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FERNANDA ALMEIDA RIBEIRO DE JESUS

FOOTBALL AND VIOLENCE: THE IMPACT OF UNEXPECTED EMOTIONAL SHOCKS ON VIOLENCE AGAINST WOMEN

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To my family, for always encouraging me
to follow my dreams

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Y la culpa no era mía,
ni dónde estaba, ni cómo vestía.

Un violador en tu camino

RESUMO

Neste trabalho, estudamos a relação entre o futebol e a violência contra a mulher no período de 2007 a 2018. Em nossa estratégia empírica, especificamos um modelo de regressão de Poisson para o número de casos notificados à Polícia Civil do Rio de Janeiro. Analisamos se a nossa variável dependente, a violência contra as mulheres, é afetada por choques emocionais no futebol. Os resultados sugerem um efeito positivo e significativo no caso de upset loss (derrota quando o esperado era uma vitória) em jogos importantes do campeonato sobre a violência contra as mulheres. Além disso, avaliamos o impacto da heterogeneidade racial e encontramos que os efeitos são maiores para mulheres pretas e pardas.

Palavras-chave: Regressão de Poisson, Violência contra a mulher, Futebol, Crime.

ABSTRACT

In this work, we study the relationship between football and violence against women in the period of 2007 to 2018. In our empirical strategy, we specify a Poisson regression model for the number of cases reported to the civil police of Rio de Janeiro. We analyze whether our dependent variable, violence against women, is affected by emotional shocks in football. The results suggest a significant positive effect of an upset loss (defeat when the expected was a victory) in important games of the tournament on violence against women. We also evaluate the impact of racial heterogeneity and find that the effects are larger for black and brown women.

Keywords: Poisson Regression, Violence against women, Football, Economics of Economia do Crime.

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1 INTRODUCTION

Gender-based violence is pervasive and common all over the world. The World Health Organization (WHO) estimates that 35% of all women worldwide have experienced either physical and/or sexual violence in their lifetime. This number is especially higher in developing countries. In Brazil, over 1 in 4 women have experienced some kind of violence or aggression in the 12 months prior to the survey (FORUM BRASILEIRO DE SEGURANÇA PUBLICA, 2019). At the same time, Football has an undoubted influence on Brazilian daily life. The sport is a national passion, about 60% of the Brazilian population are interested in football (NIELSEN SPORTS, 2018).

This work studies the link between violence against women and the emotional shocks associated with wins and losses in the Brazilian Championship A Series and B series over the period of 2007 to 2018. We investigate whether unexpected outcomes of football games lead to a rise in the cases of violence against women. Our empirical analysis uses the data from the Public Security Institute (Instituto de Segurança Pública).

An example of a felony domestic assault occurred after the final of Copa Libertadores 2021 (South America's version of the Champions League) occurred recently in Brazil. Initial information suggests that the husband supports the winner team of the final, Palmeiras, and the woman another team. The couple starts the argument after the end of the game, and the interaction escalates to violence. When the police arrived at the place, after the call of neighborhoods, the woman was already dead [1].

The individual's conscious decision to exercise violence is first shown in Becker's seminal model of crime (BECKER, 1968). The author suggests that the criminal chooses to exercise a crime comparing the benefit of violating the law with the possible cost (in terms of probability and the degree of punishment). As a result, there are optimal levels of punishment because individuals are only making rational decisions based on their utility maximization problem.

[1] <https://tinyurl.com/6rtzfva4>

Recently, some studies have explored the influence of emotions on decision-making. Depetris-Chauvin, Durante e Campante (2020) find that a football team victory in an important game reduces violence in African countries. The paper suggests that national team achievements lead to fewer civil conflicts. Therefore, emotional shocks have powerful impacts on decisions. Eren e Mocan (2018) show that unexpected losses in football games increase sentence lengths in cases where the judges have obtained their undergraduate degree. Tabakovic e Wollmann (2019) use unexpected outcomes of college football as an instrument to evaluate knowledge productivity. In Latin America, Munyo e Rossi (2013) suggest that a violation of expectations in football games has an impact on violent crime.

More close to our approach is the paper Card e Dahl (2011) exploring the link between family violence and the emotional shocks associated with unexpected wins and losses by professional football teams in the US. Their main finding is that upset losses (losses when expected to win) lead to an approximately 10% increase in police reports of at-home male-on-female intimate partner violence. Another similar paper is Dickson, Jennings e Koop (2016). The study seeks to investigate whether disappointing results in football games increase domestic violence in Glasgow. The authors only find a large increase in Domestic Violence when the Scottish rivals Celtic and Rangers play and in the last five matches of the season. As a result, they conclude that loss aversion seems not to be a general behavioral aspect of Celtic and Rangers fans, but is presented only when the match is highly important.

Moreover, in Brazil, Ostrovski (2019) analyzes the effect of emotional shocks arising from football matches on violence. The author uses Ministry of Health administrative data on mortality (homicides caused by assaults) and morbidity (total hospitalizations) as crime proxies. The main result is that an increase of about 1 percentage point in the proportion of individuals in a municipality receiving negative shocks is sufficient to increase by 0.08% the expected number of deaths due to aggression. The study points out that the effect found in this main regression comes mainly due to male deaths. To be more specific, the author suggests that 1 p.p in the proportion of individuals receiving negative shocks is associated with an increase of about 0.14% in the expected daily number of male deaths due to aggression.

Additionally, the author shows that an increase of 1.p.p. in negative shocks increases the expected number of female deaths occurring at home by approximately 0.58%.

We contribute to this literature analyzing the relationship between violation of expectancy in soccer games in Rio de Janeiro state and violence against women, using data from the Public Security Institute (ISP) of Rio de Janeiro, which is linked to the Civil Police forces. Rio de Janeiro is the second largest state in Brazil and is home to Clube do Flamengo, the biggest cheering team in Brazil. We use results of Flamengo games to identify the impact of unexpected losses on women aggressions. The richness of ISP data allow us to more accurately measure the impact of negative emotional chocks than using the administrative data from the Ministry of Health used in Ostrovski (2019) because it presents not only cases that result in death or hospital admissions, but all cases reported to the police. We believe that this is important, since in most cases of this type of violence, the victim does not go to the hospital, and the violent incident is underreported, especially in less developed countries (SOARES, 2004). We also contribute to the literature constructing a measure of expectation in order to identify more or less salient games. The aim is to understand the importance of each game in the championship to analyze the influence of emotions on violence against women.

Moreover, it is worthwhile to mention that few other works in the economic literature approach this subject that is extremely important in a country that has high rates of violence, especially against women, and in poorer countries. Differently to Card e Dahl (2011) and Dickson, Jennings e Koop (2016), the context here is about a country with higher poverty rates, which is important in the results, as showed when we present heterogeneity effects pointing to higher impacts on black and brown women. In Brazil, race could be considered a good proxy for income, as the wages for black and brown people is much smaller than for white people. Our work shows that negative shocks have high impact on violence against black and brown (poorer) women and have smaller or none impacts on violence against white (richer) women.

This work uses a Poisson Regression in order to study the relationship between

football matches and violence against women. We relies on data between 2007 and 2018. Our first database comes from the Public Security Institute (Instituto de Segurança Pública). Then, we gathered the results of all games from Brazilian Championship, Series A and B, and merge the result of these matches with the expected results using the probabilities of victories, draws and defeats. We also merge this data to the probabilities of being crowned as the champion and going to the second nation division to construct a measure of importance of each single games. Moreover, we added a local climate data. The study suggests that an upset loss (a defeat when it was expected a victory) in important games of the tournament lead to a 21.5% increase of the violence against women cases in the city of Rio de Janeiro and a 15.5% increase in the state of Rio de Janeiro. We find larger effects in cases of violence against black and brown women, 22.3%, against 9% for white women. Additionally, we perform two robustness exercises that corroborate our findings.

The rest of the essay is organized as follows Section 2 presents a small survey on the literature. Section 3 describes the institutional setting. Section 4 describes the data used. The section 5 presents the methodology and the section 6, the main results. Finally, section 7 contains some concluding remarks.

2 LITERATURE REVIEW

This dissertation relates to different literatures. First of all, it contributes to a strand of the literature on emotion and decision. This work also adds to the literature that connects sports and violence. Finally, this study aims to contribute with the works about domestic and family violence in economic literature.

2.1 Emotion and Decision

Over the years, the interest in Psychology and Economics, Behavioral Economics, research exploded. A famous principle in economics is that individuals make choices, under constraints, in order to maximize a utility function. Agent's preferences are assumed to be time-consistent, affected only by their own payoffs, and independent of the conditions present at the moment of the decision. However, laboratory experiments in psychology and the economics literature questioned these assumptions. It is known that aspects of behavior that deviate from the forecasts of the standard theory affect economic decisions (DELLAVIGNA, 2009)

A vast literature in psychology suggests that emotions have an important role in decision making (LOEWENSTEIN; LERNER, 2003). DellaVigna (2009) consider two types of emotions: mood and arousal. For example, the relationship between mood and tipping behavior. For example, Ge (2018) uses sporting event outcomes as instruments to analyze consumers' tipping behavior in the presence of social norms. The author finds that an unexpected win can lead to a higher tipping percentage, but an unexpected loss does not lead to a lower tipping amount.

Even the financial market suffers from mood fluctuations induced by the weather. Hirshleifer e Shumway (2003) analyze the stock market from twenty-six countries between 1982 and 1997. The study finds a positive relationship between sunshine and stock returns. However, other weather variables such as rain and snow are not correlated to returns. Edmans, Garcia e Norli (2007) investigate the effect of international football outcomes on daily stock returns using a cross-section of

third nine countries. The paper finds that losses in football matches reduces daily returns by 0.21% in losing country's stock market. Moreover, the authors find that important games have a larger impact and that is robust to methodological changes.

Dahl e DellaVigna (2009) investigate whether exposure to blockbuster violent movies leads to more violent crimes. They find that violent crime decreases on days with larger theater audiences for violent movies. The work suggests a crowding-out between violent movie and violent crime, people change their time spent in alternative activities (such as drinking at a bar) and this lead to a reduction of violent crime. The authors estimation suggested that in the short run, violent movies prevent almost 1,000 assaults on an average weekend.

Finally, despite in this subsection, we focus on the relationship between emotion and decision, some relevant studies are showing the effects of emotional stress caused by football on health. For instance, the literature points out a significant increase of heart attacks during the World Cup (WILBERT-LAMPEN, ; CARROLL, 2002). Trovato (1998) also finds that suicides among Canadians increase significantly if the Montreal Canadians are eliminated at the beginning of the National Hockey League playoffs.

2.2 Sports and Violence

Several works address the link between sports and violence. In the United States, college football is prevalent. Therefore, some studies focus on the social costs of these events. Lindo, Siminski e Swensen (2018) estimates the increases in reports of rape caused by football games. They find that football game days raise the number of reports of rape victimization among 17–24-year-old women by 28 %. Similarly, Rees e Schnepel (2009) analyzes the effects of college football games on assault, vandalism, disorderly conduct, and alcohol-related crimes. The authors find that an upset result, defined as when an unranked team beat a ranked team or when a lower-ranked team beat a higher-ranked team, is the largest estimated effect. Expected assaults more than double with an upset loss at home and increase by 36% with

an upset victory. On the other hand, non-upset losses at home are related to a 6% increase in assaults, and non-upset wins lead to a 7% increase. The results for vandalism exhibit a similar pattern.

In professional football, Gantz, Wang e Bradley (2012) investigates the relationship between the National Football League (NFL) and incidence rates of domestic violence during the period of 1996 to 2002. The study suggests that the presence of an NFL game does slightly increase the number of domestic violence reports. Card e Dahl (2011) study the link between family violence and the emotional shocks associated with different results by professional football teams. However, this paper has a different approach in comparison to Rees e Schnepel (2009).

Card e Dahl (2011) examines the effects of wins and losses relative to pregame expectations. The author find that upset losses (defeats when the home team was predicted to win) lead to a 10% increase in the rate of at-home violence. Also, the paper suggests that upset losses in more salient games (those involving a traditional rival, or when the team is still in playoff contention) have a bigger effect on the rate of domestic violence. Moreover, upset losses in games that are frustrating for fans (i.e. those games that have four or more sacks, four or more turnovers, or 80 or more penalty yards) generate a larger emotional response.

Munyo e Rossi (2013) follow the approach of Card and Dahl (2011), studying the impact of a violation of expectancies, measured by the odds of football games in the betting market, on crime. The study suggests that euphoria (an unexpected win) has the effect of reducing violent crime, a reduction that is only statistically significant for one hour after the game end. On the other hand, violent crime (as measured by robberies) shows a significant increase after a frustrating loss.

Ivandic, Kirchmaier e Torres-Blas (2021) use administrative data from the Greater Manchester Police in the United Kingdom to estimate the hourly dynamics of intimate partner domestic abuse during and after a football game. The authors find a decrease in domestic abuse incidents during the 2-hour duration of the game suggesting a substitution effect of football and domestic abuse. However, following the initial decrease, domestic abuse starts increasing. In aggregate, the long term in-

crease offsets the initial short term decrease leading to a positive cumulative effect. The authors suggest that the largest increases in domestic abuse occur when football games are scheduled early in the day. They hypothesise that this leads perpetrators to start drinking alcohol earlier and continuing to do so through the afternoon and evening.

Priks (2010) study a problem common in many places around the world, sport-related violence (hooliganism). The author points out some costs for society. First of all, he holds that some supporters avoid attending games in fear of violence, which leads to losses in consumer surplus. Additionally, he mentioned that the costs from emergency care and from depredations of proprieties are high. Moreover, hooliganism also generates high costs of policing. Based on these negative externalities and the little documentation of this event in the literature, the author empirically studies if frustration generates violence.

Priks (2010) estimates the effect of the teams' changed position in the championship on the number of unruly behavior by their supporters. The work finds that when a team performs worse, its supporters throw much more objects onto the field. A one-position drop in the championship leads to approximately 5 percent more unruly incidents.

Our contribution to this literature is to analyze the relationship between unexpected results and violence against women in Brazil using the ISP data. Additionally, we will construct a measure of importance in order to identify more or less important games. The aim is to understand the importance of each game in the championship. During the course of the tournament (from May to December) each team plays the others twice (a double round-robin system), once at their home stadium and once at that of their opponents, for a total of 38 games per team. As a result, some of the games played are low stakes and the measure of importance help us to identify them. Another contribution of this paper is that we present heterogeneity effects pointing to higher impacts on black and brown women. In Brazil, race could be considered a good proxy for income, as the wages for black and brown people is much smaller than for white people.

2.3 Domestic and Family Violence

Violence against women is shockingly common. In fact, Aizer (2010) points out that three-quarters of all violence against women is committed by domestic partners and that poor women are much more likely to be victims of assault. Lauritsen e White (2001) also show that there are relevant differences in victimization rates by race and ethnicity. As a result, the authors agree that geographic targeting according to socioeconomic disadvantage leads to better results on victimization prevention and postvictimization services with scarce resources, since nonlethal violence risk is considerably higher in the most disadvantaged areas.

Currie, Mueller-Smith e Rossin-Slater (2020) highlights the consequences of domestic violence for the society. The paper suggests that intra-family conflict may be an important mechanism for the persistence of economic inequality across generations. Currie, Mueller-Smith e Rossin-Slater (2020) investigate the costs for infants that experienced assaults during the mother's pregnancy. It is noteworthy that the paper includes all assaults reported to the police, not only those resulting in hospitalization. The authors suggest an estimated 1.5 percentage point increase in the likelihood of a very low birth weight birth, and account for six types of short and long-term costs: higher rates of infant mortality, increased medical costs during and immediately following birth, increased childhood disability, increased adult disability, decreases in adult income, and reductions in life expectancy. Finally, the author finds an average social cost of at least $36,857 per assault during pregnancy and a national annual total cost of at least $3.8 billion in the U.S.

Bindler e Ketel (2020) shed light on the costs of crime to victims and their families in Netherlands. One year after a domestic violence offense (females), the authors find up to 17.9% decreases in earnings and 41.7% increases in days of social benefit receipt such as sickness and disabilities benefits. In the U.S., Carrell, Hoekstra e Kuka (2018) also study the labor market effects of domestic violence. More specific, the labor market consequences in children's classmates that are exposed to domestic violence. Moreover, Carrell e Hoekstra (2010) hold that children exposed to domestic violence significantly decrease their peers' reading and math test scores

and significantly increase misbehavior of other students in the classroom.

More related to the health costs, Aizer (2011) suggests that the children of women who are the victims of violence while pregnant suffer worse health at birth. Indeed, she finds that hospitalization for assault during pregnancy is related to a 163-gram reduction in birth weight, with larger effects if it occurs at the beginning of the pregnancy. She uses the different enforcement of laws against domestic violence across California counties and matching methods to compare the birth outcomes of women who were assaulted with women who were not.

Prior research suggests that lower birth weight babies have worse outcomes not only in terms of one-year mortality but also in terms of educational attainment and earnings. Black, Devereux e Salvanes (2007) suggest that a 10 percent increase in birth weight raises full-time earnings by about 1 percent. On the other hand, an increase in birth weight of 10 percent increases the probability of finishing high school by almost 1 percentage point. In order to find the above results, the study uses within-twin variation in birth weight to control for parental and environmental factors. Otherwise, we might see an issue in the causality relationship because the low birth weight may be correlated with many difficult-to-measure socio-economic backgrounds and genetic variables.

This work seeks to contribute to the literature on domestic and family violence. Although domestic violence leads to high social costs with long-lasting consequences both for the individual and society as a whole, there is limited evidence about what triggers domestic violence (IVANDIC; KIRCHMAIER; TORRES-BLAS, 2021). Therefore, understanding the channels through which football games lead to domestic abuse can have important implications for public policy to reduce the relationship between sports and abuse.

3 INSTITUTIONAL BACKGROUND

3.1 Football

Football is a popular sport in Brazil; in fact, the country is known by many as being "The Country of Football". According to IBGE, the Brazilian Institute of Geography and Statistics, football is the most practiced sport in the country, with 15.3 million people or 39.3 % of the 38.8 million sports players. In second place is walking with 9.5 million people or 24.6 % of the 38.8 million sports players (IBGE, 2017).

Football also has a significant TV audience. To be more specific, in 2019, the classic game between Brazil and Argentina was the most-watched television program of the year in Brazil, with an estimated audience of 44 million viewers[1]. In the same year, Flamengo (the football team with the largest fanbase in Brazil) and River Plate (a traditional team from Argentina) attracted 41.1 million viewers for the final of the 2019 Copa Libertadores, with almost half of the television sets in Brazil [2].

DaMatta (2009) argues that a sociological understanding of football is valuable because it increases the change of a more accurate perception of Brazilian society. He analyzes football together with society as two sides of a coin. According to the anthropologist, this particular sport is capable of bringing together many spheres of social life. As a result, the author holds that the sport is an instrument for social communication and an important part of the national identity of Brazilians. The sport mobilizes the country and shows a momentarily homogeneous world, with supporters from different social classes, gender, and races.

[1] <https://en.wikipedia.org/wiki/List_of_most_watched_Brazil_television_broadcasts_of_2019>

[2] <https://en.wikipedia.org/wiki/2019_Copa_Libertadores_Final>

3.2 Violence Against Women

Over the past years, some important changes were made in order to prevent and respond to violence against women in Brazil. In 2006, Law 11340, commonly referred to as the *Maria da Penha Law*, became the first Brazilian law to regulate violence against women and punish perpetrators. This Law was named after Maria da Penha, victim of a double femicide attempt by Marco Antonio Heredia Viveros, became paraplegic due to irreversible injuries caused by her husband at the time[3].

The Maria da Penha Law was landmark legislation that changed the penal Code. The law established that the perpetrators could be arrested (when they are caught flagrant practicing a case of violence against women) or have preventive custody decreed. Thus, with this new legal framework, the payment of a fine, for example, with a food basket, was no longer a valid option. In other words, the new regulation offers for the victim's protection measures and makes the penalty more rigid[4].

Cerqueira et al. (2015) analyze the effects of the Maria da Penha Law on the number of homicides of women. The results showed that the introduction of the Maria da Penha law generated statistically significant decrease of the number of homicides of women associated with the gender issue. The authors believe that the law affected the behavior of aggressors and victims by three channels: increase in the cost of the penalty for the aggressor; increased empowerment and security conditions for the victim to report; and iii) improvement of the criminal justice system.

Moreover, the law typifies five types of violence, expanding the understanding of violence against women. First of all, *physical violence*, which, in 2018, has the highest number of reports. Secondly, *sexual violence* is mostly composed of rape cases. The third is *psychological violence*, according to Dossie da Mulher, which is the most subjective type of violence against women. Threats, manipulations, insults, and other similar behaviors are classified as psychological violence. The second last is *moral violence*. In this type of violence, the perpetrator aims to

[3]https://www.institutomariadapenha.org.br/quem-e-maria-da-penha.html

[4]https://www12.senado.leg.br/institucional/omv/entenda-a-violencia/a-violencia-contra-a-mulher

attack the reputation or self-esteem of the victim. Finally, there is *patrimonial violence* which occurs, for example, when the partner of the victim breaks into the house (MANSO; CAMPAGNAC, 2019).

In 2015, another key legislative advance was made in order to curb the phenomenon of gender-based violence. The Brazilian State passed Act Nº 13.104, the Feminicide Law, which sets tougher penalties for intentional homicides of women resulting from domestic and family violence, as well as those who have been motivated by the simple condition of being women. Despite some efforts of the Brazilian government to tackle violence against women, the country is far from being considered safe for women. In 2018, a woman was murdered every two hours in Brazil, totaling 4,519 victims in that year. The situation is even worse for black women since 68% of the women murdered in 2018 were black (CERQUEIRA; BUENO, 2020). Therefore, to better understand the violence against women, we have to look beyond the simply national rates of homicides.

The national rates of homicides and aggression are provided by the administrative records from the Brazilian Ministry of Health's System of Information (DataSUS). In fact, this is the only way to analyze crime data in all of Brazil´s municipalities over the years. The reason is that police reports are not computed in a form that allows national comparison between the states. To be more specific, different states classify the same type of violence differently.

4 DATA

In this chapter, we describe the main sources of data and variables used in our analysis and present some descriptive statistics.

4.1 Data on Violence Against Women

This study explores the effect of football on violence against women in Rio de Janeiro. Ideally, this work requires a victimization survey. However, collecting such data is prohibitive because we do not have an extended and complete follow-up through victimization survey covering the area of Rio de Janeiro. Thus, we can analyze public security in Brazil with two other main sources: administrative data on hospitalization and deaths collected by the Ministry of Health and administrative data from the police (ENAP, 2021). Despite the administrative records from the Brazilian Ministry of Health's System of Information (DataSUS) covers various essential aspects of the Brazilian health system, we believe that for this particular study is not ideal since many cases do not result in hospitalization or death.

We, therefore, rely on data collected by police. In order to file a police report, individuals can communicate the crime to the Civil Police (Polícia Civil) or can call the Military Police (Polícia Militar) emergency number (190). The police reports in Brazil are not concentrated in one place and for this reason, we focus on one of the largest metropolitan regions of Brazil, Rio de Janeiro.

According to Dossie Mulher 2018, crimes against women represent 11.0% of the 190 Calls, behind only to work disturbance and peace of others (14.5%). Each observation of the microdata represents a call and includes information such as the municipality of the victim, the date of the call and a brief description of the incident. Despite efforts of the Military Police, until the year of this study, the microdata does not cover crimes from 2007 to 2018, only from 2014 to 2018. As a result, we will not use this dataset in our empirical strategy.

The first dataset we rely on comes from the Public Security Institute (Instituto de Segurança Pública). This entity is responsible for the disclosure of criminal statistics coming from the Civil Police. Our data on violence against women includes the population of all calls to the civil police from January 2007 to December 2018. In addition, every incident has the date of the incident, the date of the registration, the incident location, municipality of the victim's residence, information on the relationship between victim and perpetrator. It also contains variables like ethnicity, age, gender, education, and occupation of the victim.

The temporal distribution of crimes against women varies whether we use the date of the incident or the date of the registration. In the first case, 48% of the incidents take place on Friday, Saturday, and Sunday (Table 1). In the second case, only 40% of the crimes are reported in these three days (Table 2). It is worth pointing out that the period between the date of the incident and the date of registration varies according to the type of crime. In our study, we use the date of registration at the police station. We choose this date because there are fewer missing entries. To be more precise, just four observations do not have information about the date in our database. Analysis of occurrence record data in Rio de Janeiro shows that 90% of the cases of robbery by passersby are registered in the same month of the fact. That percentage is much lower for rape cases, where about 60% of the cases were registered in the same month of the fact (ENAP, 2021).

Table 3 depicts some summary statistics for this dataset. Column (1) presents the mean of incidents reported. As expected Rio de Janeiro, the capital of the state has the highest number of cases. In column (4), we show the mean of female population during this period, and column (5) corresponds to the highest cases of violence against women considering the size of the population.

4.2 Matches

We gathered results for matches from Brazilian Championship A Series and B Series (first and second national division) from 2007 to 2018. In the final data, we

Table 1: Date of the incident

Day of the Week	Cases	Proportion
Sunday	242,254	0.19
Saturday	199,672	0.16
Monday	172,850	0.14
Tuesday	158,649	0.13
Wednesday	158,523	0.13
Friday	157,224	0.13
Thursday	153,319	0.12
Total	1,242,491	1.00

Notes: This table shows the number of violent cases against women by day of the week. Column (1) reports the absolute values and column (2) reports the percent of cases by day.

Table 2: Incidents by the date reported

Day of the Week	Cases	Proportion
Monday	225,837	0.18
Tuesday	178,353	0.14
Sunday	177,817	0.14
Wednesday	174,647	0.14
Thursday	167,832	0.14
Saturday	160,490	0.13
Friday	157,515	0.13
Total	1,242,491	1.00

Notes: This table shows the number of violent cases against women registered by day of the week. Column (1) reports the absolute values and column (2) reports the percent of cases by day.

select only the games that at least one of the main four football teams from Rio de Janeiro (Botafogo, Flamengo, Fluminense, and Vasco) played. Each team played 38 games, one game per round, in each Brazilian Championship season, which occurs between May and December. In total, the selected teams played a combined 1824 games during the period. There is a high frequency of football matches on Sunday, with 43% of the games occurring then (Table 4).

Together with the observed outcome provided by CBF, the Brazilian Football Federation, we also record the expected results from the Brazilian website, Chance de Gol. We used this website to capture pre-game expectations, since there we have

Table 3: Municipalities with the largest number of civil police reports per year

Municipalities	Cases per year	SD	female population	Cases per 10k women
Rio de Janeiro	38,628	6,316	3,511,853	109
Duque de Caxias	6,281	1,191	468,756	133
São Gonçalo	5,793	1,108	558,628	103
Nova Iguaçu	5,532	850	426,877	129
Niterói	3,091	361	272,474	113
São João de Meriti	2,943	396	247,181	119
Belford Roxo	2,594	604	257,612	100
Campos dos Goytacazes	2,206	606	256,132	86
Magé	1,898	298	123,674	153
Volta Redonda	1,730	459	141,051	122
Petrópolis	1,665	332	159,878	104
Nova Friburgo	1,465	246	98,725	148
Queimados	1,457	353	76,092	191
Cabo Frio	1,445	276	110,476	130
Itaboraí	1,428	336	120,713	118
Macaé	1,261	184	120,828	104
Mesquita	1,255	221	92,021	136
Teresópolis	1,235	139	92,771	133
Nilópolis	1,183	224	86,162	137
Angra dos Reis	1,128	224	96,738	116

This table shows some summary statistics for this dataset. Column (1) presents the mean of incidents reported. As expected Rio de Janeiro, the capital of the state has the highest number of cases. In column (4), we show the mean of female population during this period, and column (5) corresponds to the highest cases of violence against women considering the size of the population

all the games' expected results of this period. In addition, we used a dataset provided by professor Gilcione Nonato Costa (Department of Mathematics at UFMG) with the probabilities of being champion and going to the second nation division in each championship round.

4.3 Teams' Fan bases

Unlike other studies, we do not believe that a municipality's fan base is entirely composed of fans of one single team. In fact, this assumption in the Brazilian case would be incorrect. For this reason, we use Google Trends to gathered soccer fan bases of the four most popular teams of the municipalities in the state of Rio de Janeiro. In almost every municipality, when we look for the four main teams, Flamengo is responsible for more than 50% of the researches in Google (Table 5).

Moreover, we use the data provided by CBF, the Brazilian Football Federation, to observe the participation of the public during the tournament. Figure 1 shows

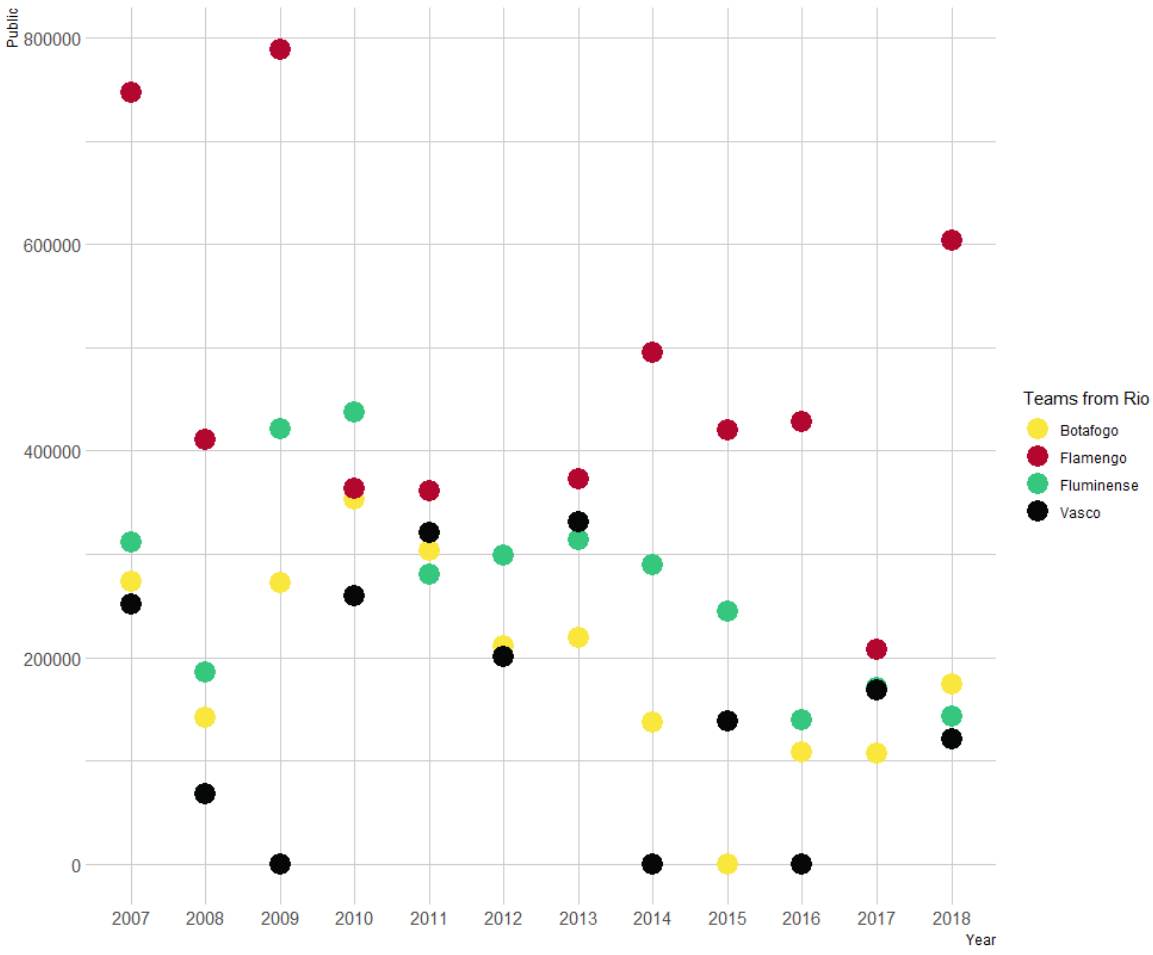
Table 4: Frequency of matches per day of the week

Day of the week	Number of matches	Proportion
Sunday	815	0.45
Saturday	446	0.24
Wednesday	322	0.18
Thursday	135	0.07
Tuesday	52	0.03
Monday	30	0.02
Friday	24	0.01
Total	1824	1.00

Notes: This table shows the number of matches by day of the week. Column (1) reports the absolute values and column (2) reports the percent of cases by day.

that in most of the years, Flamengo has more spectators than the rest of teams from Rio de Janeiro.

Figure 1: Number of fans present in the stadium



Notes: This picture shows the mean of attendance in Campeonato Brasileiro Serie A. In 2009, 2014 and 2016 the football team Vasco did not played the championship. Botafogo also did not participate of the tournament in 2015. For this reason, in these cases the public is 0.
Source: Self elaboration based on Base dos Dados Mais (BD+).

Table 5: Teams' Fan bases (2016-2018)

	Municipalities	Fluminense	Flamengo	Vasco	Botafogo
1	Magé	11%	55%	22%	12%
2	Belford Roxo	12%	53%	22%	13%
3	São João de Meriti	12%	53%	23%	12%
4	Duque de Caxias	12%	54%	22%	12%
5	Queimados	14%	53%	21%	12%
6	Itaperuna	11%	52%	24%	13%
7	Nova Iguaçu	13%	52%	22%	13%
8	Nilópolis	13%	52%	22%	13%
9	Mesquita	14%	52%	22%	12%
10	Três Rios	12%	55%	18%	15%
11	Barra Mansa	12%	52%	23%	13%
12	Araruama	13%	53%	21%	13%
13	Barra do Piraí	14%	52%	21%	13%
14	São Gonçalo	14%	53%	21%	12%
15	Itaguaí	12%	52%	21%	15%
16	Itaboraí	13%	51%	23%	13%
17	Saquarema	15%	50%	23%	12%
18	Rio Bonito	12%	51%	24%	13%
19	Campos dos Goytacazes	11%	52%	25%	12%
20	Angra dos Reis	13%	53%	22%	12%
21	Cabo Frio	13%	53%	22%	12%
22	Rio das Ostras	12%	57%	19%	12%
23	São Pedro da Aldeia	14%	52%	22%	12%
24	Maricá	15%	50%	22%	13%
25	Volta Redonda	14%	52%	21%	13%
26	**Rio de Janeiro**	12%	53%	21%	14%
27	Nova Friburgo	14%	49%	24%	13%
28	Itatiaia	16%	53%	21%	10%
29	Petrópolis	16%	51%	20%	13%
30	Teresópolis	13%	53%	21%	13%

Notes: This table shows the distribution of searching per football team during the period of 2016-2018.
Source: Self elaboration based on Google trends

5 METHODOLOGY

5.1 Theoretical Strategy

The hypothesis used here is the same presented in the paper of Card e Dahl (2011). It is supposed that wins and losses have an impact on the emotions of the individuals, and this is reflected in a 'gain-loss' utility around a rational reference point.

5.1.1 Loss-of-Control Model

First, suppose that each period has some risk of tension that can escalate to some kind of gender-based violence. The probability of this event occurs is $j \geq 0$, and it is influenced by the outcomes of the football games, where y=1 expresses a victory and y=0 expresses a loss. It is defined that $p = \mathrm{E}[y]$ and assumed that:

$$j = j^0 - u(y - p) \tag{5.1}$$

Where u is, a parameter, the gain-loss utility associated with the game outcome (KOSZEGI; RABIN, 2006). We suppose that this utility is linear:

$$u(y - p) = \alpha(y - p), y - p < 0 \tag{5.2}$$

$$u(y - p) = \beta(y - p), y - p > 0 \tag{5.3}$$

In Equation (5.2), it is showing a loss and in (5.3) a victory. In order to indicate the loss aversion, i.e., that the marginal effect of a loss is larger than the effect of a victory, the model suppose $\alpha > \beta$. Moreover, both are positive constants.

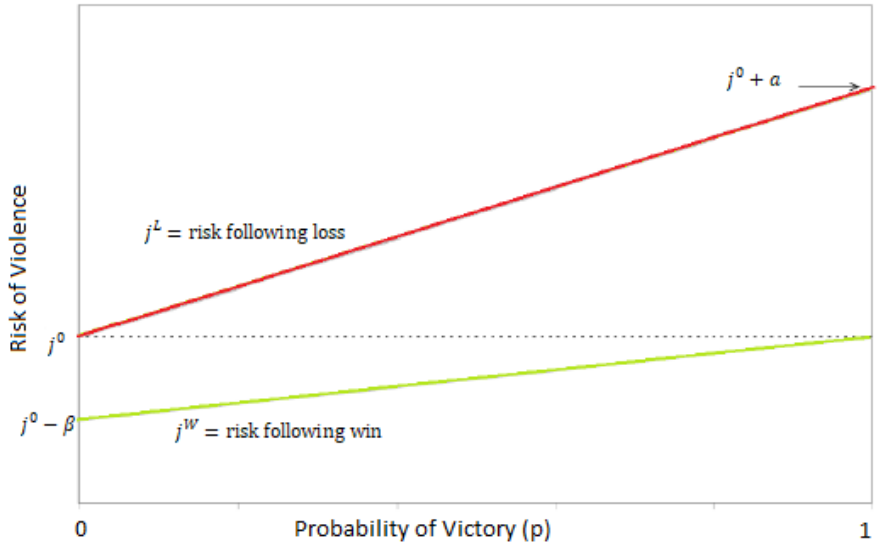
The probability that an individual committed a violent act as a function of the probability of the team lose or win is:

$$j^L(p) = j^0 + \alpha p \text{ if } y = 0 \tag{5.4}$$

$$j^W(p) = j^0 - \beta(1-p) \text{ if } y = 1 \tag{5.5}$$

In Figure 2, it is showed that when p is zero, the individuals already expect a negative result of the game. These cases are the best possible results, with the lowest levels of risk of violence and can happen in a victory or loss of the team, respectively $j^0 - \beta$ and j^0. On the other hand, when p is positive, any defeat is unexpected and gives negative utility. Note that the higher the probability that the individuals attribute to a victory, the higher is the risk of violence.

Figure 2: Risk of Violence Associated with the Game Outcome



Note: Image from Card and Dahl (2011)

5.2 Empirical Strategy

We specify a Poisson regression model for the number of violence against women reported. First, we estimate the following log-linear model:

$$
\begin{aligned}
log(Viol_{t+1}) =& \beta_1 \text{Derby}_t + \beta_2 \text{Flamengo Game}_t \\
&+ \beta_3 \text{Fluminense Game}_t + \beta_4 \text{Vasco Game}_t \\
&+ \beta_5 \text{Botafogo Game}_t + \beta_6 \text{Flamengo Importance}_t \\
&+ \eta_d + \gamma_m + \delta_y + \theta_h + \gamma \sum x_m + \varepsilon_t
\end{aligned}
\tag{5.6}
$$

Where, $Viol_{t+1}$ represents the number of cases of violence against women reported in Rio de Janeiro in the first day after the game *t+1*. It is important to keep in mind two aspects of our dependent variable. First, in this study, we are using the date of registration at the police station. Additionally, Most of the games in Brazilian Championship occurred at night, and in the first hours it is seen crowding-out between leisure and violence, as perpetrators give their attention to the game during that time. For this reason, we will gather the police reports of the next day after the game. (DAHL; DELLAVIGNA, 2009; IVANDIC; KIRCHMAIER; TORRES-BLAS, 2021)

In addition, Flamengo Game is a dummy that is one whether the football team Flamengo plays and zero otherwise. We also can define Fluminense Game as a dummy that is one whether the football team Fluminense plays and zero otherwise. Similarly, we define Vasco and Botafogo game. The Game variable that we mentioned are used as control variables. It is also worth noting that we use all the days of the period 2007 to 2018.

Moreover, $\eta_d, \gamma_m, \delta_y, \theta_h$ denote day of the week, month, year, and holiday dummies. $\sum x_m$ represents weather controls. The parameter β_3 describes the effects of Flamengo's football matches in the violence against women. Analogously, we identify the parameters β_4, β_5, and β_6. In addition, β_1 is the parameter used when at least one of the four teams played. Moreover, we identify $Derby_t$ as the matches played by traditional rivalries.

Another relevant point is that matches with high stakes is seen as important not only in papers that studies the link between football games and domestic violence (SACHS; CHU, 2000), but also in articles that provides evidence of loss aversion as

a trigger of domestic abuse after rivals matches (DICKSON; JENNINGS; KOOP, 2016).

We defined $FlamengoImportance_t$ as a measure of importance. The highest 20% values of the measure are classified as important and the others are classified as non important.The measure is constructed as follows:

$$Measure\ of\ importance = Number\ of\ rounds\ *\ (prob\ of\ being\ champion + prob\ of\ being\ relegated) \tag{5.7}$$

If either of the two probabilities is 100%, the measure is equal to zero. This variable is constructed for Flamengo. We focus on Flamengo's games because this team is the biggest club in Brazil and therefore more likely to be affecting individuals. For this reason, it is more likely to find significant effects focusing this particular club.

In order to analyze the emotional responses triggered by the games. We estimate:

$$\begin{aligned} log(Viol_{st+1}) =& \beta_1 \text{Derby}_t + \beta_2 \text{Importance}_t + \lambda_1 \text{Upset Loss}_t \\ &+ \lambda_2 \text{Upset Win}_t + \lambda_3 \text{Predicted Win}_t + \lambda_4 \text{Predicted Loss}_t + \eta_d + \gamma_m \\ &+ \delta_y + \theta_h + \gamma \sum x_m + \varepsilon_t \end{aligned} \tag{5.8}$$

We classify a match as predicted win if the probability of Flamengo winning a match is higher than 50% and as predicted loss if the probability of Flamengo losing was higher than 50%. An upset loss is when the football team Flamengo loss and it was expected a win. On the other hand, an upset win occurs when Flamengo win and it was expected a loss.

In Equation (5.9), we interact the variables upset loss, upset win, predicted win and predicted loss with the measure of importance. The aim is to expand our understanding of unexpected results in important games, allowing us to test whether important games combined with unexpected results leads to higher cases of violence against women.

$$\begin{aligned} log(Viol_{st+1}) = \beta_1 \text{Derby}_t + \beta_2 \text{Importance}_t \\ +\lambda_1 \text{Upset Loss}_t \times \text{Importance} + \lambda_2 \text{Upset Win}_t \times \text{Importance} \\ +\lambda_3 \text{Predicted Win}_t \times \text{Importance} + \lambda_4 \text{Predicted Loss}_t \times \text{Importance} \\ \eta_d + \gamma_m + \delta_y + \theta_h + \gamma \sum x_m + \varepsilon_t \end{aligned} \tag{5.9}$$

In the section heterogeneity of the results, two main exercises will be done. First, we will test the hypothesis whether an important home game lead to changes in the cases of violence against women. The second exercise is related to the potential impact of football on violence against black and brown women compared to the effects on white women. The Equation (5.10) presents our first exercise interacting Upset Win and Upset Loss Flamengo with our measure of importance and with a dummy that is equal to one when the game is at home and zero otherwise.

$$\begin{aligned} log(Viol_{st+1}) = \beta_1 \text{Derby}_t + \beta_2 \text{Importance}_t + \beta_3 \text{Home}_t \\ +\lambda_1 \text{Upset Loss}_t \times \text{Importance} + \lambda_2 \text{Upset Win}_t \times \text{Importance} \\ +\sigma_1 \text{Upset Loss}_t + \sigma_2 \text{Upset Win} + \lambda_3 \text{Upset Loss}_t \times \text{Importance} \times \text{Home} \\ +\lambda_4 \text{Upset Win}_t \times \text{Importance} \times \text{Home} + \lambda_5 \text{Upset Loss}_t \times \text{Home} \\ +\lambda_6 \text{Upset Win}_t \times \text{Home} + \rho \text{Importance} \times \text{Home} \\ \eta_d + \gamma_m + \delta_y + \theta_h + \gamma \sum x_m + \varepsilon_t \end{aligned} \tag{5.10}$$

6 MAIN RESULTS

In this chapter, we present the main results on the violence against women around football games. First, we examine the effect of matches on violence against women estimating the model in the Equation (5.6). In Table 6, we could not find statistically significant effects on Flamengo Game Day, Fluminense Game Day, Vasco Game Day or Botafogo Game Day.

Table 6: Effects on Violence Against Women (Game Day)

	(1) Rio State	(2) Rio State	(3) Rio City	(4) Rio City
Derby Day	-0.0095	-0.0021	-0.0101	-0.0042
	(0.0139)	(0.0144)	(0.0194)	(0.0200)
Flamengo Game Day		-0.0034		-0.0016
		(0.0079)		(0.0102)
Fluminense Game Day		-0.0110		-0.0064
		(0.0074)		(0.0096)
Vasco Game Day		0.0015		-0.0012
		(0.0076)		(0.0097)
Botafogo Game Day		-0.0051		-0.0038
		(0.0075)		(0.0095)
Flamengo Game Importance	-0.0003		0.0085	
	(0.0127)		(0.0175)	
Observations	4,383	4,383	4,383	4,383
FE: year & month & week day	yes	yes	yes	yes
controls: weather	yes	yes	yes	yes

Notes: The dependent variable in this table is the cases of violence against women reported to the civil police. In columns (1) and (2) the data is from Rio de Janeiro State. In columns (3) and (4), we restrict our sample to Rio de Janeiro city. Robust standard errors are reported in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1

Table 6 also shows the effect of Flamengo's salient games, in the tournament, on violence against women. We focus on Flamengo because the Brazilian team has the highest number of fans in the country.

Table 7 shows the results of our main specification. These results suggest that unexpected results and important games of Flamengo do trigger violence against

women. In the state of Rio de Janeiro, an upset loss lead to an increase of 15.5%. The effect is larger in the city of Rio de Janeiro, an upset loss of Flamengo in important games increase of approximately 21% of violence against women. An upset win of Flamengo in salient games also has a positive effect but not significant. In Table 8, we restrict our analysis for only the days that Flamengo played. The significant results of the Table 7 are maintained in this specification.

These results suggest that a defeat in important football games, when the expected was a victory, trigger violent behaviors against women. This result is in line with that found by Card e Dahl (2011) as they found a 10% increase in domestic violence after an upset loss and with the work of Dickson, Jennings e Koop (2016), they only find significant effects of loss aversion as a trigger of domestic violence after matches with high stakes in the championship.

Table 7: Main Specification

	(1) Rio State	(2) Rio State	(3) Rio City	(4) Rio City
Derby Day	-0.0043	-0.0035	-0.0048	-0.0033
	(0.0146)	(0.0140)	(0.0204)	(0.0197)
Flamengo Game Importance	0.0045	0.0049	0.0083	0.0150
	(0.0174)	(0.0143)	(0.0227)	(0.0193)
Ex-ante probability of Flamengo winning	0.0062	0.0140	-0.0002	0.0160
	(0.0148)	(0.0130)	(0.0198)	(0.0180)
Ex-ante probability of Flamengo losing	-0.0136	-0.0122	-0.0104	-0.0117
	(0.0099)	(0.0110)	(0.0124)	(0.0137)
Upset Loss Fla X Fla Game Import.	0.1548***		0.2147**	
	(0.0540)		(0.1057)	
Upset Win Fla X Fla Game Import.	0.0113		-0.0037	
	(0.0263)		(0.0383)	
Ex-ante prob. of Fla winning X Fla Game Import.	-0.0373		-0.0218	
	(0.0369)		(0.0458)	
Upset Loss Flamengo		-0.0490		-0.0597
		(0.0448)		(0.0597)
Upset Win Flamengo		-0.0021		0.0068
		(0.0144)		(0.0186)
Observations	4,383	4,383	4,383	4,383
FE: year & month & week day	yes	yes	yes	yes
controls: weather	yes	yes	yes	yes

Notes: The dependent variable in this table is the cases of violence against women reported to the civil police. In columns (1) and (2) the data is from Rio de Janeiro State. In columns (3) and (4), we restrict our sample to Rio de Janeiro city. Robust standard errors are reported in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Effects of Violence Against Women (Restricted Sample)

	(1) Rio State	(2) Rio State	(3) Rio City	(4) Rio City
Derby Day	-0.0224	-0.0219	-0.0193	-0.0198
	(0.0171)	(0.0165)	(0.0236)	(0.0228)
Flamengo Game Importance	0.0062	0.0130	0.0041	0.0189
	(0.0173)	(0.0145)	(0.0234)	(0.0202)
Ex-ante probability of Flamengo winning	0.1362	0.1426	0.0481	0.0581
	(0.1801)	(0.1793)	(0.1753)	(0.1737)
Ex-ante probability of Flamengo losing	0.1360	0.1311	0.0542	0.0393
	(0.1802)	(0.1793)	(0.1755)	(0.1734)
Upset Loss Fla X Fla Game Import.	0.1457***		0.2146**	
	(0.0501)		(0.0979)	
Upset Win Fla X Fla Game Import.	0.0084		0.0031	
	(0.0254)		(0.0401)	
Ex-ante prob. of Fla winning X Fla Game Import.	-0.0103		0.0055	
	(0.0349)		(0.0468)	
Upset Loss Flamengo		-0.0426		-0.0507
		(0.0430)		(0.0593)
Upset Win Flamengo		-0.0008		0.0141
		(0.0141)		(0.0186)
Observations	456	456	456	456
FE: year & month & week day	yes	yes	yes	yes
controls: weather	yes	yes	yes	yes

Notes: The dependent variable in this table is the cases of violence against women reported to the civil police. In columns (1) and (2) the data is from Rio de Janeiro State. In columns (3) and (4), we restrict our sample to Rio de Janeiro city. Robust standard errors are reported in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1

6.1 Heterogeneity results

Another interesting analysis is related to the heterogeneidity of results. First, we analysed if unexpected results lead to different effects depending on the place the game of Flamengo is played. We test our hypothesis in Table 9, we could find a positive significant effect in an upset loss of an important home game and a negative effect in an upset win of an important home game.

Our next exercise consist in investigate how race affect our results. Black and brown women are more severely affected by violence against women. Especially in more violent cases, for instance, in homicides and attempted murder. According to Manso e Campagnac (2019), many factors in Brazil contributed to this fact such as poverty, racism, and discrimination.

In Table 10, we restrict our analysis to black and brown women. The results suggest that an upset loss in important games lead to an increase of 20.5% in the state of Rio de Janeiro and 22.3% in the city. These effects are larger than the one find in Table 7. When we restrict our analysis to only white women, we find a significant effect in the state but smaller, and a positive non significant effect in the city of Rio de Janeiro (Table 11).

As a result, it is worthwhile to mention that this approach is extremely important in a country that has high rates of violence, especially against women, and in poorer nations. In contrast to Card e Dahl (2011) and Dickson, Jennings e Koop (2016) that did not study this heterogeneity, our results points to higher impacts on black and brown women. Our work shows that negative shocks have high impact on violence against black and brown (poorer) women and have smaller or none impacts on violence against white (richer) women.

6.2 Robustness exercises

In order to increase the robustness of our results, we run a placebo regression with results from one day before the matches. We find non significant results in Table 12. The idea, in this exercise, is that before games the variables of football should not modify our dependent variable.

Moreover, in our second robustness exercise, we run a regression that has as a dependent variable the daily temperature. The reason behind this falsification test is that we do not expect that football results affect violence against women, and again we did not find any significant result (Table 13).

Table 9: Effects of Violence Against Women (Games played at Home)

	(1) Rio State	(2) Rio City
Derby Day	-0.0051	-0.0062
	(0.0138)	(0.0192)
Flamengo at Home	-0.0004	-0.0016
	(0.0131)	(0.0170)
Flamengo Game Importance	-0.0152	-0.0052
	(0.0198)	(0.0253)
Fla at Home X Fla Game Import.	0.0016	0.0004
	(0.0305)	(0.0385)
Upset Win Flamengo	-0.0195	-0.0038
	(0.0195)	(0.0244)
Upset Loss Flamengo	-0.0146	0.0173
	(0.1254)	(0.1237)
Upset Win Fla X Fla at Home X Fla Game Import.	-0.1427***	-0.1169
	(0.0508)	(0.1074)
Upset Loss Fla X Fla at Home X Fla Game Import.	0.2287***	0.3382***
	(0.0738)	(0.1226)
Upset Win Fla X Fla at Home	0.0059	-0.0006
	(0.0294)	(0.0384)
Upset Loss Fla X Fla at Home	-0.0727	-0.1489
	(0.1383)	(0.1432)
Upset Win Fla X Fla Game Import.	0.0727**	0.0355
	(0.0350)	(0.0433)
Observations	4,383	4,383
FE: year & month & week day	yes	yes
controls: weather	yes	yes

Notes: The dependent variable in this table is the cases of violence against women reported to the civil police. In column (1) the data is from Rio de Janeiro State. In column (2), we restrict our sample to Rio de Janeiro city. Robust standard errors are reported in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Effects of Violence Against Black and Brown Women

VARIABLES	(1) Rio State	(2) Rio State	(3) Rio City	(4) Rio City
Derby Day	-0.0059	-0.0048	0.0030	0.0054
	(0.0183)	(0.0175)	(0.0248)	(0.0240)
Flamengo Game Importance	-0.0553	-0.0006	-0.0537	0.0284
	(0.0377)	(0.0180)	(0.0432)	(0.0248)
Ex-ante prob. of Fla losing X Fla Game Import.	0.0506			
	(0.0443)			
Upset Loss Fla X Flamengo Game Import.	0.2052***		0.2230**	
	(0.0670)		(0.1016)	
Upset Win Fla X Flamengo Game Import.	0.0315		0.0111	
	(0.0356)		(0.0442)	
Ex-ante probability of Flamengo winning	0.0039	0.0089	0.0134	0.0287
	(0.0187)	(0.0168)	(0.0254)	(0.0268)
Ex-ante probability of Flamengo losing	-0.0141	-0.0129	-0.0222	-0.0222
	(0.0119)	(0.0135)	(0.0162)	(0.0182)
Upset Loss Flamengo		-0.0413		-0.0658
		(0.0557)		(0.0644)
Upset Win Flamengo		0.0001		0.0080
		(0.0174)		(0.0245)
Ex-ante prob. of Fla winning X Fla Game Import.				-0.0391
				(0.0548)
Observations	4,383	4,383	4,383	4,383
FE: year & month & week day	yes	yes	yes	yes
controls: weather	yes	yes	yes	yes

Notes: The dependent variable in this table is the cases of violence against black and brown women reported to the civil police. In columns (1) and (2) the data is from Rio de Janeiro State. In columns (3) and (4), we restrict our sample to Rio de Janeiro city. Robust standard errors are reported in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Effects of Violence Against White Women

VARIABLES	(1) Rio State	(2) Rio State	(3) Rio City	(4) Rio City
Derby Day	-0.0093	-0.0083	-0.0165	-0.0155
	(0.0162)	(0.0156)	(0.0238)	(0.0234)
Flamengo Game Importance	-0.0002	0.0111	0.0242	-0.0136
	(0.0362)	(0.0154)	(0.0545)	(0.0274)
Ex-ante prob. of Fla losing X Fla Game Import.	0.0093			
	(0.0408)			
Upset Loss Fla X Flamengo Game Import.	0.0991*		0.2088	
	(0.0536)		(0.1529)	
Upset Win Fla X Flamengo Game Import.	-0.0036		-0.0046	
	(0.0300)		(0.0558)	
Ex-ante probability of Flamengo winning	0.0039	0.0186	-0.0128	-0.0015
	(0.0166)	(0.0139)	(0.0228)	(0.0236)
Ex-ante probability of Flamengo losing	-0.0122	-0.0136	0.0008	-0.0003
	(0.0111)	(0.0121)	(0.0147)	(0.0172)
Upset Loss Flamengo		-0.0698		-0.0509
		(0.0514)		(0.0716)
Upset Win Flamengo		0.0019		0.0088
		(0.0164)		(0.0232)
Ex-ante prob. of Fla winning X Fla Game Import.				0.0806
				(0.0661)
Observations	4,383	4,383	4,383	4,383
FE: year & month & week day	yes	yes	yes	yes
controls: weather	yes	yes	yes	yes

Notes: The dependent variable in this table is the cases of violence against white women reported to the civil police. In columns (1) and (2) the data is from Rio de Janeiro State. In columns (3) and (4), we restrict our sample to Rio de Janeiro city. Robust standard errors are reported in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Placebo Regressions

	(1) Rio State	(2) Rio State	(3) Rio City	(4) Rio City
Derby Day	0.0087	0.0081	0.0256	0.0239
	(0.0126)	(0.0125)	(0.0169)	(0.0168)
Game Day	-0.0030		-0.0092	
	(0.0072)		(0.0093)	
Flamengo Game Importance	0.0128	0.0129	0.0065	0.0068
	(0.0171)	(0.0171)	(0.0258)	(0.0259)
Ex-ante probability of Flamengo winning	0.0154	0.0135	0.0212	0.0155
	(0.0135)	(0.0130)	(0.0176)	(0.0170)
Ex-ante probability of Flamengo losing	0.0107	0.0089	0.0123	0.0066
	(0.0098)	(0.0090)	(0.0129)	(0.0117)
Upset Loss Fla X Fla Game Import.	0.0015	0.0014	-0.0248	-0.0251
	(0.0458)	(0.0458)	(0.0513)	(0.0513)
Upset Win Fla X Fla Game Import.	-0.0214	-0.0213	-0.0460	-0.0457
	(0.0293)	(0.0293)	(0.0398)	(0.0398)
Ex-ante prob. of Fla winning X Fla Game Import.	0.0194	0.0194	0.0267	0.0265
	(0.0320)	(0.0320)	(0.0402)	(0.0402)
Observations	4,383	4,383	4,383	4,383
FE: year & month & week day	yes	yes	yes	yes
controls: weather	yes	yes	yes	yes

Notes: The dependent variable in this table is the cases of violence against women reported to the civil police on day before the football matches. In columns (1) and (2) the data is from Rio de Janeiro State. In columns (3) and (4), we restrict our sample to Rio de Janeiro city. Robust standard errors are reported in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1

Table 13: Falsification Test

	(1) Rio State	(2) Rio State	(3) Rio City	(4) Rio City
Derby Day	-0.0001	-0.0001	-0.0001	-0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Game Day	0.0001		0.0001	
	(0.0001)		(0.0001)	
Flamengo Game Importance	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Ex-ante probability of Flamengo winning	-0.0000	0.0000	-0.0000	0.0000
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Ex-ante probability of Flamengo losing	-0.0002	-0.0002	-0.0002	-0.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Upset Loss Fla X Fla Game Import.	-0.0007	-0.0007	-0.0007	-0.0007
	(0.0016)	(0.0016)	(0.0016)	(0.0016)
Upset Win Fla X Fla Game Import.	0.0000	0.0000	0.0000	0.0000
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Ex-ante prob. of Fla winning X Fla Game Import.	0.0002	0.0002	0.0002	0.0002
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Observations	4,383	4,383	4,383	4,383
FE: year & month & week day	yes	yes	yes	yes
controls: weather	yes	yes	yes	yes

Notes: The dependent variable in this table is the daily temperature of Rio de Janeiro. Robust standard errors are reported in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1

7 CONCLUSION

After analyzing the literature on domestic and family violence, we found scarce evidence of what triggers gender-based violence. Although some factors have been identified. One possible source through which sport is related to violence against women is the emotional reactions to unexpected results. In this work, we follow a growing literature on the relevance of reference points in observed attitudes and behaviors.

We used data from several data during the period of 2007 to 2018. We gathered the violence against women results at Public Security Institute (Instituto de Segurança Pública). Moreover, we collected the matches from Brazilian Championship A Series and B, we merge the result of these games with the expected results and with the probabilities of being champion and going to the second nation division. Additionally, we added a local climate data.

Our work suggest that a loss when the supporters expected a win from important games of Flamengo football team lead to an increase in violence against women of up to 22,3%. The larger effects are found in black and brown women, but we still found a positive significant effect in white women of the state of Rio de Janeiro. We also show that an upset loss of Flamengo home games increase the cases of violence against women reported. On the other hand, an upset win in the state of Rio de Janeiro lead to a decrease of 14.3%.

It is relevant to produce information, research and analysis that help measure and understand how gender violence is perpetrated in our society. Understanding the channels that football games are linked to violence against women can have important implications for public policy. For instance, how government should formulate and promote campaigns and how games should be organised (IVANDIC; KIRCHMAIER; TORRES-BLAS, 2021).

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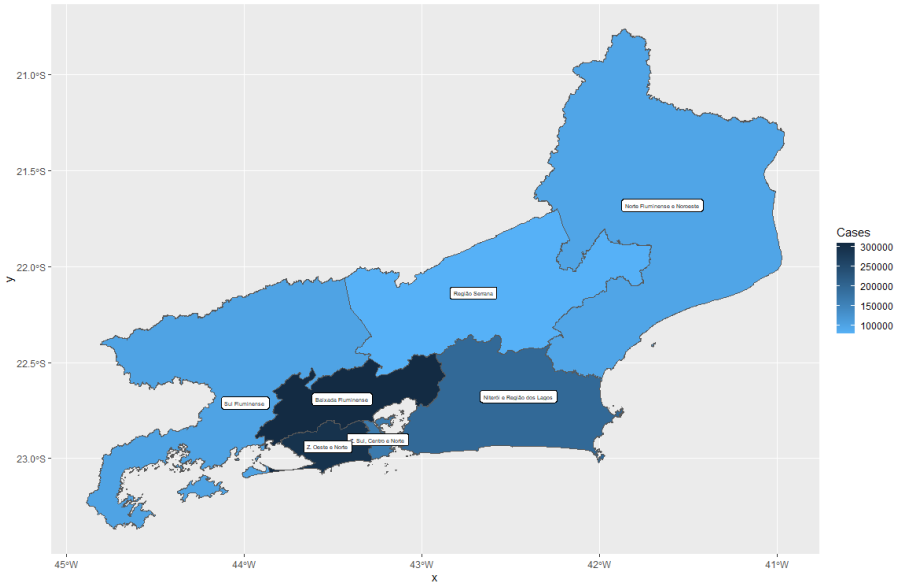
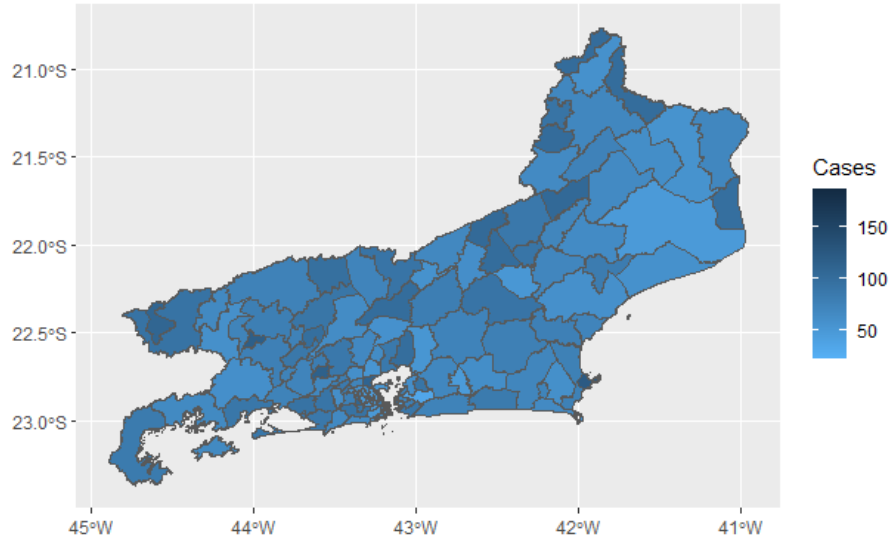
APPENDIX

Figure 3: Violence against women during the period 2007-2018 in Rio de Janeiro



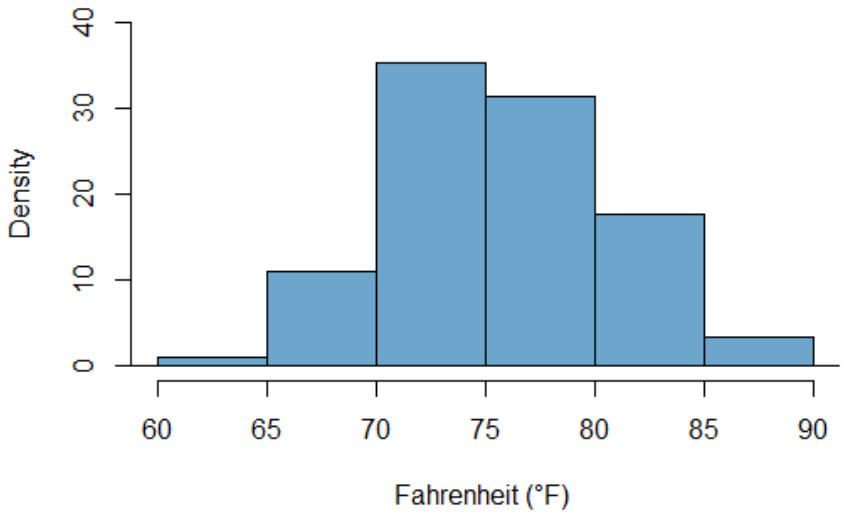
Notes: This picture shows the number of violence against women reported to the Civil Police per area of the State of Rio de Janeiro between 2007 and 2018

Figure 4: Violence against women per year in Rio de Janeiro (according to population)



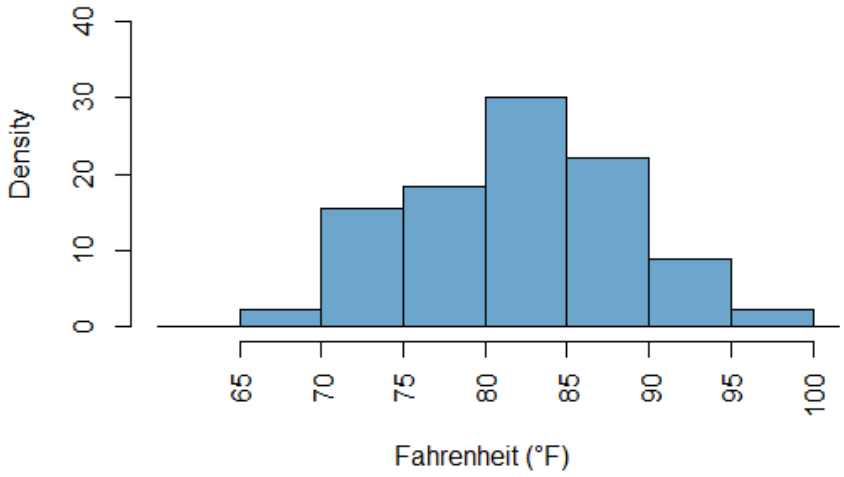
Notes: This picture shows the number of violence against women reported to each police station per 1,000 women between 2007 and 2018.

Figure 5: Average Daily Temperature in Rio



Notes: This picture shows the percentage of daily average temperature in Rio de Janeiro between 2007 and 2018. The data in divided in five Degree Bin Intervals.

Figure 6: Percentage of Maximum Daily Temperature in Rio



Notes: This picture shows the percentage of daily maximum temperature in Rio de Janeiro between 2007 and 2018. The data in divided in five Degree Bin Intervals

Table 14: Cases of Violence against Women by Race

Race	Number of Cases
Albino	201
Yellow	1,876
White	573,218
Native Brazilians	367
Brown	475,696
Black	171,973
Without information	22,060
Total	1,245,391

Notes: This table presents the race distribution of the victims in the period of 2007 to 2018.