

# Do States with Professional Sports Teams Have Lower Suicide Rates?

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## Abstract

The author examines six age-group specific suicide rates in 2016 between states (in the continental United States) with and without professional sports teams in baseball [MLB], football [NFL], hockey [NHL], and basketball [NBA]. States with at least one team in baseball or football have significantly lower suicide rates among adults in all six age groups (over 20 years of age). States with at least one hockey team have significantly lower suicide rates for all adults over the age of 20, except the oldest age group (adults 65 years of age or over). The results are weakest for states with at least one basketball team. Adults only between 25 and 44 years of age and 65 years of age or over have significantly lower suicide rates with at least one NBA team.

## Keywords

Professional Team Sports, Suicide Rates, U.S. States, 2-Sample  $t$ -Tests, Chi-Squared Test

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## 1. Introduction

Many people have written on the *economic* benefits and costs of hosting a sports franchise. One benefit of a franchise might be that its presence promotes marital stability [1]. The finding that the 1998 World Cup had an effect on reducing suicide rates in France [2], the host nation and eventual winner of that year's World Cup, begs the question: do U.S. states with baseball, football, hockey, or basketball professional sports franchises experience significantly *lower* suicide rates? One could argue that the sense of belonging and social integration associated with a sports franchise explains why states with a pro sports team might have lower suicide rates than those states without.

In this brief research note, we examine the difference in average suicide rates

across six age groups between states (in the continental United States) with and without franchises in the four major North American professional sports leagues (baseball [MLB], football [NFL], hockey [NHL], and basketball [NBA]). The emphasis here is not on how the aftermath of a single sporting event or how well (or poorly) a team performs over the course of a season affects suicidal behavior (see, for example, Fernquist [3]). Rather, we are curious to see if the mere presence of a major sports franchise reduces suicidal behavior among residents of the state fortunate enough to have attracted a major league franchise.

## 2. Literature Review

The ultimate location of professional sports teams depends in large part on the competition among host cities and the public subsidies, not to mention “sweetheart deals,” they can offer to entice teams (see, for example, Porter and Thomas [4]). Reasonably good weather, proximity to a well-heeled fan base, and maybe the promise of a new or at least renovated stadium all factor into where a team decides to locate.

The economic benefits that allegedly result from hosting a major league sports franchise include: 1) job creation, 2) greater tax revenues, and 3) increased retail spending by out-of-state visitors. Yet many economists have debunked the alleged economic benefits (see, for example, Baade and Sanderson [5]). There is scant evidence that these economic benefits—*additional* employment or *increased* spending—actually materialize.

The less tangible and nonpecuniary benefits of having a home team to root for are, however, very difficult to measure. The difference in average suicide rates (easier to quantify) between states with and without at least one professional sports team may be nothing more than a statistical curiosity. But, if such a relationship does exist, one would expect that the difference would be greatest for the most stable sports leagues, namely, those leagues with the fewest franchise relocations.<sup>1</sup> According to Edwards [7], since 1970 MLB has had the fewest franchise relocations and the NBA has experienced the most. As a result, one might expect to find that the difference between average suicide rates in states with and without MLB (NBA) teams would be largest (smallest).

## 3. The Data

The Centers for Disease Control and Prevention (CDC) in June 2018 released the latest figures (as of 2016) on age-specific suicide rates per 100,000 people by state. Suicide death rates by state for six age groups—20 - 24, 25 - 34, 35 - 44, 45 - 54, 55 - 64, and 65 or over—were obtained from the CDC WONDER’s online database for mortality [8]. In cases where the number of deaths by suicide was less than 10 (or deemed by the CDC to be “unreliable”), the CDC’s figures were

<sup>1</sup>When the Dodgers left Ebbets Field in Brooklyn for the West Coast after the 1957 season, many Dodger fans felt abandoned. The sense of loss was likened to “taking a heart out of a person” [6]. To Walter O’Malley, then owner of the Dodgers, the motivation to move was a simple matter of economic profit.

suppressed.

A list of the twenty-nine Major League Baseball [MLB], thirty National Football League [NFL], twenty-four National Hockey League [NHL], and twenty-nine National Basketball Association teams located in the continental United States are from [9].

**Table 1** shows age-group specific suicide rates by state in the continental United States in 2016. The highest average suicide rate was among adults between 25 and 34 years of age in Montana (44.4 per 100,000 people), a state with no professional sports teams from any of the four leagues. The lowest average suicide rate was among adults also between 25 and 34 years of age in New Jersey (7.9), a state with two NFL teams (New York Giants and New York Jets; both teams play in East Rutherford, New Jersey's MetLife Stadium) and one NHL team (New Jersey Devils). For all 48 contiguous states, the average suicide rate was highest in 2016 among adults between 45 and 54 years of age (23.02) and lowest for 20- to 24-year-olds (18.46, just slightly below the 18.48 average for adults 65 or over).

**Table 2** shows the number of major professional sports teams by league in each state. Twenty-two of the lower 48 states have no teams in any of the four sports leagues. Thirteen states have at least one team in each of the four sports leagues: Arizona, California, Colorado, Florida, Illinois, Maryland,<sup>2</sup> Massachusetts, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Texas. Seventeen states in 2016 had at least one MLB team. Twenty-two, eighteen, and twenty-two states had at least one NFL, NHL, and NBA team, respectively, in 2016. California had the highest number of teams in each league.

The smallest state (in terms of their 2016 population as of July 1 [10]) with an MLB team was Minnesota (Minnesota Twins) and the largest state without an MLB team was North Carolina. The smallest state with an NFL team was Louisiana (New Orleans Saints) and the largest state without an NFL team was Virginia. The smallest state with an NHL team was Nevada (Las Vegas Golden Knights)<sup>3</sup> and the largest state without an NHL team was Georgia. The smallest state with an NBA team was Utah (Utah Jazz) and the largest state without an NBA team was New Jersey (after the New Jersey Nets moved to Brooklyn, New York in the 2012-13 NBA season).

## 4. Methodology

To determine whether or not states in the lower 48 with at least one sports franchise in either baseball [MLB], football [NFL], hockey [NHL], or basketball

<sup>2</sup>The CDC suppressed suicide rates for all six age groups in Washington DC. As a result, the Washington Nationals (MLB), Washington Capitals (NHL), and Washington Wizards (NBA) were counted among Maryland's sports franchises (joining the Baltimore Orioles (MLB) and Washington Redskins and Baltimore Ravens (NFL)) because Annapolis, Maryland is the closest state capital to Washington, DC.

<sup>3</sup>Although the Las Vegas Golden Knights did not begin play until 2017, the decision to expand the NHL to include Las Vegas was made at the league owners' meeting on June 22, 2016. Therefore, the Golden Knights are included in 2016 as a Nevada team.

**Table 1.** Suicide rates by age group and by state in the continental U.S., 2016.

State	Age Groups					
	20 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65+
Alabama	17.7	20.4	19.5	24.7	20.0	19.9
Arizona	19.8	22.2	19.3	27.5	26.3	24.6
Arkansas	19.2	25.5	26.9	20.6	24.8	24.0
California	10.8	11.6	12.2	15.1	16.7	16.8
Colorado	25.9	26.4	26.0	29.4	27.5	22.9
Connecticut	8.9	12.2	11.1	17.0	19.0	12.8
Delaware	—	—	—	19.6	20.7	15.0
Florida	13.2	15.6	17.9	21.6	21.5	20.0
Georgia	20.3	16.3	15.0	19.9	19.2	16.1
Idaho	26.8	15.8	32.5	39.8	21.1	27.5
Illinois	12.1	12.0	15.2	16.2	15.6	12.5
Indiana	20.9	18.8	21.0	24.1	19.3	16.9
Iowa	17.8	20.8	20.1	25.7	16.1	11.9
Kansas	20.8	27.8	26.2	24.3	21.2	16.5
Kentucky	17.3	21.4	22.6	26.3	19.6	19.1
Louisiana	20.2	19.2	18.6	19.6	18.7	16.2
Maine	25.9	17.8	21.9	19.4	22.4	17.5
Maryland	10.4	11.3	11.3	14.2	12.6	12.8
Massachusetts	11.2	11.3	12.4	12.5	13.0	8.6
Michigan	17.3	16.1	18.1	19.1	18.2	14.0
Minnesota	17.2	18.2	17.6	19.2	18.7	12.1
Mississippi	16.4	17.5	17.0	17.6	16.3	14.4
Missouri	23.0	26.2	24.5	27.9	21.0	18.4
Montana	27.2	44.4	36.8	30.2	28.2	19.5
Nebraska	20.8	20.6	16.1	18.3	15.8	9.8
Nevada	18.3	22.7	26.8	30.3	27.3	37.6
New Hampshire	—	17.4	28.3	22.4	20.4	23.8
New Jersey	8.8	7.9	8.5	12.3	11.0	9.2
New Mexico	25.4	30.4	34.2	30.6	26.7	27.5
New York	9.6	8.5	10.8	12.2	12.1	9.9
North Carolina	15.9	14.2	17.7	18.7	19.4	16.1
North Dakota	—	25.5	25.5	35.1	—	—
Ohio	16.2	20.1	18.2	19.7	20.4	16.2
Oklahoma	30.1	28.4	29.4	29.8	26.4	21.2
Oregon	22.4	16.5	22.7	27.7	25.0	25.8
Pennsylvania	17.2	17.5	19.6	23.6	20.7	16.2
Rhode Island	—	—	17.1	20.4	19.7	—
South Carolina	21.0	18.3	18.9	25.5	22.3	19.0
South Dakota	—	24.9	39.6	22.5	—	—
Tennessee	14.9	20.6	22.4	25.0	20.7	19.5
Texas	15.8	16.3	15.2	17.8	17.0	15.7
Utah	23.7	27.2	31.4	35.0	26.1	22.4
Vermont	—	30.3	—	24.3	25.8	22.1
Virginia	18.0	17.3	15.1	16.8	18.4	18.7
Washington	20.3	17.8	17.3	20.6	23.4	19.1
West Virginia	18.7	27.4	35.9	22.6	22.9	20.7
Wisconsin	19.4	18.4	20.8	21.7	17.6	14.5
Wyoming	—	25.6	39.3	40.5	—	36.4

<sup>a</sup>Data sources: Suicide rates per 100,000 population by state for residents 20 to 24 years of age in 2016 are from:

<https://wonder.cdc.gov/controller/saved/D76/D38F594>; suicide rates by state for residents between 25 and 64 years of age by ten-year age groups are from:

<https://wonder.cdc.gov/controller/saved/D76/D38F595>; and suicide rates by state for residents 65 years of age or over are from:

<https://wonder.cdc.gov/controller/saved/D76/D38F596>.

**Table 2.** Number of major professional sports teams by league in each state, 2016.

<i>State</i>	<i>MLB</i>	<i>NFL</i>	<i>NHL</i>	<i>NBA</i>
Alabama	0	0	0	0
Arizona	1	1	1	1
Arkansas	0	0	0	0
California	5	4	3	4
Colorado	1	1	1	1
Connecticut	0	0	0	0
Delaware	0	0	0	0
Florida	2	3	2	2
Georgia	1	1	0	1
Idaho	0	0	0	0
Illinois	2	1	1	1
Indiana	0	1	0	1
Iowa	0	0	0	0
Kansas	0	0	0	0
Kentucky	0	0	0	0
Louisiana	0	1	0	1
Maine	0	0	0	0
Maryland <sup>a</sup>	2	2	1	1
Massachusetts	1	1	1	1
Michigan	1	1	1	1
Minnesota	1	1	1	1
Mississippi	0	0	0	0
Missouri	2	1	1	0
Montana	0	0	0	0
Nebraska	0	0	0	0
Nevada <sup>b</sup>	0	0	1	0
New Hampshire	0	0	0	0
New Jersey	0	2	1	0
New Mexico	0	0	0	0
New York	2	1	3	2
North Carolina	0	1	1	1
North Dakota	0	0	0	0
Ohio	2	2	1	1
Oklahoma	0	0	0	1
Oregon	0	0	0	1
Pennsylvania	2	2	2	1
Rhode Island	0	0	0	0
South Carolina	0	0	0	0
South Dakota	0	0	0	0
Tennessee	0	1	1	1
Texas	2	2	1	3
Utah	0	0	0	1
Vermont	0	0	0	0
Virginia	0	0	0	0
Washington	1	1	0	0
West Virginia	0	0	0	0
Wisconsin	1	1	0	1
Wyoming	0	0	0	0

<sup>a</sup>Because Annapolis, Maryland is the closest state capital to Washington DC, the three teams based in Washington DC—Washington Nationals (MLB), Washington Capitals (NHL), and Washington Wizards (NBA)—are all included in Maryland's counts. <sup>b</sup>The decision to locate an NHL team in Las Vegas, Nevada was made in June 2016. Data Sources: <https://state.1keydata.com/mlb-teams-by-state.php>; <https://state.1keydata.com/nfl-teams-by-state.php>; <https://state.1keydata.com/nhl-teams-by-state.php>; and <https://state.1keydata.com/nba-teams-by-state.php>.

[NBA] have average suicide rates that are lower than the corresponding averages in states with no sports franchise, we ran a series of two-sample  $t$ -tests. Under the null hypothesis, there is no difference in average suicide rates in 2016 between states with and without franchises in the four major North American professional sports leagues. Under the alternative hypothesis, states with at least one franchise have, on average, lower suicide rates than states without a franchise. We test these two competing hypotheses for each of the six age groups in each of the four major sports leagues.

## 5. Presentation of Results

**Table 3** shows the difference in average suicide rates for each of six age groups in states with and without a pro sports team in 2016.<sup>4</sup> Among 20- to 24-year-olds and adults 45 to 64 years of age, suicide rates are, on average, discernibly lower in states with a baseball, football, or hockey franchise, but not discernibly lower in states with a basketball franchise (using  $\alpha = 0.05$ ).

Among adults 25 to 44 years of age, suicide rates are discernibly lower in states with a franchise from *any* of the four pro sports leagues. In addition, among adults 65 years of age or older, suicide rates are discernibly lower in states with an MLB, NFL and NBA franchise, but not an NHL franchise. For all six age groups (that is, any adult 20 years of age or older), suicide rates are discernibly lower in states with either an MLB or NFL franchise.

There are, admittedly, strong regional differences in average suicide rates, the lowest (for all six age groups but adults 65 or over) being in northeastern states (Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine) as shown in **Table 4**. Hence, one might confuse regional differences in suicide rates to differences that are incorrectly ascribed to the presence of professional sports teams. For example, perhaps the average suicide rate for states with NHL teams is low because disproportionately many NHL teams are located in the northeast (more than in any other Census region). **Table 5** shows how pro sports league coverage depends on Census region. To test the null hypothesis of no dependence,  $\chi^2$  may be used. In **Table 5**, let  $\pi_{ij}$  denote the underlying bivariate probability distribution; for example,  $\pi_{23}$  is the probability that an NFL team is located in the South. Let  $\pi_i$  and  $\pi_j$  similarly denote the marginal probability distributions. Then the null hypothesis of statistical independence may be stated precisely as follows:

$$H_0 : \pi_{ij} = \pi_i \times \pi_j \quad (1)$$

against the two-tailed alternative hypothesis that  $\pi_{ij} \neq \pi_i \times \pi_j$ . The calculated  $\chi^2$  is 4.107; the critical  $\chi^2$  (with nine degrees of freedom and  $\alpha = 0.05$ ) is 16.9. The calculated  $\chi^2$  can be converted to a  $p$ -value, which is 0.904. This  $p$ -value is too

<sup>4</sup>The two samples—states with and without at least one sports franchise—do not always add up to 48 because the CDC did not report in 2016 a suicide rate for particular age groups (see, for example, 20- to 24-year-olds in Delaware, New Hampshire, North Dakota, Rhode Island, South Dakota, Vermont, and Wyoming, which all happen to be states without a sports franchise).

**Table 3.** Differences in average suicide rates by age and by major professional sports league, in states in 2016.

<i>Age Group</i>	<i>Group 1</i>	<i>Group 2</i>	<i>Averages</i>		<i>p-value on difference</i>
			<i>Group 1</i>	<i>Group 2</i>	<i>between means<sup>a</sup></i>
20 - 24	States with MLB (n = 17)	States without MLB (n = 24)	16.453	19.879	<b>0.0184</b>
	States with NFL (n = 22)	States without NFL (n = 19)	16.382	20.863	<b>0.0023</b>
	States with NHL (n = 18)	States without NHL (n = 23)	15.422	20.835	<b>0.0002</b>
	States with NBA (n = 22)	States without NBA (n = 19)	17.477	19.595	0.0996
25 - 34	States with MLB (n = 17)	States without MLB (n = 24)	16.812	21.959	<b>0.0055</b>
	States with NFL (n = 22)	States without NFL (n = 24)	16.659	23.171	<b>0.0003</b>
	States with NHL (n = 18)	States without NHL (n = 28)	16.594	22.282	<b>0.0021</b>
	States with NBA (n = 22)	States without NBA (n = 24)	17.577	22.329	<b>0.0077</b>
35 - 44	States with MLB (n = 17)	States without MLB (n = 29)	17.141	24.245	<b>0.0009</b>
	States with NFL (n = 22)	States without NFL (n = 24)	17.255	25.621	<b>&lt;0.0001</b>
	States with NHL (n = 18)	States without NHL (n = 28)	17.428	24.314	<b>0.0012</b>
	States with NBA (n = 22)	States without NBA (n = 24)	18.764	24.238	<b>0.0076</b>
45 - 54	States with MLB (n = 17)	States without MLB (n = 31)	19.894	24.732	<b>0.0066</b>
	States with NFL (n = 22)	States without NFL (n = 26)	19.905	25.654	<b>0.0009</b>
	States with NHL (n = 18)	States without NHL (n = 30)	20.128	24.753	<b>0.0084</b>
	States with NBA (n = 22)	States without NBA (n = 26)	21.345	24.435	0.0531

## Continued

55 - 64	States with MLB (n = 17)	States without MLB (n = 28)	18.912	21.261	<b>0.0368</b>
	States with NFL (n = 22)	States without NFL (n = 23)	18.664	22.009	<b>0.0036</b>
	States with NHL (n = 18)	States without NHL (n = 27)	18.872	21.374	<b>0.0267</b>
	States with NBA (n = 22)	States without NBA (n = 23)	19.668	21.048	0.1422
65 or over	States with MLB (n = 17)	States without MLB (n = 28)	15.906	20.036	<b>0.0143</b>
	States with NFL (n = 22)	States without NFL (n = 23)	15.832	21.004	<b>0.0020</b>
	States with NHL (n = 18)	States without NHL (n = 27)	16.839	19.567	0.0753
	States with NBA (n = 22)	States without NBA (n = 23)	16.864	20.017	<b>0.0442</b>

<sup>a</sup>The *p*-values are for a two-sample one-tailed *t*-test. Numbers in *italics* (**boldface**) are significant at better than the .10 (0.05) level of significance.

**Table 4.** Average suicide rates by age group and by census region.

Age Group	Census Region			
	Northeast	Midwest	South	West
20 - 24	13.60	18.55	17.94	22.06
25 - 34	15.36	20.78	19.31	23.69
35 - 44	16.21	21.91	20.23	27.14
45 - 54	18.23	22.82	21.27	29.70
55 - 64	18.23	18.39	20.03	24.83
65+	15.01	14.28	18.03	25.46

**Table 5.** Sports league coverage, by census region.

League	Census Region			
	Northeast	Midwest	South	West
MLB <sup>a</sup>	5	9	7	8
NFL <sup>b</sup>	6	8	11	7
NHL <sup>c</sup>	7	5	6	6
NBA <sup>d</sup>	4	6	11	8

<sup>a</sup>The league currently includes 30 franchises; all but the Toronto Blue Jays are located in the U.S. <sup>b</sup>The league currently includes 32 franchises. <sup>c</sup>The league currently includes 31 franchises, all but seven are located in the U.S. The seven Canadian teams are: Montreal Canadiens, Toronto Maple Leafs, Ottawa Senators, Winnipeg Jets, Edmonton Oilers, Calgary Flames, and Vancouver Canucks. <sup>d</sup>The league currently includes 30 franchises; all but the Toronto Raptors are located in the U.S.

high to reject  $H_0$  at the customary 5% level. That is, at this level  $\chi^2$  fails to establish any dependence of pro sports league coverage on region. In other words, the finding that suicide rates in states with MLB, NFL, or (excluding the oldest age group) NHL teams are lower than in states without representation in these leagues is no accident of geography.

## 6. Concluding Remarks

There are numerous risk factors associated with suicide, including major psychiatric illness, substance abuse, a family history of suicide, and severely frayed relationships with family and friends. What role could sports possibly play in suicidal behavior? The analysis presented here suggests that states with professional sports teams in baseball, football, hockey, and, to a lesser extent, basketball generally have lower suicide rates. Even among die-hard fans for “lovable losers,” there is a sense of belonging that manifests itself in significantly lower suicide rates.

Future research might examine whether season-long success or failure of sports teams in the four major sports leagues affect the suicide rates of younger state residents differently from older state residents. Does making the playoffs or even winning a league championship reduce suicidal behavior more in one sport than in another? Moreover, how do the effects of winning on reducing suicidal behavior vary across the six different age groups?

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## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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