



Effect of the NFL's Super Bowl on emergency department visits for assault-related injuries

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Abstract

Purpose Through its associations with mass gatherings, alcohol consumption, emotional cues, and gambling, the Super Bowl (SB) has been implicated in increased rates of interpersonal violence and assaults. This study endeavors to investigate the relationship between assault-related injuries, especially intimate partner violence (IPV) and SB.

Method A retrospective review of prospectively collected data from the National Electronic Injury Surveillance System (NEISS) spanning 2005 to 2017 was conducted. Assault-related injuries were examined in relation to (1) the 4-day Super Bowl weekend (Friday–Monday), (2) Super Bowl Sunday, and (3) the Super Bowl week (Friday–Thursday) for all years, following the loss of the projected winning team (underdog victories), and losses despite a significant point spread favoring one team (upset losses). National estimates of injuries and associated variables were derived using the SUDAAN software.

Results While there were no significant differences in the overall number of assaults or assault types during the SB weekend (5.6% vs 5.5%; $p=0.31$), relative decreases were observed for altercations (21.1% vs 24.8%; $p<0.01$), sexual assault (3.4% vs 4.0%; $p<0.01$), and IPV (8.3% vs 12.5%; $p<0.01$) on the Friday preceding SB, and robbery incidents on SB Sunday (2.1% vs 3.5%; $p=0.01$). No changes in the incidence of assault-related injuries were found based on the favored or underdog status of the teams, including upset losses.

Conclusion Contrary to expectations, SB was not associated with increased assault-related injuries. This study underscores the need for year-round structural changes in addressing violence rather than relying solely on heightened awareness during specific events.

Keywords Assault · Injuries · Super Bowl · Intimate partner violence · Interpersonal violence altercation · Robbery

Introduction

Over the past few decades, the effect of sporting events on interpersonal violence perpetration has been a topic of discussion. Mass gatherings during sporting events have been associated with increased rates of intimate partner violence (IPV) and sexual assault [1, 2]. These trends are largely thought to be fueled by the “holy trinity of sports, alcohol, and hegemonic masculinity.” [3] To date, the relationship between sporting events and crime has been explored using routine activity theory. This theory posits that “structural changes in routine activity patterns can influence crime rates by affecting the convergence in space and time of the three minimal elements of direct-contact predatory violations: (1) motivated offenders, (2) suitable targets, and (3) the absence of capable guardians against a violation.” [4] The application of routine activity theory to sporting events argues that such an event destabilize a person’s normal routine due to

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alterations in their normal routine and environment. Non-criminal individuals are likely to experience higher susceptibility to criminal offenders when the three elements above are satisfied, resulting in increased violence.

The National Football League's annual Super Bowl (SB), an iconic American sporting event, is one of the most widely watched sporting events in the US, capturing the attention of the general public across the nation [5]. Given its association with large gatherings, alcohol consumption, and emotional cues due to high expectations, SB has been associated with increased rates of violence in prior studies [5, 6]. Two studies noted increased partner maltreatment on SB Sunday—one from a clinical database from the US Air Force [7] and another using incident-based reporting data from Idaho [8]. Conflicting evidence from other studies, however, raises questions about this relationship. Two studies examining the association between professional football events and intimate partner violence (IPV) found no significant associations between the professional football season and emergency department (ED) visits or sheriff dispatches for IPV [8, 9]. In a 1992 study, White et al. [10] found increased rates of female ED presentations for IPV-related traumatic injuries that were associated with the local football team's victories, bringing into question the role of sporting outcomes in interpersonal violence perpetration.

The role of sporting outcomes is particularly relevant in professional football, as it is the most popular sport for wagers in the US, making up nearly half of all sports bets in the country. Thus, the SB annually tops the list as one of the most wagered events (i.e., the largest betting volume) in the world [11–13]. Sports betting has recently become more accessible with the expansion of legalized betting and online gambling opportunities. Sports betting is now legal in 34 US states and Washington DC [14], and almost 25% of US adults in 2023 placed a bet on the Super Bowl totaling up to \$16 billion in wagers [15]. Up to \$6.8 billion dollars were circulated in sports betting for the 2020 SB alone, of which 95% of bets were placed illegally [16–18].

For the SB, following the conclusion of the American Football Championship and National Football Championship games, one team is deemed to be the SB "favorite" (i.e., the team favored to win) and the other is deemed to be the "underdog" (i.e., the team not favored to win). There are two major types of bets in the NFL: a point spread bet and a moneyline bet [19]. A point spread refers to the difference between the points scored by the winning team and the points scored by the losing team with bets based on the margin of victory. In a moneyline bet, bettors select the winning team, with odds adjusted based on team strength. A bet on the winning team, regardless of the score or point difference, results in a win. Different prices are offered for favorites and underdogs. An "upset loss" occurs when the favored team loses by four or more points to the underdog [20]. Such

losses may be associated with increased perpetration of violence [6, 13]. Criminal justice research has shown a link between upset losses and an increased rate of IPV based on a higher number of phone calls reporting IPV [20]. In contrast, expected losses and upset wins (i.e., the home team wins when the home team was expected to lose) had little to no impact on IPV [20]. However, the existing literature addressing the relationship between sporting events and injuries related to assaults and IPV in the US is deficient. This is particularly critical for emergency radiologists, who are increasingly recognized for their pivotal role in identifying injuries stemming from interpersonal violence and assaults, including IPV. Understanding the potential surge in such injuries around major events like SB enables emergency radiologists to anticipate and accurately identify the nature and extent of injuries, leading to more effective and timely patient care. To address this gap, we aimed to investigate patterns of ED visits for assault-related injuries using data from the National Electronic Injury Surveillance System's (NEISS) All Injury Program (AIP) during multiple time frames, (1) the 4-day Super Bowl weekend (Friday–Monday), (2) Super Bowl Sunday itself, and (3) the Super Bowl week (Friday–Thursday) following the loss of the projected winning team (underdog victories) and the losses despite a significant point spread favoring one team (upset losses).

Materials and methods

Study design

This study utilized data sourced from the National Electronic Injury Surveillance System's (NEISS) All Injury Program (AIP). The NEISS is a meticulously organized database managed by the US Consumer Product Safety Commission (USCPSC), which collects injury data from 96 hospitals in the United States and its territories having an ED and is very often used in injury research. This dataset is a widely recognized resource in the field of injury research. By employing appropriate statistical methodologies, it allows researchers to extrapolate national estimates of ED visits. Initially designed to capture injuries associated with consumer products, NEISS recognizes that not all injuries are product-related. Consequently, approximately 65 of these hospitals (with slight annual variations in numbers) were chosen by the USCPSC to provide data on all injuries, irrespective of their connection to consumer products. This specific dataset, stemming from this select group of hospitals, is referred to as the AIP. The NEISS AIP data is publicly available and is maintained by the Inter-University Consortium for Political and Social Research (ICPSR). Access to this dataset can be obtained at <https://www.icpsr.umich.edu/icpsrweb/ICPSR/search/studies?q=all+injury+program>. The use of

this publicly accessible, de-identified data was granted an exemption by our local Institutional Review Board.

The database includes the date of the ED visit, gender/race/age of the injured patient, diagnosis, disposition from the ED, incident locale, body part injured, perpetrator and type of assault, reason for the assault, causative agent/mechanism of the injury, and hospital size. Hospital size (strata) are defined by the number of ED visits per year which are small [1–16], medium [16,831–21,850], large [28,151–41,130], and very large [$> 41,130$], and one encompassing children’s hospitals of all sizes.

The NEISS-AIP data for the years 2005 through 2017 was used. This period was chosen because 2017 was the last available year at the time the study began in October 2021. (The AIP data typically lags a few years behind the actual year). Data collected prior to 2005 employed different coding conventions for many variables, rendering it challenging to integrate with data from subsequent years. In this study, injury results resulting from assaults were identified using the code INTENT = 1 (assault). The NEISS definition of assault is any injury from an act of violence where physical force by one or more persons is used with the intent of causing harm, injury, or death to another person, or an intentional poisoning by another person [21]. This category includes perpetrators as well as intended and unintended victims of violent acts (e.g., innocent bystanders); it excludes unintentional shooting victims (other than those occurring during an act of violence), unintentional drug overdoses, and children

or teenagers “horsing” around. The type of assault was identified by the code REASON, and classified by NEISS as altercation, robbery/burglary, drug-related, sexual assault, gang-related, other specified, and unknown/not specified. An altercation was defined as a heated argument or dispute over traffic, children, gambling, money, property, sex jealousy, politics, ethnicity, race, or sexual preference. Sexual assault was defined as the use of physical force to compel another person to engage in a sexual act against his or her will with attempted or completed sex acts and abusive sexual contact. The other specified category included injuries related to drive-by-shooting, homicide–suicide pacts, mercy killing, revenge, blackmail, extortion, ransom, kidnapping, and contact injuries. When there was inadequate or no information in the narrative to describe the type of assault, it was categorized as unknown in the NEISS database. IPV was defined as INTENT = 1 and PERP (perpetrator of the assault) = 1 (spouse/partner).

Three different methods were used to define the SB time interval: SB Sunday, the entire SB weekend defined as Friday through Monday (SB weekend), and the SB week from Friday to Thursday. The control groups were the Sunday before and after the SB Sunday, the weekend before and after the SB weekend, and the week before and after the SB week. To investigate the effect of underdog victories and upset losses, we used a sports betting database’s archives consisting of the point spread and final score to identify “unexpected” SB underdog victories from 2004 (SB XXXVIII)

Table 1 Point spread and upset losses for 2004–2016 Super Bowl

Super Bowl (season)	Date	Favored team	Spread	Underdog team	Winner
Favored team victories					
2016 LI	2/5/17	New England Patriots	–3	Atlanta Falcons	New England Patriots
2010 XLV	2/6/11	Green Bay Packers	–3	Pittsburgh Steelers	Green Bay Packers
2008 XLIII	2/1/09	Pittsburgh Steelers	–6.5	Arizona Cardinals	Pittsburgh Steelers
2006 XLI	2/4/07	Indianapolis Colts	–6.5	Chicago Bears	Indianapolis Colts
2005 XL	2/5/06	Pittsburgh Steelers	–4	Seattle Seahawks	Pittsburgh Steelers
2004 XXXIX	2/6/05	New England Patriots	–7	Philadelphia Eagles	New England Patriots
Underdog victories					
2015 L	2/6/16	Carolina Panthers	–5	Denver Broncos	Denver Broncos
2014 XLIX	2/1/15	Seattle Seahawks	–1	New England Patriots	New England Patriots
2013 XLVIII	2/2/14	Denver Broncos	–2.5	Seattle Seahawks	Seattle Seahawks
2012 XLVII	2/3/13	San Francisco 49ers	–4.5	Baltimore Ravens	Baltimore Ravens
2011 XLVI	2/5/12	New England Patriots	–3	New York Giants	New York Giants
2009 XLIV	2/7/10	Indianapolis Colts	–4.5	New Orleans Saints	New Orleans Saints
2007 XLII	2/3/08	New England Patriots	–12.5	New York Giants	New York Giants
Upset losses (underdog victories with spreads > 4)					
2015 L	2/6/16	Carolina Panthers	–5	Denver Broncos	Denver Broncos
2012 XLVII	2/3/13	San Francisco 49ers	–4.5	Baltimore Ravens	Baltimore Ravens
2009 XLIV	2/7/10	Indianapolis Colts	–4.5	New Orleans Saints	New Orleans Saints
2007 XLII	2/3/08	New England Patriots	–12.5	New York Giants	New York Giants

to 2018 (SB LII) [22]. An underdog victory was defined as a win by the non-favored team. During this period, eight out of fifteen SBs resulted in underdog victories. For these SBs with underdog victories, we further identified upset losses by scrutinizing the point spread. Upset losses represent a subset of underdog wins, where the favored team was expected to win by four or more points. Among the eight underdog victories from 2004 to 2018, five fell into the category of upset losses (Table 1). Subsequently, we conducted comparisons of the number of assault-related injury incidents for all three time frames.

Calculation

The national estimates of ED visits due were obtained using SUDAAN 11.0.01™ software (RTI International, Research Triangle Park, NC, 2013) which accounts for the weighted, stratified nature of the data. The estimated number (N) of injuries/ED visits is calculated along with 95% confidence intervals [CIs] of the estimate. When the actual

number of patients (n) is < 20, the estimated number (N) becomes unstable and should be interpreted with caution; thus, we report both the n and N. Analyses between groups of continuous data were performed with the t-test (2 groups) or ANOVA (3 or more groups). Differences between groups of categorical data were analyzed by the χ^2 test.

Results

All injuries, including transportation

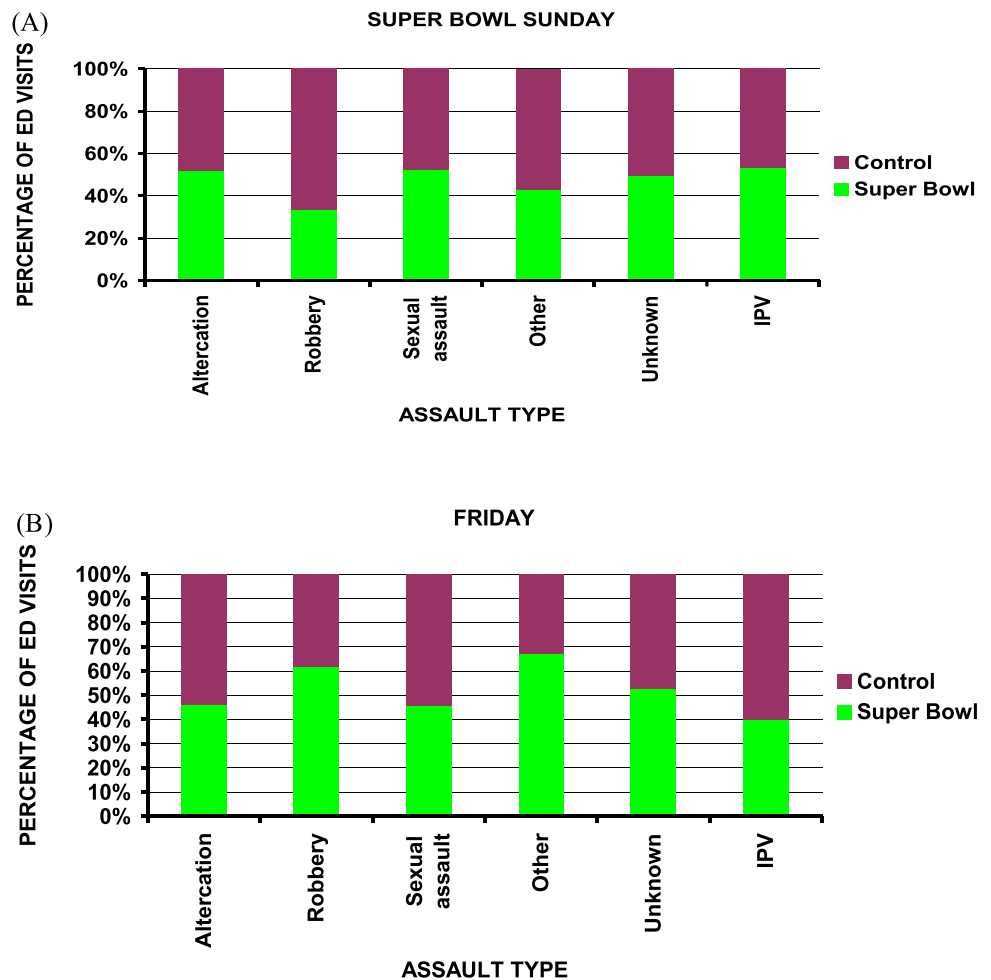
We first analyzed the entire NEISS AIP data for the three four-day weekends (SB weekend, weekend before SB, and weekend after SB) for all injuries—including those due to transportation, as it could be hypothesized that more people were traveling by car during SB week—which might influence the number of assault-related injuries. The numbers in the control groups are typically double that of the SB group, as the SB group comprises only one day/weekend,

Table 2 Number of ED visits for all assaults and assault types encompassing all 4 days of the Super Bowl weekend including injuries due to transportation mechanisms

FOR ENTIRE SUPER BOWL 4 DAY WEEKEND																
	All					Super Bowl					Control				p value	
	n	N	L95%	U95%	%	n	N	L95%	U95%	%	n	N	U	L95%		%
Assault	200,155	11,898,714				67,214	3,981,141				132,941	7,917,574				
Y	12,448	659,556	533,062	813,872	5.5	4,266	224,919	178,355	283,059	5.6	8,182	434,637	6.72	354,707	5.5	0.31
N	187,707	11,239,158	11,084,842	11,365,652	94.5	62,948	3,756,222	3,698,082	3,802,786	94.4	124,759	7,482,937	95.52	7,385,513	94.5	
Altercation																
Y	3,091	171,004	139,215	209,417	1.4	1,099	60,817	47,376	77,632	1.5	1,992	110,188	1.68	91,844	1.4	
N	197,064	3,920,324	11,689,297	11,759,499	32.9	66,115	3,920,324	3,903,509	3,933,765	98.5	130,949	7,807,386	98.84	7,784,559	98.6	
Robbery																
Y	306	14,855	9,519	23,797	0.1	110	5,093	3,185	8,360	0.1	196	9,763	0.20	6,334	0.1	0.77
N	199,849	11,883,859	11,874,917	11,889,195	99.9	67,104	3,976,048	3,972,781	3,977,956	99.9	132,745	7,907,811	99.92	7,901,739	99.9	
Sexual Assault																
Y	841	29,357	23,797	35,696	0.2	288	9,646	7,564	12,342	0.2	553	19,711	0.32	15,835	0.2	0.83
N	199,314	11,869,357	11,863,018	11,874,917	99.8	66,926	3,971,494	3,968,799	3,973,577	99.8	132,388	7,897,863	99.80	7,892,238	99.8	
Other Specified																
Y	210	9,507	7,139	13,089	0.1	65	3,056	1,991	4,777	0.1	145	6,451	0.12	4,751	0.1	0.79
N	199,945	11,889,208	11,885,625	11,891,575	99.9	67,149	3,978,085	3,976,364	3,979,150	99.9	132,796	7,911,123	99.94	7,908,073	99.9	
Unknown Type																
Y	7,984	433,757	346,253	541,391	3.6	2,699	146,025	115,453	184,327	3.7	5,285	287,732	4.53	230,401	3.6	0.75
N	192,171	11,464,957	11,357,323	11,552,461	96.4	64,515	3,835,116	3,796,814	3,865,688	96.3	127,656	7,629,841	97.09	7,558,908	96.4	
IPV																
Y	1,365	78,464	65,443	92,810	0.7	460	27,032	22,693	31,849	0.7	905	51,432	0.79	41,963	0.6	0.53
N	198,790	11,820,251	11,805,904	11,833,271	99.3	66,754	3,954,109	3,949,292	3,958,448	99.3	132,036	7,866,142	99.47	7,855,025	99.4	

FOR ONLY SUPER BOWL SUNDAY																
	All					Super Bowl					Control				p value	
	n	N	L95%	U95%	%	n	N	L95%	U95%	%	n	N	U	L95%		%
Assault	48,776	2,888,545				16,443	962,883				32,333	1,925,662				
Y	3,347	183,821	150,782	223,285	6.4	1,170	63,378	50,455	79,342	6.6	2,177	120,443	99,942	144,810	6.3	0.29
N	45,429	2,704,724	2,665,260	2,737,763	93.6	15,273	899,506	883,541	912,428	93.4	30,156	1,805,219	1,780,852	1,825,720	93.7	
Altercation																
Y	826	48,680	39,862	59,215	1.7	300	18,021	13,577	23,879	1.9	526	30,659	25,419	36,780	1.6	0.19
N	47,950	2,839,865	2,829,330	2,848,683	98.3	16,143	944,862	939,004	949,306	98.1	31,807	1,895,003	1,888,882	1,900,243	98.4	
Robbery																
Y	78	3,419	2,022	6,066	0.1	20	693	289	1,541	0.1	58	2,726	1,541	4,622	0.1	0.0008
N	48,698	2,885,126	2,882,479	2,886,523	99.9	16,423	962,190	961,342	962,594	99.9	32,275	1,922,936	1,921,040	1,924,121	99.9	
Sexual Assault																
Y	217	8,311	6,066	11,265	0.3	79	3,109	2,215	4,333	0.3	138	5,203	3,466	7,895	0.3	0.42
N	48,559	2,880,234	2,877,280	2,882,479	99.7	16,364	959,775	958,550	960,668	99.7	32,195	1,920,459	1,917,767	1,922,196	99.7	
Other Specified																
Y	53	2,510	1,733	3,755	0.1	16	625	289	1,155	0.1	37	1,885	963	3,466	0.1	0.42
N	48,723	2,886,035	2,884,790	2,886,812	99.9	16,427	962,259	961,728	962,594	99.9	32,296	1,923,777	1,922,196	1,924,699	99.9	
Unknown Type																
Y	2,167	120,479	97,633	148,471	4.2	753	40,816	32,160	51,611	4.2	1,414	79,664	65,087	97,438	4.1	0.62
N	46,609	2,768,066	2,740,074	2,790,912	95.8	15,690	922,068	911,272	930,723	95.8	30,919	1,845,998	1,828,224	1,860,575	95.9	
IPV																
Y	365	21,836	17,620	27,152	0.8	131	8,103	6,451	10,207	0.8	234	13,732	10,399	18,101	0.7	0.24
N	48,411	2,866,710	2,861,393	2,870,925	99.2	16,312	954,780	952,676	956,432	99.2	32,099	1,911,930	1,907,561	1,915,263	99.3	

Fig. 1 **A** The percentage of ED visits due to assault-related injuries on SB Sunday by assault type. **B** The percentage of ED visits for assault-related injuries on Friday before the Superbowl by assault type



while the control comprises both the day/weekend before and after SB assault-related injuries represented 5.6% of all injuries during the four-day SBW and 5.5% for the control timeframe with no significant difference in the number of assault-related injuries ($p=0.31$) (Table 2). Similarly, there was no difference in the percentage of assault injuries, including transportation for the SB Sunday and SB week timeframes. No differences in the percentage of assault-type injuries were observed during the SB weekend or week but there was a relative decrease in the percentage of robberies for SB Sunday itself ($p=0.008$) (Table 2) (Fig. 1A).

Assaults for Friday, Saturday, and Monday outside of SB Sunday

There were only differences for the Friday before SB Sunday but not for the Saturday before or Monday after (Table 3). There was a relative decrease in the incidence of IPV (8.3% vs 12.5%; $p=0.0001$), altercation (21.1% vs 24.8%; $p=0.0001$), sexual assault (3.4% vs 4.0%; $p=0.006$) with a relative increase in robbery (3.5% vs 2.1%; $p=0.012$) and

unknown injuries (61.1% vs 55.3%; $p=0.0001$) on the Friday before the Super Bowl (Table 3) (Fig. 1B).

Favored and underdog victories

There was no change in the overall percentage of assaults and type of assaults based on favored and underdog victories, including upset losses for all three time-frames (Table 4).

Upset losses and no upset losses

There was no change in the overall percentage of assaults and type of assaults based on upset losses for all three time frames (Table 4).

Discussion

Several hypotheses have been proposed linking the SB with increased interpersonal violence. First, there is a belief that increased drinking during sporting events such as the SB is

associated with increased IPV and sexual assault [23–28]. Second, there is reason to believe that strong emotional cues based on the outcome of a sporting event might impact violence. “Emotional cues” largely refer to visceral factors that can influence a person’s state of being (sexual desire, hunger, pain, anger, etc.) and thereby motivate specific behaviors. Regarding IPV, “hypermasculine activity in which physical force is used to successfully overcome others increases the likelihood that male spectators will become physically aggressive with their partners,” [10] creating a possible mechanism for SB viewing to lead to increased violence perpetration. This hypothesis aligns with prior findings, yet inconsistent with other studies, that IPV is more likely if the perpetrator’s team unexpectedly loses. Upset losses have been reported to be associated with increased at-home violence and IPV by men against their partners [20, 29]. Third, as problem gambling has been associated with significantly increased odds of IPV, the high volume of sports betting during the SB may increase violence perpetration during and/or following the event [30, 31]. In fact, a 2000 study examining the link between professional football games and domestic

violence using Los Angeles Sheriff Department’s data from 1993 to 1995, found a substantial increase in domestic violence dispatches during playoff and SB weeks, though the overall study did not find a statistically significant association between the football games and domestic violence in Los Angeles County [32].

Despite these hypotheses, our study failed to demonstrate any statistically significant increase in IPV or any other interpersonal violence during the SB Sunday, throughout the SB weekend, or the weekdays after the SB compared to the respective time frames before and after the SB based on the number of assault-related injuries seen in Emergency Departments. While our findings may contradict popular belief, they align with Pena Alejandra’s study assessing the influence of NFL’s SB event on host crime rates from 1990 to 2012 by analyzing 8 different crime trends before, during, and after the event and observing no significant impact on the crime rate of the host city [5].

Misinformation regarding the SB and its alleged association with IPV can be attributed to several factors. The SB draws immense viewership, making it a focal point for

Table 3 Number of ED visits by assault type outside of SB Sunday by day

	Super Bowl					Control					P-value	P-value^
	n	N	L95%	U95%	%	n	N	L95%	U95%	%		
FRIDAY												
Assault type	964	47,843			21.3	1766	93,246			21.5		
Altercation	227	10,102	8176	12,343	21.1	416	23,127	20,374	26,118	24.8	0.0001	0.0001
Robbery	31	1672	1053	2636	3.5	43	1997	1222	3236	2.1		0.012
Sexual assault	59	1614	957	2703	3.4	107	3734	2639	5250	4.0		0.006
Other	19	1224	694	2143	2.6	40	1159	727	1846	1.2		0.12
Unknown	546	29,251	27,132	31,289	61.1	973	51,552	48,134	54,922	55.3		0.0001
IPV	82	3979	3043	5172	8.3	187	11,676	9698	13,987	12.5		0.0001
SATURDAY												
Assault type	1,101	58,713				2203	114,802					
Altercation	240	13,067	11,343	14,972	22.3	448	24,500	20,928	28,494	21.3	0.14	
Robbery	34	1587	957	2619	2.7	44	2234	1596	3134	1.9		
Sexual assault	65	2452	1468	4045	4.2	148	5683	3857	8312	5.0		
Other	10	282	100	816	0.5	30	1271	804	2021	1.1		
Unknown	619	33,565	31,058	36,015	57.2	1275	67,391	61,970	72,635	58.7		
IPV	133	7760	6053	9858	13.2	258	13,724	11,492	16,313	12.0		
MONDAY												
Assault type	1,119	59,964				1940	100,571					
Altercation	269	15,697	13,630	17,917	26.2	430	22,385	19,521	25,535	22.3	0.43	
Robbery	24	1007	648	1559	1.7	49	2753	1820	4154	2.7		
Sexual assault	88	2375	1649	3400	4.0	128	3635	2323	5652	3.6		
Other	18	813	456	1451	1.4	26	1377	835	2273	1.4		
Unknown	593	32,320	29,736	34,869	53.9	1088	58,479	54,238	62,595	58.1		
IPV	127	7752	5805	10,236	12.9	219	11,942	9826	14,442	11.9		

*Excluding IPV

^Post hoc goodness-of-fit p-values

Table 4 Number of ED visits by assault types for (A) favored victories vs underdog victories and (B) upset losses with a spread of at least 4 vs upset losses with a spread of less than 4 for the SB weekend timeframe

Assault type	Upset loss						Not upset loss						P-value
	n	U	L	U%	L%	%	n	U	L	U%	L%	%	
(A)													
	n = 1821	N = 89,306					N = 48,428						
Altercation	392	19,341	24.63	18.96	21.996	16,932	21.7	227	20.42	14,068	9,889	24.5	0.28
Robbery	48	2193	3.48	1.74	3104	1554	2.5	18	1.46	1710	707	2.3	0.18^
Sexual assault	148	5233	8.18	4.17	7305	3724	5.9	61	2.71	3467	1312	4.4	
Other specified	26	1017	2.26	0.57	2018	509	1.1	17	0.79	1351	383	1.5	
Unknown	1017	51,079	65.25	5.17	58,272	4616	57.2	475	50.45	28,974	24,432	55.2	
IPV	190	10,442	15.69	8.61	14,012	7689	11.7	91	9.47	7477	4586	12.1	0.82*
(B)													
	Upset loss with spread of at least 4						Upset loss with spread less than 4						
	n = 1,219	N = 59,526					n = 1,491	N = 78,210					
Altercation	261	13,033	24.94	19.12	14,846	11,381	21.9	358	19.80	21,140	15,486	23.2	0.94
Robbery	32	1377	3.13	1.71	1863	1018	2.3	34	1.75	2675	1369	2.5	0.90^
Sexual assault	92	3143	7.77	3.56	4625	2119	5.3	117	3.77	6038	2949	5.4	
Other specified	17	637	3.36	0.34	2000	202	1.1	26	0.89	1744	696	1.4	
Unknown	694	34,748	64.95	51.48	38,662	30,644	58.4	798	51.46	45,823	40,247	55.1	
IPV	123	6586	16.00	7.51	9524	4470	11.1	158	10.29	11,653	8048	12.4	0.47*

^Excludes IPV

*Includes only IPV yes vs no

media attention, and this attention extends to the NFL and its players. Over the years, the NFL and its players have received significant media attention for their involvement in violent incidents. According to the USA Today's NFL Arrest Database, 134 players in the NFL have been arrested for IPV since the year 2000 and an additional 15 have been arrested for sexual assault, battery, and/or solicitation [33]. However, the complexity arises when examining the legal outcomes of these cases. A recent study has found that among the 117 NFL players arrested for violence against women between 2000 and 2019, only 21 were ultimately found guilty, and a mere six players were incarcerated [34]. Notably, the study emphasized that the post-arrest career trajectories of these players were predominantly influenced by their on-field value and performance rather than their legal consequences [34]. This lack of accountability and incongruity can foster the development of strong associations between the SB, often regarded as the NFL's flagship event, and a culture of violence [35]. Regrettably, some abusers may perceive NFL players as role models, potentially normalizing such behavior. Victims of domestic violence, on the other hand, may feel threatened and apprehensive as they continue to witness alleged abusers playing and achieving success. This dissonance between media coverage, social media posts, arrests, legal outcomes, and player success shapes public perceptions and contributes to spreading misinformation regarding the SB and its connection to IPV.

Our study found that the lack of connection between SB outcomes and assault-related injuries persisted even in cases of underdog wins and upset losses, emphasizing the complexity and multifaceted nature of the relationship between sports gambling, upset losses, and IPV. This intricate association is influenced by a range of factors, including individual personality traits, pre-existing dynamics within relationships, and the severity of gambling losses. Interviews of 30 women who had experienced IPV due to a male partner's gambling behavior identified five key elements contributing to this relationship: (1) rigid gender roles of males as authority figures in the relationship, (2) relationships normalizing aggression, (3) attitudes normalizing violence, (4) male as decision-maker in the relationship, and (5) limited female autonomy as well as increased isolation [36]. In other words, sports and gambling create "an intentional and sustained pattern of conduct...to induce fear through the invasive and intrusive tactics of intimidation, confinement, restriction, surveillance, isolation, and threats [37]."

We also explored the previous literature describing potential associations between drinking and sports events. As pointed out by Oths and Robertson, it is essential to recognize that individuals with substance abuse issues may not limit their intoxication to specific occasions, as they may view each weekend as an opportunity for heavy drinking, which can contribute to persistent patterns of crisis calls and shelter admissions across the year [6]. The persistence of these issues is likely rooted

in broader social structures and institutions that tolerate violence. For example, certain social and cultural behaviors, such as resource competition, alcohol-related violence, arguments, and sexism have been correlated with increased violence perpetration within the US [6]. These sociocultural behaviors that are associated with violence persist year-round, and our national sociocultural landscape is unlikely to undergo significant change due to a single event like SB.

Of note, we found a statistically significant decrease in robbery-related injuries and a decrease in IPV-related injuries on the Friday preceding SB Sunday compared to the control Fridays before and after SB Friday. The decreased incidence of robbery-related injuries during SB Sunday may be explained by routine activity theory. Although the SB may present more potential victims and opportunities for robbery, our finding aligns with prior studies noting that economically motivated crimes occur less frequently on holidays [18]. Increased guardianship by family, friends, and security protecting potential victims by virtue of social gatherings and residence-based activities during the SB, might explain this pattern [31]. Regarding the decrease in IPV-related injuries and altercations on the Friday of SBW, the SB event itself has been associated with positive emotional sentiments of pride, excitement, attachment, and community spirit [38]. Social gatherings and viewing parties are hosted to foster a sense of community, fortify local pride, and celebrate belonging through this event [39]. Further, regardless of the outcome, watching the SB game in and of itself has been associated with a baseline level of entertainment that provides an average positive effect [40]. These positive sociocultural associations preceding the SB event may outweigh triggers for IPV perpetration.

The limitations of this study must also be acknowledged. This study considers injuries only seen in US EDs and is not representative of injuries treated in additional health-care settings such as outpatient care, urgent centers, women's health centers, etc. The NEISS dataset that was used in our data collection and analysis is nationally representative and unable to provide regional or state-level data. Local variations in IPV based on the wins or losses of each SB and team allegiance could not be elucidated from our project. Thus, it is possible that there are microcosms of increased assaults/IPV in the actual cities where the SB is played for each particular year. We have no information regarding those patients who experienced nonviolent events (e.g. emotional IPV) or those not severe enough to result in ED visits.

Conclusions

In conclusion, our study dispels the misconception of an alleged link between SB and IPV by comprehensively analyzing injury data and SB outcomes, revealing no increase in

the incidence of overall assaults or specific types of assaults, including IPV during Superbowl Sunday, Superbowl weekend, the week following the Superbowl, underdog victories, or upset losses. These findings indicate that interpersonal violence is pervasive throughout the year and does not change significantly in the context of a single sporting event. Rather than attributing it solely to specific events, such as SB, our prevention efforts should target structural changes and foster enduring interventions that address the intricate roots of violent behavior, moving beyond temporary measures to more sustainable solutions.

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Declarations

Conflict of interests The authors declare that they have no conflict of interest.

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