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The Relationship Between Distance from Gambling Venues and Gambling Participation and Problem Gambling Among U.S. Adults

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Abstract In this article we examine the relationship between extent of gambling for U.S. adults and the distance from their residence to the nearest casino or track. We employ data from a telephone survey of U.S. adults conducted in 2011–2013. The chances that the respondents gambled in the past year, were frequent gamblers, or were problem gamblers were greater if they lived close to a casino. The chances that the respondents gambled in the past year or were frequent gamblers were greater if they lived close to a horse or dog track. The effects of closeness to a casino on the likelihood of past-year gambling, frequent gambling, and problem gambling, as well as the effect of closeness to a track on past-year gambling, extended to about 30 miles from the respondent's home. In addition, the concentration of casinos within 30 miles of the respondent's home was positively related to the respondents' chance of being a frequent or problem gambler. If a respondent had no casinos within 30 miles, he or she had a 2.7 % chance of being a problem gambler; if one casino, a 3.9 % chance; if six or more, a 6.2 % chance. The authors estimate that at least part of this effect is causal.

Keywords Problem gambling · Gambling availability · Gambling survey

Introduction

There has long been a controversy about the relationship between availability of gambling venues and the likelihood of being a problem gambler. Advocates of the availability model have spoken in favor of public control of gambling opportunities, while advocates of what

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might be called a disease model of problem gambling are generally not as alarmed by increased opportunities to gamble. Disease model advocates focus the search for risk factors on individual rather than ecological characteristics. An example of this debate was featured in the journal *Addiction.* Sociologist Robin Room (2005) took the position that liberalized gambling laws would lead to more problems. In contrast, Psychologist Blaszcynski (2005) took the position that public health and policies should be based on the assumption that people have the capacity to make sensible choices.

Studies have been conducted relating availability of gambling opportunities to rates of problem gambling. A national survey of adults conducted by the National Opinion Research Center and funded by the National Gambling Impact Study Commission found that respondents living within 50 miles of a casino had twice the rate of problem or pathological gambling as those living farther from a casino (Gerstein et al. 1999). Our own research group found that adult respondents in a national survey who lived within 10 miles of a casino had twice the rate of problem or pathological gambling (7.2 vs. 3.1 %) as those who lived farther from a casino (Welte et al. 2004). Shaffer et al. (2004) computed a score of exposure to casinos for Nevada counties which took into account the number of casinos, the age of the casinos, and the number of gambling industry employees. They linked their exposure index for a given county to data from a Nevada state gambling survey. The four counties with the highest scores had the highest rates of problem gambling, and the four counties with the lowest scores had the lowest rates. Rush et al.(2007) in a study of the province of Ontario found a slight positive relationship between proximity to a gambling venue and rates of problem gambling. In a study using data from the New Zealand Health Survey, Pearce et al. (2008) compared respondents in the quartile closest to a casino to respondents in the quartile farthest from a casino. Those closest to a casino were more likely to be problem gamblers. Moore et al. (2011) found in an Australian study that rates of disordered gambling were positively related to a measure of gambling venue accessibility, which included geographic proximity as one of its components. Adams et al. (2007) conducted a study of Canadian university students, and found that students enrolled in universities that were within easy traveling distance of a casino had higher rates of pathological gambling than those who were farther from casinos. LaBrie et al. (2007) conducted a study in Missouri that used self-exclusion enrollment as the dependent variable. They discovered that the Missouri regions with the most casinos had the most self-exclusions. They also found that after new casinos opened up, there was a significant increase in self-exclusions. Most studies, but not all, have found positive results for the relationship between distance from a casino and the likelihood of problem gambling. In a Quebec study, Sevigny et al. (2008) found a positive relationship between distance from a casino and gambling participation, but failed to find a relationship with problem gambling. Likewise, In an Australian study, Hing and Haw (2009) failed to find a relationship between accessibility of casinos and prevalence of problem gambling.

There have also been studies which compared the prevalence of problem gambling before and after an increase in the availability of gambling in a designated region. Room (1999) reported on a casino which opened in Niagara Falls Ontario in December 1996. Telephone surveys were conducted in Niagara Falls in 1996 and 1997. The prevalence of all 18 problem gambling items made statistically significant increases between the surveys. Christian et al. (2000) conducted a before-and-after study which included a control venue and was longitudinal. They interviewed random-digit-dial samples in both Hull and Quebec City before a casino was opened in Hull in 1996. They interviewed the same experimental and comparison subjects at 1, 2 and 4 year follow-ups. They did not find an increase in problem gambling in the casino city (Hull), either absolutely or in comparison

with Quebec City. They speculated that adaptation might be taking place, whereby residents developed defenses against gambling availability. In general, before-and-after studies have not shown positive results as much as have proximity studies.

Earlier we mentioned our own 1999–2000 national U.S. survey that found higher rates of problem gambling within 10 miles of a casino (Welte et al. 2004). More recently, we conducted another national U.S. gambling survey which was in the field in 2011–2013. In more detail than the earlier study, we revisited the issue of the relationship between gambling involvement and distance from gambling venues. We are hypothesizing that close proximity to casinos, and perhaps tracks, will be positively related to problem gambling. The current article describes our findings.

Methods

The research project described in this article was approved by the Social and Behavioral Sciences Institutional Review Board of the State University of New York at Buffalo. All respondents gave informed consent for their inclusion in the study.

Our research group at the University at Buffalo's Research Institute on Addictions (RIA) conducted a telephone survey concerning gambling behavior and problem and pathological gambling among adults in the U.S. Twenty-nine hundred and sixty-three (2963) interviews were conducted in 2011–2013. Respondents were interviewed in all 50 states and the District of Columbia. Both a landline sample and a cell phone sample were used. Eligible respondents were persons 18 or older. Respondents in each landline household were recruited randomly by selecting the potential respondent with the next birthday. This has been shown to be equivalent to random selection (Lavrakas 1993) and results in higher response rates because it does not require listing all household members. Cell phones were assumed to be dedicated to the person who answered, and that person was recruited if he or she was 18 or older. The response rate for the landline sample (1748 respondents) was 54.0 % and for the cell phone sample (1215 respondents) was 62.7 %.

The telephone samples were purchased from Survey Sampling International of Fairfield, Connecticut. Every landline phone number in the U. S. had an equal probability of being included in the sample, and every cell phone number likewise had the same probability as every other cell phone number. The samples were stratified by county and by telephone block within county. This resulted in samples that were spread evenly across the U.S. according to population distribution. Each telephone number in the landline sample was called at least seven times to determine if that number was assigned to a household containing an eligible respondent. Once a household was designated as eligible, the number was called until an interview was obtained or refusal conversion had failed. Each number in the cell phone sample was called at least seven times in an attempt to determine whether that number was associated with an eligible respondent. Interviews lasted from 20 to 50 min, depending on the answering speed of the respondents and the extent of their involvement with gambling, alcohol, and drugs. The median interview lasted slightly over 40 min. Respondents were paid $30. Sample management and interviewing was conducted by trained interviewers using the Computer-Assisted Telephone Interviewing (CATI) facility at the University at Buffalo's Research Institute on Addictions.

The questionnaire included questions on the frequency of past-year gambling on specific types of gambling. These were: (1) raffles, office pools, and charitable gambling; (2) pulltabs; (3) bingo; (4) cards, not in a casino; (5) games of skill, e.g., pool, golf; (6)

dice, not in a casino; (7) sports betting; (8) horse or dog track; (9) horses or dogs off-track; (10) gambling machines, not in a casino; (11) casino; (12) lottery; (13) lottery video-keno; (14) internet gambling; and (15) other gambling. An overall gambling frequency variable was produced by summing the frequency of these types of gambling. If this sum was greater than zero, we considered that to be "any gambling" in the past year. If this sum was 104 or greater (i.e., twice a week more), we considered that to be "frequent gambling" in the past year.

Our measure of pathological or problem gambling is the DIS-IV for pathological gambling (Robins et al. 1996). The DIS-IV contains 13 items that map into the 10 DSM-IV criteria, such as preoccupation with gambling and needing to gamble with increasing amounts of money to get the same excitement ("tolerance"). Endorsement of three or more criteria was considered to be problem gambling.

The measure of socioeconomic status was based on respondent's years of education, occupational prestige and family income. Occupational prestige was measured using the method of Duncan updated (Stricker 1988). The respondent's occupation was classified into predefined categories used by the U.S. Census, and these categories were subsequently recoded into scores based on the average prestige ratings given those categories by a U.S. general population sample. This prestige score and the respondent's years of education and the respondent's family income were scaled in the 0–10 range and then averaged.

For our previous work on this data set, sampling weights have been used for analyses in which population parameters, such as the rate of problem gambling, were of primary interest (Welte et al. 2015). In the current article, which focuses on the analysis of relationships between variables rather than population parameters, we have used unweighted analyses. The standard errors of regression coefficients are smaller in an unweighted analysis, similar to the effect of having a larger sample (Korn and Graubard 1999). Another reason to use unweighted analyses is that we have used demographics as control variables, including gender, race and age, in all of our logistic regression analyses. These three variables were also used in developing our survey weights, so their use as explicit controls reduces the need for the weights (Winship and Radbill 1994).

Variables reflecting distance for various gambling establishments were created in-house. The latitude and longitude of gambling establishments was supplied by Casino City Press (2010). The respondents' home addresses were geocoded (converted to latitude and longitude) by using various geocoding web sites. Proximity variables were computed using a formula which takes the curvature of the earth into account.

In this investigation, we have used logistic regression as our primary statistical technique. The dependent variables are: whether or not the respondent gambled in the past year (any gambling), whether or not the respondent gambled twice a week or more in the past year (frequent gambling), and whether or not the respondent qualified as a problem gambler in the past year (problem gambling). Our independent variables are the log of the distance to the nearest gambling facility and the log of the number of casinos within 30 miles. The odds ratios designate the change in the odds of being a (for example) problem gambler for each unit change in the independent variable. Therefore, an odds ratio less than one means that as the distance from a gambling venue becomes greater, the odds of being (for example) a problem gambler become smaller. The log transformation of the independent variables is used to attenuate the influence of extreme distances to the gambling facility. For example, there is no reason to expect that the difference between 1000 and 1100 miles would have any effect on the respondent's gambling, but the difference between 10 and 20 miles might. Likewise, it probably makes little difference whether the respondent lives near 20 or 21 casinos, but 1 versus 2 casinos might make a difference.

Results

Table 1 shows the results from six logistic regressions. The dependent variables reflect the respondent's gambling frequency and problems, while the independent variables reflect the distance from respondent's home to the nearest casino or track. In this article, we have included "racinos" (tracks with electronic gaming machines), as well as traditional tracks with betting only on hoses or dogs, in the category of tracks. The regressions show that distance from a casino predicts the respondent's likelihood of any gambling, frequent gambling and problem gambling in the past year. Likewise, the distance to the nearest track predicts any gambling and frequent gambling in the past year. The track effect for problem gambling does not reach statistical significance at the $p = .05$ level. While the use of the log transformation makes it difficult to intuit the magnitude of these effects, these analyses establish that the effects exist.

Table 2 clarifies the casino distance effect by showing the relationship between the distance from the respondent's home to the nearest casino and the respondent's level of gambling. The percentage of respondents who gambled in the past year stays at around 78 % until 30 miles, and then drops a bit to around 74 %. (In a separate logistic regression, not shown in the tables, we found that respondents who lived within 30 miles of a casino were more significantly likely ($p \leq .001$) to have gambled in the past year than those who lived more than 30 miles from a casino.) The percentage of frequent gamblers is in the 10–11 % range until 30 miles, after which it drops. The percentage of problem gamblers drops notably at 20 miles, from 5.3 to 3.5 %, and continues to drop to 2.0 % at 30 miles.

Table 3 shows the relationship for racetracks. The percentage of past-year gamblers is in the 78–80 % range within 30 miles of the nearest track; however, it drops to 72 % and below if more than 30 miles. The percentage of frequent gamblers is in the 9–12 % range within 50 miles of the nearest track, and then it drops to 6.8 % and below. Recall from Table 1 that the relationship between problem gambling and distance from a track is not statistically significant.

The next stage of our examination involves the effect of the number of gambling venues clustered near the respondent's home. This examination will be limited to casinos, as there are simply not enough tracks clustered in the same geographic areas to make this type of analysis practical. Based on the results shown previously, 30 miles was selected as the relevant distance. The logistic regressions displayed in Table 4 show that there is no

Table 1 Effects of distance to nearest gambling facility N = 2963 logistic regressions

Independent variable	Dependent variable—past year	Significance level	Odds ratio
Log. distance to nearest casino	Any gambling	.003	.80
	Frequent gambling[a]	.001	.71
	Problem gambling[b]	.006	.66
Log. distance to nearest track	Any gambling	<.001	.69
	Frequent gambling[a]	<.001	.58
	Problem gambling[b]	.18	.78

Gender, race, age and socioeconomic status are controlled

[a] Frequent gambling is twice a week or more

[b] Problem gambling is 3 or more DIS-IV criteria for pathological gambling

Table 2 Effect of distance to nearest casino on past year gambling N = 2963

Nearest casino (miles)	N	Any gambling (%)	Frequent gambling[a] (%)	Problem gambling[b] (%)
0–10	649	77.7	11.2	5.5
10–20	419	77.8	10.0	5.3
20–30	318	78.9	10.4	3.5
30–40	199	74.4	4.5	2.0
40–50	191	74.3	8.4	2.1
50 or more	1187	72.2	7.5	2.9

[a] Frequent gambling is twice a week or more

[b] Problem gambling is 3 or more DIS-IV criteria for pathological gambling

Table 3 Effect of distance to nearest track on past year gambling N = 2963

Nearest track (miles)	N	Any gambling (%)	Frequent gambling[a] (%)	Problem gambling[b] (%)
0–10	643	79.8	11.5	5.0
10–30	942	78.2	9.1	3.4
30–50	391	72.4	11.0	2.6
50–100	529	72.0	6.8	4.3
100 or more	458	68.5	5.0	3.1

[a] Frequent gambling is twice a week or more

[b] Problem gambling is 3 or more DIS-IV criteria for pathological gambling

Table 4 Effect of number of casinos within 30 miles logistic regressions N = 2963

Independent variable	Dependent variable—past year	Sig. level	Odds ratio
Log. number of casinos within 30 miles	Any gambling	.08	1.2
	Frequent gambling[a]	.003	1.5
	Problem gambling[b]	.003	1.7

Gender, race, age and socioeconomic status are controlled

[a] Frequent gambling is twice a week or more

[b] Problem gambling is 3 or more DIS-IV criteria for pathological gambling

significant relationship for any past-year gambling, but there is a significant relationship for frequent and problem gambling. Table 5 shows these relationships in more detail. The percentage of respondents who gambled in the past year was not quite significant at the .05 level (Table 4), and Table 5 shows no effect beyond the effect of having one casino as opposed to none. Frequent gambling shows an effect up to 3 casinos. Problem gambling shows a continuous effect from zero to 6 casinos. Respondents who have no casinos within 30 miles have a 2.7 % rate of problem gambling—this rate increases in steps until

Table 5 Effect of number of casinos within 30 miles on past year gambling N = 2963

Casinos within 30 miles	N	Any gambling (%)	Frequent gambling[1] (%)	Problem gambling[2] (%)
Zero	1577	72.7	7.2	2.7
1	360	78.6	8.9	3.9
2–3	370	77.6	12.2	4.6
4–5	234	79.9	12.4	5.1
6+	422	76.8	10.0	6.2

[a] Frequent gambling is twice a week or more

[b] Problem gambling is 3 or more DIS-IV criteria for pathological gambling

respondents who have 6 or more casinos within 30 miles have a 6.2 % rate of problem gambling.

Discussion

The goal of this project was to examine the relationship between Americans' gambling and their closeness to gambling venues. Our hypothesis was upheld. There is no question that those who live closer to casinos and tracks gamble more than those who do not. Distance from a casino is negatively related to rates of past-year gambling, frequent gambling and problem gambling, even after controlling for gender, age, race and socioeconomic status. Distance from a track is negatively related to past-year and frequent gambling, but not to problem gambling. It is not surprising that casinos have an especially strong link to problem gambling. Modern casinos are devoted to the no-frills business of gambling, and have a variety of types of gambling. Tracks without electronic gaming machines attached (not racinos) have only gambling on the races, and may be traditionally associated with a pleasant outing. Rates of frequent gambling (and, to a lesser extent, past-year gambling) are lower among those who live over 30 miles from the casino. For problem gambling, rates drop beyond 20 miles from a casino, and continue dropping at 30 miles.

Our results also showed, that over and above the effect of the distance to the nearest casino, the concentration of more casinos within 30 miles of the respondent's home is associated with more problem gambling. A respondent who has 1 casino within 30 miles has a 3.9 % chance of being a problem gambler; a respondent who has 6 or more has a 6.2 % chance of being a problem gambler. Obviously more casinos mean that the closest one will tend, on the average, to be closer. Also, more casinos causes the resident will be exposed to advertising from a greater number of casinos.

A limitation of this study is the inability of the authors to state with confidence that the relationship between the availability of gambling venues and the likelihood of being a problem gambler is a causal relationship. We do, however, suspect that it is at least partly causal. An alternative explanation would be that, for political and economic reasons, casinos tend to be located in regions where there is already a culture favorable to gambling, and therefore more problem gamblers. However, the fact that the effect of proximity to a casino tends to fall off after about 30 miles (see Table 2) is interesting in this regard. If it were a spurious effect based on local culture, it is not clear why 30 miles should be special. However, if it is an actual exposure effect, 30 miles may be relevant because it is roughly

the distance limit for a practical day trip. Also, the noticeable difference between the rates of problem gambling in the 20–30 mile range (3.5 %) and the 10–20 mile range (5.3 %) suggests that the possibility of a quick trip during the day, with a half hour or so driving time, is also significant for developing a gambling problem. In summary, our causal argument is buttressed by the combined effect of distance and concentration. These two measures show a dose–response. There is more availability of gambling by being close and having more choices.

Our study adds to the available knowledge because it is a recent study of the entire U.S., and because it used an objective measure of distance to gambling venues rather than a self-report measure. In our introduction, we described the dispute between those who think that vulnerability to problem gambling is based on individual characteristics, and those who think that the environment, especially availability of gambling opportunities, also plays an important role. Our results strengthen the argument of those who stress availability, but we acknowledge that individual characteristics are also important in determining who becomes a problem gambler.

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Compliance with ethical standards

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

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