

# Fighting in the National Hockey League: Before, During, and after the Pandemic

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## ABSTRACT

Fighting has long been a tradition in the National Hockey League (NHL). The impact of violence in the NHL on attendance has been widely studied. But, one could only surmise the counterfactual of how empty arenas influence player behavior, that is, until 2020. The COVID-19 pandemic forced NHL teams to severely limit attendance. The authors compare the proportion of regular season home games with at least one fight for each of the 31 NHL teams one season before, during, and one season after the 2020-21 NHL season. Did the absence of fans impact fighting? While there are few significant differences year to year (between 2019-20 and 2021-22), the incidence of fighting increased for most teams after fans were allowed back into arenas in 2021-22 compared to fighting one season before the COVID-19 NHL season without fans.

## Introduction

The 2019-20 National Hockey League (NHL) season was suspended on March 12, 2020, due to the COVID-19 pandemic. As a result, the typical 82-game regular season was shortened to between 68 and 71 games. The following 2020-21 NHL season was reduced to 56 games due (again) to the COVID-19 pandemic. Moreover, due to COVID-19 travel restrictions imposed by the Canadian government, all seven Canadian teams (Ottawa Senators, Montreal Canadiens, Edmonton Oilers, Calgary Flames, Winnipeg Jets, Vancouver Canucks, and Toronto Maple Leafs) were temporarily realigned into a single “North” division. But, most notable during the 2020-21 regular season was the absence of fans. Attendance at each team’s arena was severely limited. Fans were allowed back to NHL games in the full 82-game 2021-22 regular season.

One might wonder what (if any) effect the absence of fans had on fighting compared to seasons (before and after 2020-21) when fans were present. One could argue that hockey players would refrain from fighting if there were no fans to cheer them on. On the other hand, hockey players angered by the absence of fans in the stands might be more inclined to “drop their gloves.”

Fighting has long been a part of the game in ice hockey, more so than in any of the three other major North American sports leagues (baseball, basketball, and football). A “fight” in the NHL is a one-on-one altercation or bench brawl resulting in a five-minute penalty to two or more players or a ten-minute misconduct or game misconduct penalty to the instigator (who starts the fight). Such major penalties can have a decisive effect on the outcome of a game.

Several studies have investigated the impact of *fighting on attendance*. Using game-by-game data from the 1983-84 NHL season, Jones, Ferguson, and Stewart [1] find that violence is positively related to attendance for all teams in the NHL. Moreover, the authors find that the lust for “blood sports” is greater among American than Canadian fans. Using data from the 1999-2000 season, Paul [2] finds that fights per game were highly significant with a positive impact on attendance, more so for teams in the United States than for Canadian teams. But, Rockerbie [3] argues that fighting does not make economic sense. Using data over the 1997-98 through 2009-10 seasons, he finds a small negative effect on attendance.

In this brief research note, we turn the question around: What is the impact of *attendance on fighting*? During the 2020-21 season, at the height of the COVID-19 pandemic, there were practically no fans in attendance at NHL games. How did their absence affect the incidence of fights? We compare for each NHL team over three regular seasons – 2019-20, 2020-21, and 2021-22 – the proportion of home games resulting in at least one fight.

## The Data

The archive of hockey fights in the NHL [4] gives regular season fights at home games for 2019-20, 2020-21, and 2021-22. We excluded the Seattle Kraken professional hockey team which did not begin play until the 2021-22 season. Summary statistics for each of the three seasons were: (i) **2019-20** average proportion of home games with at least one fight, 15.85 percent (high: Anaheim Ducks, 37.14 percent; low: Buffalo Sabres, 2.86 percent); no difference between twenty-four U.S. teams (16.07 percent) and seven Canadian teams (15.13 percent),  $p$ -value = 0.793; (ii) **2020-21** average, 19.09 percent (high: Florida Panthers, 40.74 percent; low: Carolina Hurricanes, zero percent); no difference between U.S. teams (18.40 percent) and Canadian teams (21.47 percent),  $p = 0.455$ ; and (iii) **2021-22** average, 20.68 percent (high: Minnesota Wild, 46.34 percent; low: Dallas Stars, 4.88 percent); no difference between U.S. teams (21.59 percent) and Canadian teams (17.55 percent),  $p = 0.315$ .

## Methodology

To test whether the proportion of home games with at least one fight differed between any two seasons, we employed a series of two-sample  $t$ -tests on the difference between two population proportions using STATA. For the team-by-team comparisons involving home games in one season *v.* home games in another season, the null hypothesis ( $H_0$ ) is stated as follows:

$$(1) \quad H_0: \pi_1 = \pi_2$$

while the two-tailed alternative hypothesis ( $H_A$ ) is:

$$(2) \quad H_A: \pi_1 \neq \pi_2$$

where  $\pi_i$  denotes the population proportion of home games in regular season  $i$  with at least one

fight. The test statistic is:

$$(3) \quad z = \frac{p_1 - p_2}{s_{diff}}$$

Where,

$$(4) \quad s_{diff} = \sqrt{p_T(1 - p_T) \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}$$

and

$$(5) \quad p_T = (x_1 + x_2) / (n_1 + n_2).$$

In equation (5),  $x_1$  denotes the number of home games with at least one fight in season 1 (with a total of  $n_1$  home games) and  $x_2$  denotes the number of home games with at least one fight in season 2 (with a total of  $n_2$  home games).

For example, in 2019-20 the Florida Panthers played 34 home games ( $n_1$ ), of which 5 involved at least one fight ( $x_1 = 5$ ,  $p_1 = 5/34 = 0.14706$ ). In 2020-21, the following season, the Panthers played 27 home games ( $n_2$ ), of which 11 involved at least one fight ( $x_2 = 11$ ,  $p_2 = 11/27 = 0.40741$ ).

In this case,  $s_{diff} = \sqrt{\left(\frac{16}{61}\right)\left(1 - \frac{16}{61}\right)\left(\frac{1}{34} + \frac{1}{27}\right)} = 0.11339$  and the value of the test statistic is  $z = (0.14706 - 0.40741)/0.11339 = -2.296$ . We find that the two proportions are statistically different from each other at any level greater than 2.17 percent (i.e.,  $p = 0.0217$ ). That is, the Florida Panthers in the 2020-21 regular season were involved in a *higher* proportion of home games with at least one fight than in the previous season.

## The Results

Table 1 shows the results of the comparisons for each of the 31 NHL teams between the proportion of home games with at least one fight in 2019-20 (with fans) v. 2020-21 (with either no fans or severely limited attendance). The proportion of home games with at least one fight was higher in the 56-game 2020-21 regular season for only two teams: the Florida Panthers and Dallas Stars, two teams in that year's Central Division. According to Brown [5], only twenty NHL teams allowed a limited number of fans into their arenas during the 2020-21 season. Only two of the these twenty teams – the Florida Panthers and the Dallas Stars – allowed up to as many as 5000 fans or 25 percent of their venue's seating capacity. In both cases, there was significantly *more* fighting in 2020-21 than there was at home games the previous season.

Table 2 compares the 2020-21 season to the following 2021-22 season (when fans were allowed to return and the league returned to the 2019-20 alignment with Eastern and Western conferences which ended the all-Canadian division). Seven comparisons are statistically significant, with four teams (Dallas Stars, Edmonton Oilers, New York Rangers, and Vancouver Canucks) fighting more at home in 2020-21 than in 2021-22 and three teams (Boston Bruins, Minnesota Wild, and Nashville Predators) fighting less. Six of the seven teams (the exception being the Vancouver Canucks) advanced to the 2021-22 playoffs. Two of these six teams (the New York Rangers in the East and Edmonton Oilers in the West) advanced to their respective conference finals. Both teams fought significantly *more* often in the 82-game regular 2021-22 season.

Table 3 compares 2019-20 regular season home games (in the season before no or few fans) with the 2021-22 regular season home games (one season after no or few fans). Five teams (Arizona Coyotes, Buffalo Sabres, Minnesota Wild, Nashville Predators, and San Jose Sharks) *all* fought significantly more often at home in 2021-22 than in 2019-20. Only two of these teams (Minnesota Wild and Nashville Predators) advanced to the playoffs; both teams were eliminated in the First Round. The most striking result about Table 3 is the large number of teams (twenty-four of thirty-one) that fought more often at home in 2021-22 than they did in 2019-20, although the difference in proportions was not in most cases statistically discernible.

**Table 1.** Percentage of Regular Season NHL Home Games With At Least One Fight in 2019-20 (Shortened Season, Fans) and 2020-21 (No Fans)

Team <sup>a</sup>	Percentage		<i>p</i> -value on difference	Less fighting with no fans?
	2019-20	2020-21		
ANA	37.1	20.0	0.153	no difference
ARI	3.0	0.7	0.227	no difference
BOS	20.6	7.7	0.166	no difference
BUF	2.9	7.1	0.427	no difference
CAR	6.3	0	0.179	no difference
CBJ	5.7	14.3	0.250	no difference
CGY	18.2	14.8	0.728	no difference
CHI	14.7	10.7	0.641	no difference
COL	18.8	25.0	0.558	no difference
DAL	2.9	25.0	<b>0.010</b>	<b>NO (more fighting)</b>
DET	11.1	17.9	0.441	no difference
EDM	8.8	22.2	0.143	no difference
FLA	14.7	40.7	<b>0.022</b>	<b>NO (more fighting)</b>
LAK	18.2	14.3	0.682	no difference
MIN	20.0	25.0	0.635	no difference
MTL	8.3	21.4	0.135	no difference
NJD	29.4	25.0	0.698	no difference
NSH	20.6	17.9	0.787	no difference
NYI	22.9	10.7	0.207	no difference
NYR	22.2	39.3	0.138	no difference
OTT	25.0	29.6	0.682	no difference
PHI	11.8	13.8	0.810	no difference
PIT	11.4	10.7	0.929	no difference
SJS	14.3	29.6	0.141	no difference
STL	11.8	21.4	0.303	no difference
TBL	15.2	21.4	0.525	no difference
TOR	11.8	21.4	0.303	no difference
VAN	17.1	33.3	0.140	no difference
VGK	22.9	16.0	0.513	no difference
WPG	16.7	7.4	0.275	no difference
WSH	27.3	17.2	0.346	no difference

<sup>a</sup>ANA – Anaheim Ducks; ARI – Arizona Coyotes; BOS – Boston Bruins; BUF – Buffalo Sabres; CAR – Carolina Hurricanes; CBJ – Columbus Blue Jackets; CGY – Calgary Flames; CHI – Chicago Blackhawks; COL – Colorado Avalanche; DAL – Dallas Stars; DET – Detroit Red Wings; EDM – Edmonton Oilers; FLA – Florida Panthers; LAK – Los Angeles Kings ; MIN – Minnesota Wild; MTL – Montreal Canadiens; NJD – New Jersey Devils; NSH – Nashville Predators; NYI – New York Islanders; NYR – New York Rangers; OTT – Ottawa Senators; PHI – Philadelphia Flyers; PIT – Pittsburgh Penguins; SJS – San Jose Sharks; STL – St. Louis Blues; TBL – Tampa Bay Lightning; TOR – Toronto Maple Leafs; VAN – Vancouver Canucks; VGK – Vegas Golden Knights; WPG – Winnipeg Jets; WSH – Washington Capitals.

**Table 2. Percentage of Regular Season NHL Home Games With At Least One Fight in 2020-21 (No Fans) and 2021-22 (Full Season, Fans)**

Team <sup>a</sup>	Percentage		<i>p</i> -value on difference	Less fighting with no fans?
	2020-21	2021-22		
ANA	20.0	34.1	0.218	no difference
ARI	10.7	24.4	0.154	no difference
BOS	7.7	29.3	<b>0.034</b>	<b>YES (less fighting)</b>
BUF	7.1	17.1	0.229	no difference
CAR	0	7.3	0.143	no difference
CBJ	14.3	9.8	0.564	no difference
CGY	14.8	28.5	0.435	no difference
CHI	10.7	25.0	0.140	no difference
COL	25.0	25.0	1.000	no difference
DAL	25.0	4.9	<b>0.015</b>	<b>NO (more fighting)</b>
DET	17.9	17.1	0.933	no difference
EDM	22.2	9.8	0.156	no difference
FLA	40.7	19.5	<b>0.056</b>	<b>NO (more fighting)</b>
LAK	14.3	19.5	0.574	no difference
MIN	25.0	46.3	<b>0.072</b>	<b>YES (less fighting)</b>
MTL	21.4	12.2	0.304	no difference
NJD	25.0	17.1	0.421	no difference
NSH	17.9	39.0	<b>0.061</b>	<b>YES (less fighting)</b>
NYI	10.7	19.5	0.327	no difference
NYR	39.3	14.6	<b>0.029</b>	<b>NO (more fighting)</b>
OTT	29.6	26.8	0.801	no difference
PHI	13.8	20.0	0.387	no difference
PIT	10.7	19.5	0.327	no difference
SJS	29.6	34.1	0.697	no difference
STL	21.4	14.6	0.465	no difference
TBL	21.4	26.8	0.609	no difference
TOR	21.4	14.6	0.465	no difference
VAN	33.3	15.0	<b>0.077</b>	<b>NO (more fighting)</b>
VGK	16.0	14.6	0.881	no difference
WPG	7.4	22.0	0.111	no difference
WSH	17.2	17.1	0.985	no difference

<sup>a</sup>ANA – Anaheim Ducks; ARI – Arizona Coyotes; BOS – Boston Bruins; BUF – Buffalo Sabres; CAR – Carolina Hurricanes; CBJ – Columbus Blue Jackets; CGY – Calgary Flames; CHI – Chicago Blackhawks; COL – Colorado Avalanche; DAL – Dallas Stars; DET – Detroit Red Wings; EDM – Edmonton Oilers; FLA – Florida Panthers; LAK – Los Angeles Kings ; MIN – Minnesota Wild; MTL – Montreal Canadiens; NJD – New Jersey Devils; NSH – Nashville Predators; NYI – New York Islanders; NYR – New York Rangers; OTT – Ottawa Senators; PHI – Philadelphia Flyers; PIT – Pittsburgh Penguins; SJS – San Jose Sharks; STL – St. Louis Blues; TBL – Tampa Bay Lightning; TOR – Toronto Maple Leafs; VAN – Vancouver Canucks; VGK – Vegas Golden Knights; WPG – Winnipeg Jets; WSH – Washington Capitals.

**Table 3. Percentage of Regular Season NHL Games With At Least One Fight in 2019-20 (Shortened Season, Fans) and 2021-22 (Full Season, Fans)**

Team <sup>a</sup>	Percentage		<i>p</i> -value on difference	More fighting in 2021-22?
	2019-20	2021-22		
ANA	37.1	34.1	0.786	no difference
ARI	3.0	24.4	<b>0.010</b>	<b>YES (more fighting)</b>
BOS	20.6	29.3	0.390	no difference
BUF	2.9	17.1	<b>0.044</b>	<b>YES (more fighting)</b>
CAR	6.3	7.3	0.858	no difference
CBJ	5.7	9.8	0.515	no difference
CGY	18.2	22.5	0.650	no difference
CHI	14.7	25.0	0.272	no difference
COL	18.8	25.0	0.526	no difference
DAL	2.9	4.9	0.670	no difference
DET	11.1	17.1	0.456	no difference
EDM	8.8	9.8	0.890	no difference
FLA	14.7	19.5	0.584	no difference
LAK	18.2	19.5	0.885	no difference
MIN	20.0	46.3	<b>0.016</b>	<b>YES (more fighting)</b>
MTL	8.3	12.2	0.580	no difference
NJD	29.4	17.1	0.204	no difference
NSH	20.6	39.0	<b>0.085</b>	<b>YES (more fighting)</b>
NYI	22.9	19.5	0.721	no difference
NYR	22.2	14.6	0.389	no difference
OTT	25.0	26.8	0.855	no difference
PHI	11.8	22.0	0.246	no difference
PIT	11.4	19.5	0.335	no difference
SJS	14.3	34.1	<b>0.046</b>	<b>YES (more fighting)</b>
STL	11.8	14.6	0.716	no difference
TBL	15.2	26.8	0.225	no difference
TOR	11.8	14.6	0.716	no difference
VAN	17.1	15.0	0.801	no difference
VGK	22.9	14.6	0.357	no difference
WPG	16.7	22.0	0.559	no difference
WSH	27.3	17.1	0.289	no difference

<sup>a</sup>ANA – Anaheim Ducks; ARI – Arizona Coyotes; BOS – Boston Bruins; BUF – Buffalo Sabres; CAR – Carolina Hurricanes; CBJ – Columbus Blue Jackets; CGY – Calgary Flames; CHI – Chicago Blackhawks; COL – Colorado Avalanche; DAL – Dallas Stars; DET – Detroit Red Wings; EDM – Edmonton Oilers; FLA – Florida Panthers; LAK – Los Angeles Kings ; MIN – Minnesota Wild; MTL – Montreal Canadiens; NJD – New Jersey Devils; NSH – Nashville Predators; NYI – New York Islanders; NYR – New York Rangers; OTT – Ottawa Senators; PHI – Philadelphia Flyers; PIT – Pittsburgh Penguins; SJS – San Jose Sharks; STL – St. Louis Blues; TBL – Tampa Bay Lightning; TOR – Toronto Maple Leafs; VAN – Vancouver Canucks; VGK – Vegas Golden Knights; WPG – Winnipeg Jets; WSH – Washington Capitals.

## Concluding Remarks

Fighting has long been a part of professional ice hockey. The impact of fans in the stands (or absence thereof) is examined over three consecutive NHL seasons, 2019-20 through 2021-22. In the 2020-21 season alone, NHL teams responded to the COVID-19 pandemic by severely limiting attendance at each arena. Without fans to cheer combatants on, did the incidence of fighting in ice hockey change?

From one season to the next over the three years spanning one season before, during, and after the NHL limited fan attendance, we find few differences. In 2020-21 (the season with few or no fans), we find that only two teams experienced significantly *more* fighting than in the year before. These same two teams allowed up to 5000 fans back (or 25 percent of their arena's seating capacity), more than any other NHL team.

When fans were allowed back into all arenas (in 2021-22), NHL players were ostensibly eager to engage in fighting and "entertain" actual fans rather than cardboard replicas of fans.

## References

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