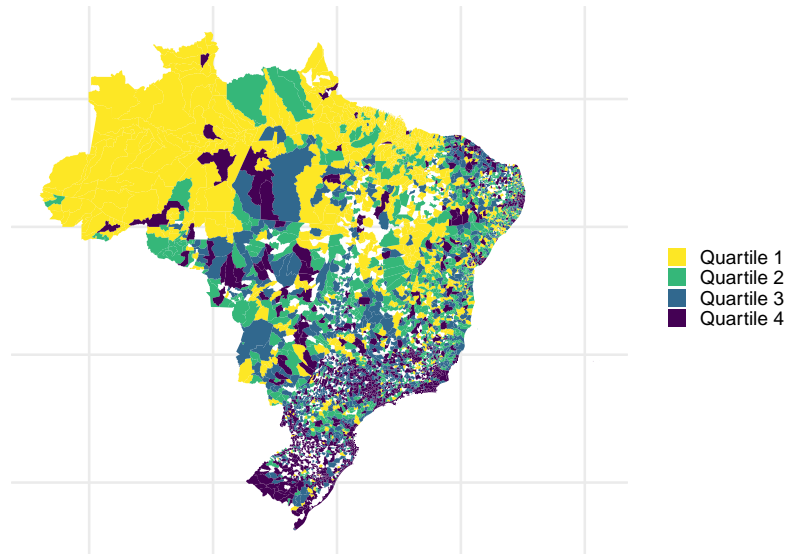
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Appendix A. Figures

Figure A.1 – Percentage of ever-partnered women who ever suffered intimate partner physical and/or sexual violence, 2019.

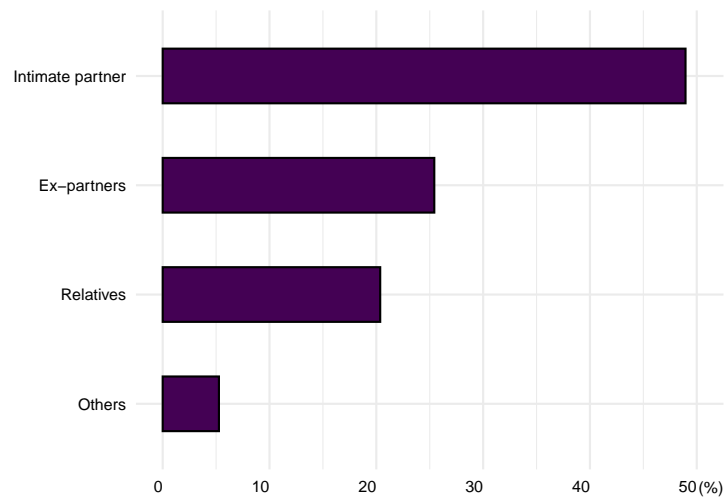


Source: OECD, accessed in January 2023. Data available [here](#)

Figure A.2 – Perpetration of *Mapa das Curtidas*

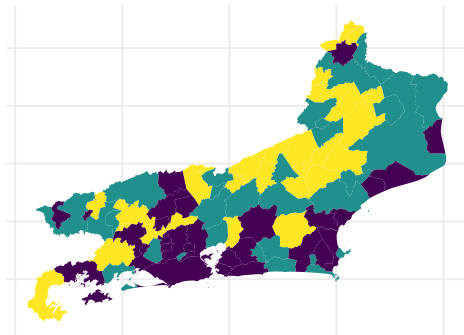
Notes: Geographic distribution of our perpetration variable: (number of likes)/(population)

Figure A.3 – Relationship between victim and offender

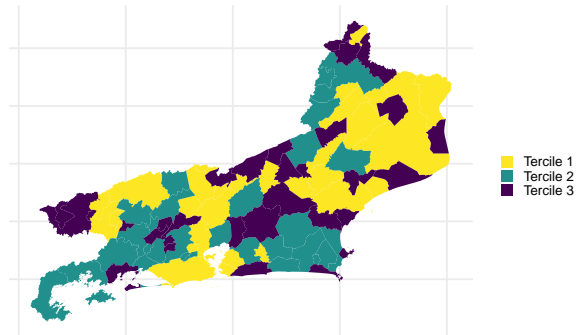


Notes: Calls to *Ligue 180* on match days, Rio de Janeiro and Sao Paulo, 2015 to 2019.

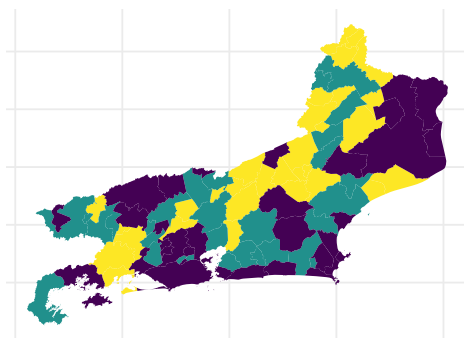
Figure A.4 – Geographic distribution of municipalities by tercile of DV rate per 100,000 women - State of Rio de Janeiro



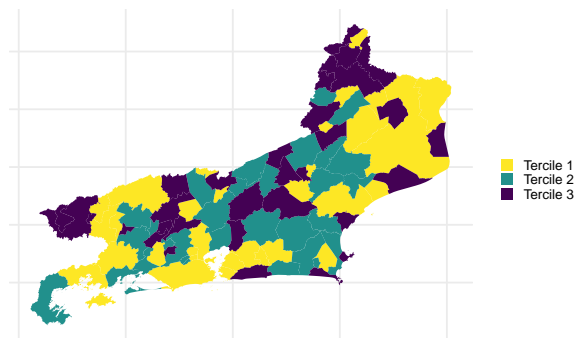
(a) Calls, 2015



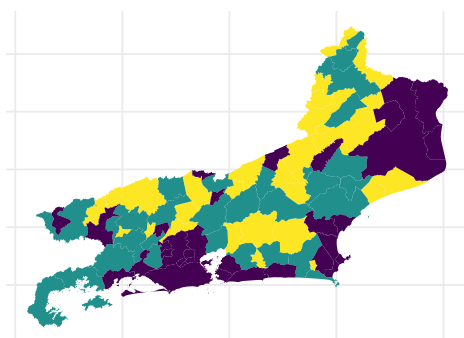
(b) Reports, 2015



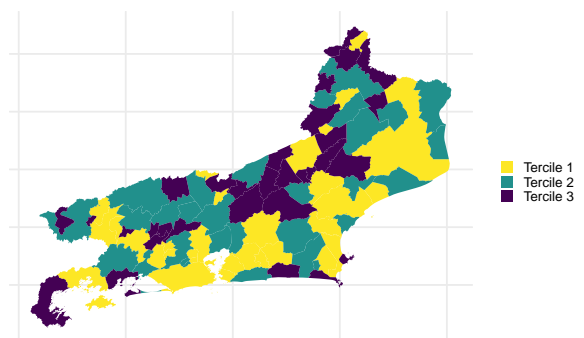
(c) Calls, 2016



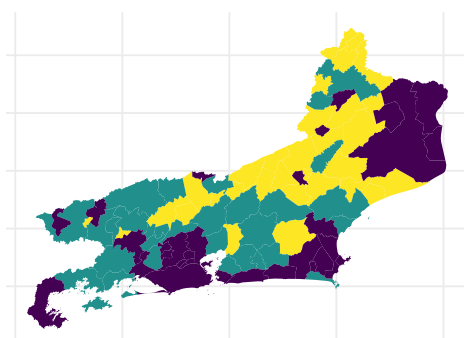
(d) Reports, 2016



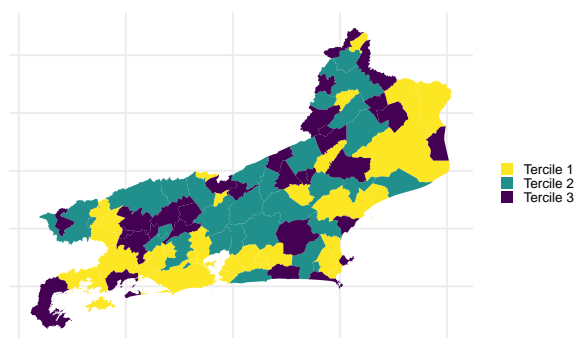
(e) Calls, 2018



(f) Reports, 2018

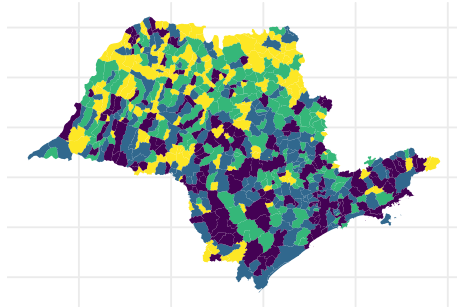


(g) Calls, 2019

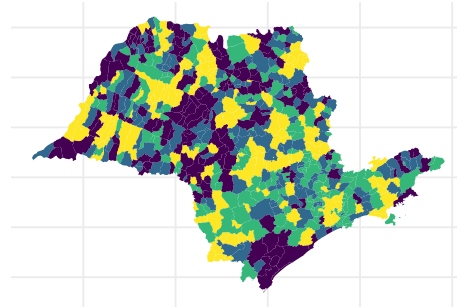


(h) Reports, 2019

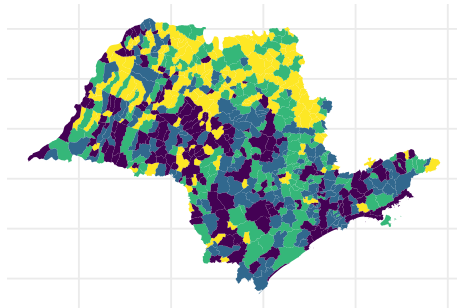
Figure A.5 – Geographic distribution of municipalities by quartile of DV rate per 100,000 women - State of Sao Paulo



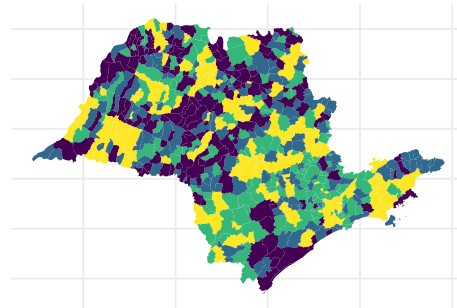
(a) Calls, 2015



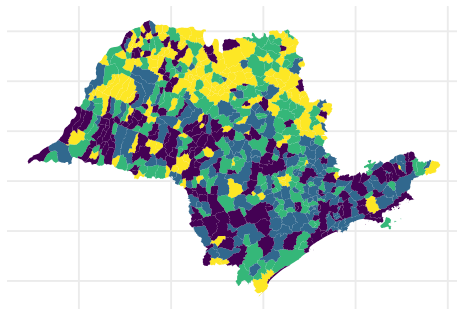
(b) Reports, 2015



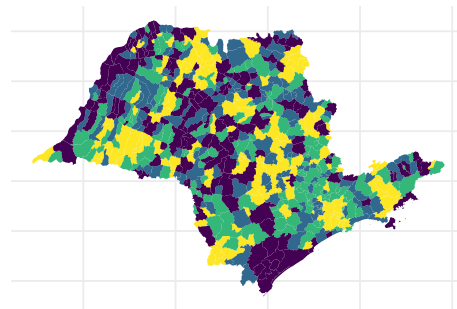
(c) Calls, 2016



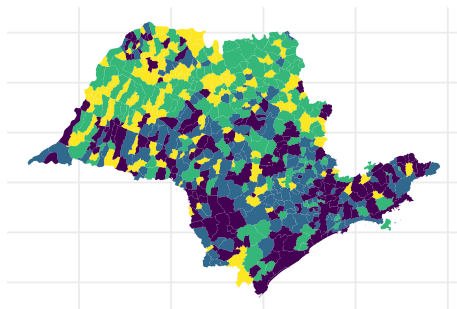
(d) Reports, 2016



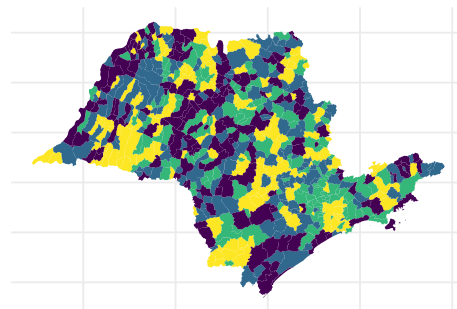
(e) Calls, 2018



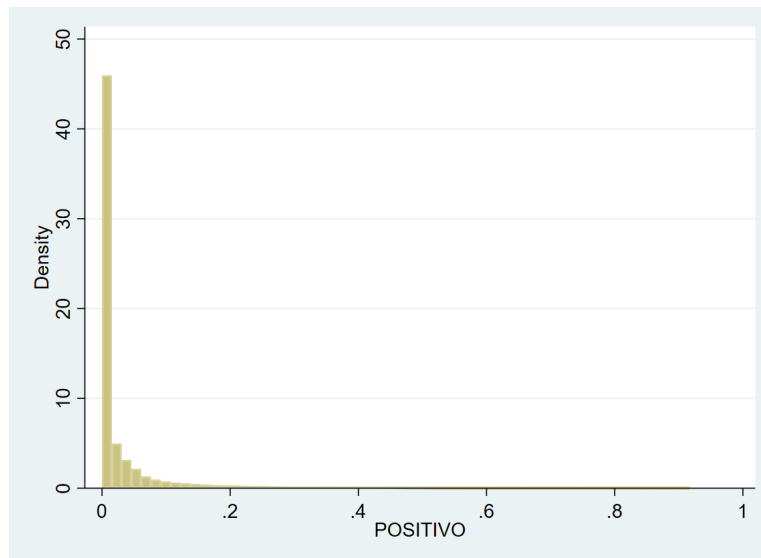
(f) Reports, 2018



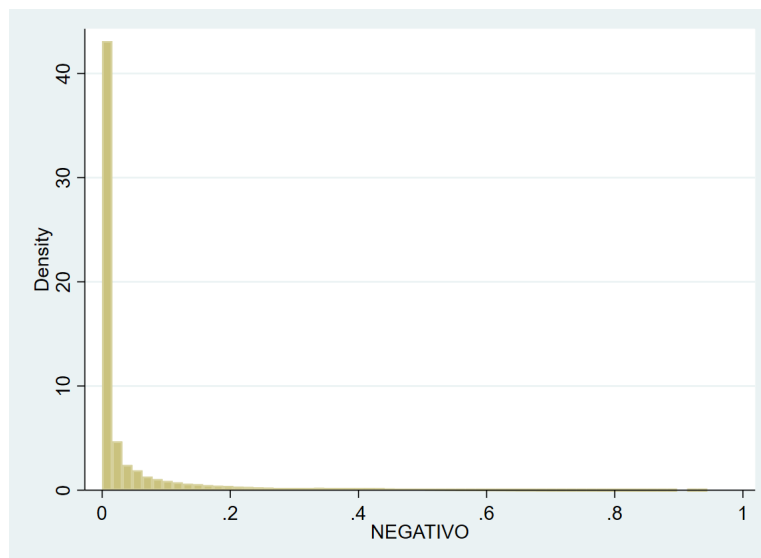
(g) Calls, 2019



(h) Reports, 2019

Figure A.6 – Histogram of $\sum_{k \in K} s_{k,m}$ Positive Shock $_{k,t}$ 

Sample restricted for matches of *Campeonato Brasileiro* in 2015 to 2019.

Figure A.7 – Histogram of $\sum_{k \in K} s_{k,m}$ Negative Shock $_{k,t}$ 

Sample restricted for matches of *Campeonato Brasileiro* in 2015 to 2019.

Appendix B. Tables

Table B.1 – Calls by type of violation - *Ligue 180*, States of Rio de Janeiro and Sao Paulo, 2015 to 2019

Type of violation	All days		Game days	
	Quantity(un)	Percentage(%)	Quantity(un)	Percentage(%)
Domestic Violence	129686	73.71	45417	73.86
Physical violence	77993		27044	
Psychological violence	31634		10743	
Moral violence	11176		4055	
Sexual violence	3151		1196	
Economic violence	3087		954	
Others	2645		1425	
Threat	12847	7.30	4417	7.18
Psychological violence	8128	4.62	2733	4.44
Physical violence	6409	3.64	2308	3.75
False Imprisonment	5705	3.24	1974	3.21
Sexual Violence	3289	1.87	1222	1.99
Moral violence	4810	2.73	1866	3.03
Femicide	2481	1.41	753	1.22
Homicide	1135	0.64	323	0.52
Others	1445	0.82	477	0.77
Total	175935	100	61490	100

Notes: This table report calls to *Ligue 180* by type of violation on municipalities from the states of Rio de Janeiro and Sao Paulo. Game days are days with soccer matches from *Campeonato Brasileiro Serie A and Serie B* from 2015 to 2019. Within the Domestic Violence violation, group "others" includes attempted femicide, non-compliance with protective measures, and attempted homicide. Among all violations, group "others" includes economic violence, traffic of women, police violence, virtual violence, obstetric violence, slavery, and violence against religious diversity.

Table B.2 – Calls by type of violation - *Ligue 180*, 2015 to 2019

Type of violation	All days		Game days	
	Quantity(un)	Percentage(%)	Quantity(un)	Percentage(%)
Domestic Violence	425631	71.73	148787	72.39
Physical violence	258032	43.49	89448	43.52
Psychological violence	101378	17.09	34462	16.77
Moral violence	32684	5.51	11847	5.76
Sexual violence	16658	2.81	6088	2.96
Economic violence	9704	1.64	3025	1.47
Others	7202	1.21	3917	1.90
Threat	41551	7.00	14142	6.88
Psychological violence	30750	5.18	10313	5.02
Physical violence	26410	4.45	8964	4.36
False Imprisonment	23294	3.93	7728	3.76
Sexual Violence	15462	2.61	5581	2.71
Moral violence	14015	2.36	4919	2.39
Femicide	6929	1.17	2203	1.07
Homicide	4599	0.78	1348	0.65
Others	4731	0.79	1542	0.75
Total	593372	100	205527	100

Notes: This table report calls to *Ligue 180* by type of violation. Game days are days with soccer matches from *Campeonato Brasileiro Serie A and Serie B* from 2015 to 2019. Within the Domestic Violence violation, group "others" includes attempted femicide, non-compliance with protective measures, and attempted homicide. Among all violations, group "others" includes economic violence, traffic of women, police violence, virtual violence, obstetric violence, slavery, and violence against religious diversity.

Table B.3 – Population size by geographic distribution and year - State of Rio de Janeiro and state of Sao Paulo

	2015		2016		2017		2018	
	Police Reports	Calls	Police Reports	Calls	Police Reports	Calls	Police Reports	Calls
Panel A: Rio de Janeiro								
T1	370631	23783	396857	27100	411413	23707	413708	27138
T2	125064	108224	97928	140367	106697	77718	105887	96643
T3	51602	414747	55075	383762	35378	451129	37368	432884
Panel B: Sao Paulo								
Q1	126483	12119	135315	19585	139453	16730	140288	17642
Q2	76982	45292	69246	46252	69800	34717	68083	35213
Q3	44308	81730	45528	89269	41019	74655	42616	95582
Q4	27255	135857	27199	122519	29728	153979	31151	133929

Table B.4 – Impact of emotional shocks on All Calls to *Ligue 180*, soccer matches, State of Rio de Janeiro and Sao Paulo, 2015 to 2019

	<i>AllCalls_{t+1}</i>				
	(1)	(2)	(3)	(4)	(5)
Positive Shock	0.159*** (0.0585)	0.135*** (0.0381)	0.00791 (0.0394)	0.0373 (0.0431)	0.0459 (0.0618)
Negative Shock	0.184*** (0.0385)	0.210*** (0.0477)	0.0694 (0.0537)	0.00662 (0.0384)	0.00356 (0.0468)
Mean dep. variable	0.165	0.165	0.165	0.165	0.165
Mean positive shock	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)
Mean negative shock	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)
Observations	451086	451086	451086	451086	451086
<i>Fixed-effects</i>					
Controls	No	Yes	Yes	Yes	Yes
Municipality	No	No	Yes	Yes	Yes
Week	No	No	No	Yes	No
Week × Year	No	No	No	No	Yes
Weekday	No	No	No	Yes	Yes
Year	No	No	No	Yes	No

Notes: This table reports the Poisson estimates of the positive/negative emotional shocks impacts on calls to *Ligue 180* in the states of Rio de Janeiro and Sao Paulo. Our dependent variable is numbers of calls on the next day of the soccer match to report DV incidents. Positive and negative shocks are calculated according to Equation 2 and 3 using data from the Brazilian national championship, betting markets, Facebook, and “Globo Esporte”. Each column reports coefficients from a different regression, depending on the fixed effects and controls. Controls are p_{kt}^{loss} , p_{kt}^{win} and p_{kt}^{close} , like Card & Dahl (2011), and log of female population size. Standard errors in parentheses are clustered by municipality. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B.5 – Impact of emotional shocks on DV Calls to *Ligue 180* on the same day, State of Rio de Janeiro and Sao Paulo, 2015 to 2019

	<i>DV Calls_t</i>				
	(1)	(2)	(3)	(4)	(5)
Positive Shock	-0.115* (0.0685)	0.163*** (0.0511)	0.0360 (0.0523)	-0.0147 (0.0533)	-0.0565 (0.0525)
Negative Shock	-0.130*** (0.0397)	0.131** (0.0542)	0.00652 (0.0575)	-0.106** (0.0426)	-0.144*** (0.0425)
Mean dep. variable	0.123	0.123	0.123	0.123	0.123
Mean positive shock	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)	0.052 (0.115)
Mean negative shock	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)	0.067 (0.128)
Observations	443086	443086	443086	443086	443086
<i>Fixed-effects</i>					
Controls	No	Yes	Yes	Yes	Yes
Municipality	No	No	Yes	Yes	Yes
Week	No	No	No	Yes	No
Week × Year	No	No	No	No	Yes
Weekday	No	No	No	Yes	Yes
Year	No	No	No	Yes	No

Notes: This table reports the Poisson estimates of the positive/negative emotional shocks impacts on DV calls to *Ligue 180* in the states of Rio de Janeiro and Sao Paulo. Our dependent variable is numbers of calls on the same day of the soccer match to report DV incidents. Positive and negative shocks are calculated according to Equation 2 and 3 using data from the Brazilian national championship, betting markets, Facebook, and “Globo Esporte”. Each column reports coefficients from a different regression, depending on the fixed effects and controls. Controls are p_{kt}^{loss} , p_{kt}^{win} and p_{kt}^{close} , like Card & Dahl (2011), and log of female population size. Standard errors in parentheses are clustered by municipality. *** p<0.01, ** p<0.05, * p<0.1.