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Gambling Involvement among Native Americans, Blacks and Whites in the United States

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Abstract

Background and Objectives—This paper examines risk factors of gambling and problem gambling among racial subgroups in the U.S. population, namely Native Americans and blacks, for whom research data are lacking.

Methods—Findings are based on a large representative general population survey (n=3,474) of gambling in the U.S. with an oversample of Native Americans (n=549). Multiple domains were assessed including sociodemographic factors; ecological factors (census-defined neighborhood disadvantage, geocoded density of casinos within 30 miles of respondents' homes, and perceived gambling convenience); impulsivity; and alcohol abuse.

Results—After controlling for all variables in the study, neighborhood disadvantage has a significantly greater effect on overall gambling, frequent gambling and problem gambling for Native Americans than for the rest of the U.S. population. In addition, the relationship between frequent gambling and heavier drinking is much stronger for blacks than for the rest of the U.S. population.

Discussion and Conclusions—There is a lack of research on gambling involvement among minority groups in the U.S. Blacks and Native Americans are at a higher risk for problem gambling as compared with the rest of the population. Furthermore, social factors and alcohol abuse may show a stronger co-occurrence with gambling involvement among minority groups than among whites.

Scientific Significance—This study is a large representative U.S. sample with sizeable numbers of Native Americans and blacks. Thus, prevalence rates and risk factors can be assessed for these important population subgroups. This will allow for targeted intervention programs for Native Americans and blacks with problem gambling and alcohol abuse.

INTRODUCTION

Few gambling studies have large, representative samples to assess the patterns of gambling involvement among important racial subgroups, particularly Native Americans and blacks in the U.S. population. The present work analyzes factors from a number of domains for their

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effects on gambling and problem gambling. These domains include sociodemographic factors – gender, age, race, and socioeconomic status; ecological factors including census-defined neighborhood disadvantage and geocoded density of casinos near respondents' homes; a key individual factor, impulsivity; and alcohol abuse which is a co-occurring behavior. In the present work, all of these factors will be taken together to determine their relative contribution to gambling involvement; and most importantly, interaction terms will be analyzed to determine if various factors have differential influences on gambling involvement for Native American and blacks than for the rest of the U.S. population.

In one of the first representative surveys of gambling among adults in the U.S., Welte et al.¹ found that males, blacks and those with low socioeconomic status were significantly more likely to be frequent gamblers (gambled 104+ times a year) than their counterparts. Findings from the large representative National Epidemiologic Survey on Alcohol and Related Conditions (NESARC),² showed that blacks were more likely than whites to have problem or pathological gambling based on DSM-IV criteria.^{2, 3} Likewise, findings from the National Comorbidity Survey showed that DSM-IV pathological gambling was significantly associated with being in the younger adult cohort, being male, being non-Hispanic black and having less than a college education.⁴ Past national surveys have not contributed much Native American-specific empirical data given that Native Americans represent only about 1.5% of the U.S. populations; consequently, data on Native Americans are represented by small numbers in their samples. Although Native Americans showed a higher rate of gambling pathology in the Welte et al. study,¹ there were only 29 Native Americans in the sample. Analyzing NESARC (n=43,093), Alegria et al.³ reported that blacks and Native/Asian Americans had higher rates of disordered gambling than white. However, there were only 15 Native Americans in the sample.

Ecological factors have been shown to have effects on problem gambling. Barnes et al.⁵ found that neighborhood disadvantage had a highly significant effect on problem gambling and further that the presence of a casino within ten miles of the respondent's home was positively related to problem gambling.⁶

Within the domain of individual factors, impulsivity has been associated with pathological gambling, especially among treatment samples.^{7, 8, 9} In a review of research related to personality dimensions and pathological gambling, Odlaug et al.¹⁰ reported that impulsivity is a key personality dimension of pathological gambling with potentially important treatment implications for pathological gambling. However, research is lacking in general population samples with controls for demographic and ecological factors.

Previous research has linked problem gambling with alcohol abuse. Barnes et al.¹¹ found that adults with alcohol abuse and/or dependence have nearly three times the odds of being problem gamblers as do those individuals who are not classified as problem gamblers. This finding was consistent with earlier studies of adults in the U.S.^{1, 4, 12, 13, 14}

In a Canadian sample, Martins et al.¹⁵ found that problem gamblers were significantly more likely than non-problem gamblers to report having an alcohol or drug problem. Griffiths et al.¹⁶ analyzed data from the 2007 British Gambling Prevalence Survey and reported that

alcohol consumption on one's heaviest drinking day was significantly associated with problem gambling.

Thus, the findings support the co-occurrence of problem gambling and alcohol abuse. However, research is lacking as to whether or not co-occurrence is similar or different among various racial minority groups in the general population, after taking into account sociodemographic, ecological, and individual factors.

METHODS

Sample

This study is based on a combined sample of two complementary general population samples. The first sample is a national U.S. sample, *Survey of Gambling in the U.S.* (SOGUS2), which was carried out between 2011–2013 (n=2,925).¹⁷ SOGUS2 also had an oversample of Native Americans (n=275). The second sample is the Survey of Native American Gambling (SONAG) (n=274),¹⁸ which was carried out in 2013 to augment SOGUS2. SONAG adapted the same sampling strategy of acquiring a targeted Native American sample from Survey Sampling International, but it differed in that tribal areas not included in the SOGUS2 study were selected for the SONAG study to increase the diversity of tribes represented. Combining the two datasets, based on the same methods and questions, yields a diverse sample of Native Americans in the U.S. to compare with the U.S. population as a whole and with African Americans who comprise the largest racial group in the U.S.

Both samples included landline and wireless samples. Both surveys were carried out using Computer-Assisted Telephone Interviewing (CATI) with respondents receiving \$30 for their time. Both surveys contained the same measures (see below). Detailed information regarding sampling, weighting, and response rates have been reported elsewhere.^{17, 18}

Dependent Measures

Gambling—Respondents in both studies were asked the frequency of past-year gambling on 15 types of gambling, including lottery; casino gambling; bingo; and horse or dog track. The variable, any gambling, was a dichotomous measure defined as gambling at least once in the past year on any of the 15 types of gambling.

Frequent Gambling—Based on responses to the frequency of the 15 types of gambling in the past year (listed above), frequent gambling is a dichotomous variable indicating those who gambled 104 times or greater. This is roughly equivalent to gambling twice a week or more often and has been used to represent heavier gambling in the U.S. population.¹¹

Problem Gambling—The dichotomous problem gambling measure is derived from a count variable based on the sum of the 37 items (0, 1) in three measures. A score of 4 or more symptoms during the past year was designated as problem gambling. The three scales were the Diagnostic Interview Schedule (DIS-IV for pathological gambling),¹⁹ the revised South Oaks Gambling Screen (SOGS-R),²⁰ and the Canadian Problem Gambling Index (CPGI).²¹ The DIS for pathological gambling contains 13 items, such as preoccupation with

gambling and gambling to escape problems. The SOGS-R contains 20 items that tap important financial dimensions of problem gambling, such as using household money to gamble. Cronbach's alphas for these scales were each over .8¹⁸ and the alpha for the 37 items scale was .90. Four non-redundant items of the nine items in the CPGI were selected, such as gambling causing health problems including stress or anxiety in the past 12 months.

Independent Measures—The independent measures were the same in both samples. Sociodemographic measures were *gender*; *age*; *race*. *Socio-economic status* was derived based on three equally weighted variables – respondent's years of education, occupational prestige, and family income; the SES variable was then scaled from one to ten.²² *Neighborhood disadvantage* is an ecological measure based on objective data from the respondent's census block group.²³ The four census block-level variables used to create the neighborhood disadvantage scale were: percentage of households on public assistance; percentage of families headed by a female; percentage of adults unemployed; and the percentage of persons in poverty. The variables were standardized and averaged.

Gambling availability—The *number of casinos within 30 miles* was derived based on the distance from geocoded home addresses of respondents and geocoded addresses of all casinos in the U.S. supplied by Casino City Press.²⁴ *Gambling convenience* was created by adding the responses on four self-report items asking how convenient it was for the respondent to: buy lottery tickets, play bingo, play a video gambling or slot machine and visit a horse or dog track. (The convenience variable ranged from 0 to 16. and had a correlation of .115 with number of casinos within 30 miles.)

Impulsivity—Impulsivity was measured by the 15-item Barratt Impulsiveness Scale was used with items such as, I do things without thinking and I don't pay attention.²⁵ A six-point Likert scale, ranging from never to always, was used for response choices. The mean value of the summed 15 items was calculated (alpha = .81).

Alcohol use—Alcohol consumption was assessed by a series of quantity and frequency questions for various alcoholic beverages (beer, malt liquor, wine, fortified wine, wine cooler and liquor). The respondent's average alcohol consumption in ounces of ethanol per day. This average consumption variable was recoded to create the dichotomous variable indicating any alcohol use in the past year, and the dichotomous variable, consumed 2+ drinks per day in the past year, representing heavier drinking.

Alcohol abuse/dependence—The alcohol abuse questions covered 12 negative consequences (fights while drinking, traffic accident while drinking, etc.) from the Diagnostic Interview Schedule (DIS).¹⁹ The alcohol dependence questions covered 30 symptoms of dependence which map onto the 9 DSM criteria. A dichotomous variable representing alcohol abuse and/or dependence in the past year was used in the logistic regression analyses.

Statistical Analyses—Three separate logistic regression analyses were carried out with dichotomous dependent variables, any gambling, frequent gambling, and problem gambling in the past year. Interactions between race and other independent variables were tested

controlling for main effects. There were 12 missing cases for listwise deletion in the logistic regressions for an N of 3,462.

RESULTS

The percentages of overall gambling among Native Americans, blacks, and the rest of the U.S. population according to key demographic and individual factors are given in Table 1. The overall rate of past year gambling in this U.S. sample is 77.4%. Native Americans have a slightly higher rate of any gambling (80.1%) than blacks (76.6%) and whites/others (76.9%) (Table 1). For frequent gambling (104+ times or approximately twice a week in the past year), Native Americans and blacks have similar rates (13.6% and 13.4%, respectively) which are higher than the rate of frequent gambling for whites/others (9%). As for problem gambling (4+ symptoms in the past year), 18.2% of Native Americans are classified as problem gamblers which is higher than the rate for blacks (12.7%) and over twice the rate for whites/others (7.5%).

Males have higher rates of gambling, frequent gambling and problem gambling than their female counterparts within each racial grouping. A notable variation in the demographic profiles according to race is for neighborhood disadvantage. The highest rate of problem gambling is observed for Native Americans in the most disadvantaged third where 21.5% are problem gamblers, compared with 13.5% problem gamblers for blacks and 8.6% problem gamblers for whites in the most disadvantaged grouping.

From these descriptive data, there is a high co-occurrence between gambling/problem gambling and alcohol use/abuse. For example, among Native Americans who consumed two or more drinks a day in the past year, 25.9% were classified as frequent gamblers whereas among those who did not consume two or more drinkers per day, 12.6% were frequent gamblers. The discrepancy in frequent gambling between those who did and did not drink 2 or more drinks per day is even greater among blacks; almost half (49.8%) of blacks who drank 2+ drinks a day were frequent gamblers as compared with 9.3% of blacks who did not drink at this level. Similar differences are observed for problem gambling and alcohol abuse/dependence. Again, the largest rates of co-occurrence are for blacks and Native Americans. Among Native Americans who do not have alcohol abuse/dependence, 17% have 4+ symptoms of problem gambling; whereas among Native Americans classified as having alcohol abuse/dependence, 38.3% are problem gamblers. This same large difference is observed for blacks with 11.6% problem gambling among those without alcohol abuse/dependence and 42.3% problem gambling among blacks classified as having alcohol abuse/dependence. Whites also show a strong relationship between alcohol abuse/dependence and problem gambling with 6.8% problem gambling among whites without alcohol abuse/dependence and 23.6% problem gambling among whites with alcohol abuse/dependence.

Logistic regression analyses with any gambling, frequent gambling, and problem gambling as the dependent variables are shown in Tables 2, 3 and 4. Examining the effects of all the main effects taken together on the dichotomous dependent variable, any gambling in the past year, blacks are not significantly different from the predominantly white reference group, whereas Native Americans have one-and-a-half times the odds of being a gambler as

compared with others (Table 2). Males have a highly significant increased odds of gambling as compared with females and younger adults are significantly more likely to be gamblers than older adults. Socioeconomic status and neighborhood disadvantage are not significantly related to any gambling in the past year with all of the other demographic factors controlled. However, the ecological factors of having a casino within 30 miles and perception of gambling convenience are significantly associated with any gambling. The individual factor, impulsivity, has a highly significant association with gambling. The largest odds ratio is observed for alcohol use with drinkers being over three times more likely to be gamblers as non-drinkers. Only one variable showed a significant interaction with race in predicting any gambling – the interaction of being Native American and neighborhood disadvantage; that is, neighborhood disadvantage has a one and a third times greater effect on the likelihood of gambling for Native Americans than for whites/others (Table 2).

The logistic regression predicting frequent gambling (i.e., twice a week) in the past year shows similar findings to the logistic regression predicting any gambling with two new significant variables. Blacks, like Native Americans have nearly one-and-a-half times the odds of being frequent gamblers as do whites/others. In addition, lower socioeconomic status is significantly linked to increased frequent gambling. The other main effects are similar to those observed for any gambling with frequent gambling being significantly associated with being male, being younger, having a casino within 30 miles, having gambling opportunities conveniently located to one's home, being impulsive and consuming an average of two or more drinks daily. In predicting frequent gambling, there are five significant interactions with race. After taking into account all of the main effects, neighborhood disadvantage has one and a half times greater effect on frequent gambling among blacks and Native Americans than it does for the white/other comparison group. Impulsivity has a larger effect on frequent gambling for whites/others than for blacks or Native Americans. For describing this effect of impulsivity on frequent gambling among whites, we examined the mean level of impulsivity within four quartiles. The first (lowest) quartile showed 7% frequent gambling among whites as compared with similar percentages of 6% and 8% among the second and third quartiles. In contrast, the rate of frequent gambling rose to 14% among whites/others in the fourth (highest) quartile of impulsivity. For blacks and Native Americans as compared with whites, the rates of frequent gambling remained fairly high and stable across the four levels of impulsivity. The final interaction shown in Table 3 indicates that blacks who are heavier drinkers have four and a half times the odds of frequent gambling as others.

Table 4 shows results from the logistic regression with problem gambling as the dependent variable with all main effects taken into account. Blacks have a nearly one-and-a-half times the odds of being problem gamblers as do whites/others whereas Native Americans have nearly twice the odds of being problem gamblers as do whites/others. Likewise, males have almost twice the odds of being problem gamblers as do females. For problem gambling, both measures of disadvantage are significantly associated with problem gambling – both low socio-economic status and more neighborhood disadvantage. Distance from a casino is not significant in this problem gambling analysis, but gambling convenience produces nearly twice the odds of problem gambling as non-convenient outlets. As in the two earlier gambling analyses, higher impulsivity is related to increased problem gambling. Strikingly,

those with alcohol abuse and/or alcohol dependence are two-and-a-half times more likely to be problem gamblers than individuals without alcohol abuse/dependence.

In predicting problem gambling, only one interaction effect is significant, i.e., Native Americans by neighborhood disadvantage which also was significant in the previous two analyses predicting any gambling and frequent gambling. Native Americans in the third with the least disadvantage have a 13% rate of problem gambling compared to 5% rate among the whites/others reference group. However, among Native Americans in the top third of disadvantaged neighborhoods, 21.5% are classified as problem gamblers as compared with a 9% rate of problem gambling among whites in the same top third of neighborhood disadvantage. Thus, the odds ratio of neighborhood disadvantage on problem gambling is one a third times greater for Native American than for the rest of the U.S. population.

DISCUSSION

The influences on gambling and problem gambling are numerous as evidenced by the number of variables which have a significant association with gambling and problem gambling. This study extends past research of levels of gambling involvement by simultaneously analyzing variables from multiple domains including sociodemographic factors; ecological factors, notably neighborhood disadvantage and gambling availability; an individual factor – impulsivity; and the co-occurring behavioral factor, alcohol abuse. Furthermore, this study has the advantage of being based on a large representative sample of adults in the United States with an additional comparable sample of Native Americans spread across the U.S. No other gambling study, to our knowledge, employs a large sample of Native Americans from various tribal groups across the U.S. and compares correlates of gambling and problem gambling with a comparable representative sample of the U.S. adult population.

Our rate of problem gambling (9.7%) is somewhat higher than reported in other studies. In fact, using the same SOGUS2 U.S. sample, we reported a rate of 4.6% using DSM-IV 3 or more pathological gambling criteria.¹⁷ In this study we used more problem gambling indicators to allow for more stable comparisons among special subgroups within the U.S. adult population.

The sociodemographic main effects of race, gender, and socioeconomic status found in this U.S. survey are consistent with some other large representative surveys. In a comparable national U.S. survey, carried out a decade before the previous study, Welte et al.¹ also found that current problem gambling was somewhat higher for males than females and like the current study, minority-group members had higher levels of current problem or pathological gambling than the majority white group.

By oversampling Native Americans (N=549), this study extends our understanding of Native American gambling by providing a more stable estimate of gambling problems among current Native Americans in the U.S. In fact, the study shows that Native Americans have nearly twice the odds of being a problem gambler as do whites after controlling for

numerous other factors. Thus, Native Americans have an elevated risk of being problem gamblers.

As in the present study, Welte et al. showed that lower socioeconomic status was significantly associated with problem gambling after controlling for the other demographic factors.¹ In the current study, even after controlling for an individual's socioeconomic status, neighborhood disadvantage, calculated by independent census data, is highly predictive of problem gambling. Furthermore, among the most important findings from the current study are the significant interaction effects for neighborhood disadvantage among Native Americans as compared with others in the U.S. population. Thus, neighborhood disadvantage has a significantly greater effect on all levels of gambling for Native Americans than for whites. These interaction effects for Native Americans have not been shown in previous general population studies. There is also a significant interaction between being black and neighborhood disadvantage in predicting frequent gambling. Thus, for Native Americans and blacks, we see the profound effect of neighborhood disadvantage on gambling involvement. One explanation may be that there is a high density of gambling opportunities in disadvantaged neighborhoods which provides strong peer influences on gambling and a lure of improved socioeconomic conditions based on profits from gambling. In an earlier work,⁵ the seminal work of William Wilson was extended to problem gambling. Wilson²⁶ conceptualized the effects of living in inner-city neighborhoods that are impoverished (poor, minority, female-only-headed households) as having a lack of access to jobs and job networks and a lack of exposure to conventional role models. Indeed, we suggest that these factors may contribute to problem gambling. Minority group individuals who live in such disadvantaged neighborhoods may not see many role models of financial success achieved through conventional opportunities and therefore, gambling may be viewed as one of the only opportunities to succeed financially and to achieve immediate financial benefits.²⁷

Impulsivity has been linked with problem gambling in numerous studies.^{10,9,8,28} These studies are consistent with the highly significant main effect of impulsivity on all three levels of gambling involvement in the present study. This is expected given that until the newly revised DSM-5, pathological gambling was defined as an 'impulse-control disorder' in the DSM-IV.²⁹ The DSM-5 classifies gambling disorders as well as substance use disorders within the addictive disorders category in the recent American Psychiatric Association's DSM-5³⁰, which is also consistent with the strong relationship between all levels of gambling behaviors and problems and the respective levels of alcohol use and alcohol dependence in the present study. What is particularly noteworthy and unique in the present general population study are the significant interactions between being black and impulsivity and being Native American and impulsivity in predicting frequent gambling. Although the overall mean level of impulsivity is higher for blacks and Native Americans than for whites, impulsivity has greater effect on frequent gambling for whites than for the other racial groups. This shows again that the relative strength of influencing factors may be different for different racial groups in the U.S. population.

The final domain of alcohol use and alcohol abuse/dependence confirms the consistent finding that gambling and problem gambling has a strong co-occurrence with alcohol

abuse.^{11, 32} The main effects' odds ratios are the largest of any other variables after controlling for all other demographic and individual factors. This consistent finding supports the long-standing notion that problem gambling and substance abuse are part of a common problem behavior syndrome.¹¹ What is different in the current study is that interactions effects with race have been examined. No significant interactions were observed for alcohol and gambling among Native Americans; however, there was a large effect of being black and frequent drinking in the risk for frequent gambling. Blacks who were classified as heavier drinkers had more than twice the rate of frequent gambling (50%) as compared with the rest of the population (19%). There is a strong link between heavier drinking and frequent gambling among blacks. To our knowledge, the only other study to report a similar race interaction was the report of Barry et al.² which examined differences in gambling problem severity and other disorders in the NESARC sample. The authors found elevated rates of substance use disorder among both black and white problem/pathological gamblers as we did in the present study. Barry and colleagues² also carried out an interaction analysis using logistic regressions analyses which showed that the relationships between low risk or at-risk gambling (called subsyndromal gambling) and any substance use disorder was stronger for blacks than for whites. This finding is consistent with the significant interaction effect from the present study showing that the relationship between frequent gambling and heavier drinking is stronger for blacks than for the rest of the population. We concur with Barry and colleagues² who suggest that clients presenting for gambling problems should be screened for alcohol abuse. Further, there is a need to exam subsyndromal levels of gambling (our term, frequent gambling) as well a problem gambling, given that there is evidence for race-related differences in the association of gambling and substance use disorders.

CONCLUSIONS

Consistent with the arguments of Petry and Blanco,³¹ there are few U.S. national surveys of gambling involvement yet gambling availability has increased markedly in recent decades.²⁴ Some population subgroups, such as Native Americans and blacks, and alcohol abusers have higher rates of gambling involvement than others in the population.³² In this national U.S. sample, not only do Native Americans and blacks have higher rates of problem gambling than whites, but some risk factors have a greater impact on gambling involvement for Native Americans and blacks than they do for whites. In each level of gambling involvement, the relationships between gambling and neighborhood disadvantage are stronger for Native Americans than for other population groups. Impulsivity is a significant risk factor for frequent gambling among whites whereas Native Americans and blacks have relatively high rates of impulsivity across all levels of gambling. Blacks show increased risk for frequent gambling when neighborhood disadvantage is greater and among those who consume more than two drinks of alcohol per day. Funding for research, increased screening for gambling problems, and greater research efforts directed to identifying the causal risk factors resulting in problem gambling among minority subgroups are warranted.

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References

1. Welte JW, Barnes G, Wieczorek W, Tidwell M, Parker J. Alcohol and gambling pathology among U.S. adults: Prevalence, demographic patterns and comorbidity. *J Stud Alcohol*. 2001; 62(5):706–712. [PubMed: 11702810]
2. Barry DT, Stefanovics EA, Desai RA, Potenza MN. Differences in the associations between gambling problem severity and psychiatric disorders among black and white adults: Findings from the National Epidemiologic Survey on Alcohol and Related Conditions. *Am J Addictions*. 2010; 20:69–77.
3. Alegria AA, Petry NM, Hasin DS, Liu S-M, Grant BF, Blanco C. Disordered gambling among racial and ethnic groups in the US: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *CNS Spectrums*. 2009; 14:132–142. [PubMed: 19407710]
4. Kessler RC, Hwang I, LaBrie R, et al. DSM-IV pathological gambling in the National Comorbidity Survey Replication. *Psychol Med*. 2008; 38(9):1351–1360. [PubMed: 18257941]
5. Barnes GM, Welte JW, Tidwell M-CO, Hoffman JH. Effects of neighborhood disadvantage on problem gambling and alcohol abuse. *J Behav Addictions*. 2013; 2:82–89.
6. Welte JW, Wieczorek WF, Barnes GM, Tidwell M-C, Hoffman JH. The relationship of ecological and geographic factors to gambling behavior and pathology. *J Gambl Stud*. 2004; 20:405–423. [PubMed: 15577275]
7. Steel Z, Blaszczynski A. Impulsivity, personality disorders and pathological gambling severity. *Addiction*. 1998; 93:895–905. [PubMed: 9744125]
8. Knezevic B, Ledgerwood DM. Gambling severity, impulsivity, and psychopathology: Comparison of treatment- and community-recruited pathological gamblers. *Am J Addictions*. 2012; 21:508–515.
9. Leppink EW, Redden SA, Grant JE. Impulsivity and gambling: A complex clinical association across three measures. *Am J Addictions*. 2016; 25:138–144.
10. Odlaug BL, Schreiber LRN, Grant JE. Personality dimensions and disorders in pathological gambling. *Curr Opin Psychiatr*. 2013; 26:107–112.
11. Barnes GM, Welte JW, Tidwell M-CO, Hoffman JH. Gambling and substance use: Co-occurrence among adults in a recent general population study in the United States. *Int Gambl Stud*. 2015; 15:55–71. [PubMed: 25914605]
12. Petry N, Stinson F, Grant B. Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: Results from the national epidemiologic survey on alcohol and related conditions. *J Clin Psychiatr*. 2005; 66(5):564–574.
13. Nower L, Martins SS, Lin KH, Blanco C. Subtypes of disordered gamblers: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Addiction*. 2013; 108(4):789–798. [PubMed: 23072599]
14. Blaszczynski A, Nower L. A pathways model of problem and pathological gambling. *Addiction*. 2002; 97(5):487–499. [PubMed: 12033650]
15. Martins S, Ghandour L, Lee G, Storr C. Sociodemographic and substance use correlates of gambling behavior in the Canadian general population. *J Addict Dis*. 2010; 29(3):338–351. [PubMed: 20635283]
16. Griffiths M, Wardle H, Orford J, Sproston K, Erens B. Gambling, alcohol, consumption, cigarette smoking and health: Findings from the 2007 British Gambling Prevalence Survey. *Addict Res Theory*. 2010; 18(2):208–223.
17. Welte JW, Barnes GM, Tidwell M-CO, Hoffman JH, Wieczorek WF. Gambling and problem gambling in the United States: Changes between 1999 and 2013. *J Gambl Stud*. 2015; 31:695–715. [PubMed: 24880744]
18. Welte JW, Barnes GM, Tidwell MC, Spicer P, Patterson DA - Silver Wolf (Adelv Unegv Waya). Sociocultural Influences on gambling and alcohol use among Native Americans in the United States. *J Gambl Stud*. 2015; 31:1387–1404. [PubMed: 25408467]

19. Robins, L., Marcus, L., Reich, W., Cunningham, R., Gallagher, T. NIMH diagnostic interview schedule – Version IV (DIS-IV). St. Louis: Dept. of Psychiatry, Washington University School of Medicine; 1996.
20. Abbott, M., Volberg, R. Research Series No. 12. Research Unit, Department of Internal Affairs; Wellington, New Zealand: 1991. Gambling and problem gambling in New Zealand: Report on phase one of the national survey of problem gambling.
21. Wynne, HJ. Introducing the Canadian Problem Gambling Index. Wynne Resources; Edmonton, Alberta, Canada: 2003.
22. Welte JW, Barnes GM, Tidwell M-CO, Hoffman JH. Gambling and problem gambling across the lifespan. *J Gambl Stud.* 2011; 27:49–61. [PubMed: 20499144]
23. Boardman JD, Finch BK, Ellison CG, Williams DR, Jackson JS. Neighborhood disadvantage, stress, and drug use among adults. *J Health Soc Behav.* 2001; 42:151–165. [PubMed: 11467250]
24. Casino City Press. Gaming business directory. Newton, MA: Casino City Press; 2010.
25. Spinella M. Normative data and a short form of the Barratt impulsiveness scale. *Int J Neurosci.* 2007; 117:359–368. [PubMed: 17365120]
26. Wilson WJ. Why both social structure and culture matter in a holistic analysis of inner-city poverty. *Ann Am Acad Polit SS.* 2010; 629:219–220.
27. Welte JW, Wieczorek WF, Barnes GM, Tidwell M-C. Multiple risk factors for frequent and problem gambling: Individual, social and ecological. *J Appl Soc Psychol.* 2006; 36:1548–1568.
28. Bottesi G, Ghisi M, Ouimet AJ, Tira MD, Sanavio E. Compulsivity and impulsivity in pathological gambling: Does a dimensional-transdiagnostic approach add clinical utility to DSM-5 classification? *J Gambl Studies.* 2015; 31:825–847.
29. American Psychiatric Association. DSM-IV: Diagnostic and Statistical Manual of Mental Disorders. 4. Washington DC: 1994.
30. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). Washington DC: 2013.
31. Petry N, Blanco C. National gambling experiences in the United States: Will history repeat itself? *Addiction.* 2012; 108:1032–1037. [PubMed: 23067256]
32. Okuda M, Liu W, Cisewski JA, Segura L, Storr CL, Martins SS. Gambling disorder and minority populations: Prevalence and risk factors. *Curr Addict Rep.* 2016; 3:280–292. [PubMed: 28824833]

Table 1

Percent any gambling and problem gambling (4+ symptoms) in past year according to demographic and individual characteristics for Native Americans, Blacks and Whites/others (N = 3,474)

Sociodemographic Group		Native Americans (n=549)	Blacks (n=363)	Whites & Others (n=2,562)
Total Sample	77.4 (9.7)	80.1 (18.2)	76.6 (12.7)	76.9 (7.5)
Gender	Male	82.0 (20.5)	84.7 (19.4)	80.2 (10.3)
	Female	78.3 (16.0)	70.6 (7.8)	73.8 (4.8)
Age Group	18 – 25	84.3 (24.1)	67.5 (9.6)	78.9 (8.1)
	26 – 35	85.0 (16.1)	83.0 (15.7)	78.9 (10.9)
	36 – 49	79.0 (17.3)	90.2 (9.3)	82.2 (8.8)
	50+	75.5 (16.5)	68.4 (14.1)	73.1 (5.4)
Socioeconomic Status (SES)	Bottom third	83.1 (21.2)	75.9 (15.5)	76.2 (11.4)
	Middle third	74.3 (15.8)	81.9 (11.3)	77.6 (7.2)
	Top third	80.7 (11.5)	68.0 (6.8)	76.9 (4.8)
Neighborhood Disadvantage	Least disadvantaged third	73.6 (13.0)	77.5 (4.0)	77.1 (5.0)
	Middle third	76.3 (9.6)	70.9 (14.6)	78.7 (9.0)
	Most disadvantaged third	82.6 (21.5)	79.5 (13.5)	74.4 (8.6)
# Casinos within 30 miles	None	71.7 (14.5)	72.1 (13.9)	75.1 (5.7)
	One or more	82.8 (19.4)	81.7 (11.4)	78.9 (9.4)
Gambling convenience	Low fourth (least convenient)	71.3 (6.8)	63.3 (5.7)	63.7 (4.5)
	Second fourth	85.0 (24.6)	77.7 (7.0)	78.9 (5.2)
	Third fourth	88.5 (28.0)	79.7 (18.4)	79.8 (8.5)
	Top fourth (most convenient)	80.6 (18.1)	85.7 (18.5)	84.9 (11.6)
Impulsivity	First quartile (lowest)	73.7 (10.9)	75.0 (10.7)	73.4 (4.4)
	Second quartile	81.2 (22.3)	73.0 (7.0)	74.9 (6.6)
	Third quartile	79.1 (18.5)	79.3 (16.8)	77.0 (5.7)
	Fourth quartile (highest)	85.2 (20.7)	81.4 (19.4)	82.0 (12.8)
Drank alcohol	No	72.0 (17.0)	66.0 (11.6)	59.5 (6.8)
% Alcohol abuse or dependence in parentheses	Yes	88.6 (38.3)	85.6 (42.3)	84.5 (23.6)

Table 2

Logistic regressions with any gambling (past year) as the dependent variable and demographic, individual and alcohol use as the independent variables

Independent variables	Main effects only (Odds ratios and Significance)	Significant interactions between race and other variables controlling for main effects
Race (Whites & Others = Reference)		
Blacks	NS	
Native Americans	1.52 **	
Gender (0=female; 1=males)	1.32 ***	
Age (18 – 90+ years)	.992 ***	
Socio-economic status (SES) (0–10)	NS	
Neighborhood disadvantage (standardized)	NS	
Casino within 30 miles (0=No; 1=Yes) (Geo-coded distance variable)	1.20 *	
Gambling convenience (Self-report) (1–4)	1.80 ***	
Impulsivity (1–6)	1.33 ***	
Drank alcohol (Past Year)(0,1)	3.23 ***	
Significant interactions with race		
Native American × Neighborhood disadvantage		1.34 **

*
p .05

**
p .01

p .001

Table 3

Logistic regressions with frequent gambling (past year) as the dependent variable and demographic, individual and frequent alcohol use as the independent variables

Independent variables	Main effects only (Odds ratios and Significance)	Significant interactions between race and other variables controlling for main effects
Race (Whites & Others = Reference)		
Blacks	1.46 *	
Native Americans	1.42 *	
Gender (0=female; 1=males)	1.96 ***	
Age (18 – 90+ years)	1.01 *	
Socio-economic status (SES) (0–10)	.80 ***	
Neighborhood disadvantage (standardized)	NS	
Casino within 30 miles (0=No; 1=Yes) (Geo-coded distance variable)	1.37 **	
Gambling convenience (Self-report) (1–4)	2.18 ***	
Impulsivity (1–6)	1.38 ***	
Consumed average of 2+ drinks/day (0,1)	2.68 ***	
Significant interactions with race		
Black × Neighborhood disadvantage		1.47 *
Native American × Neighborhood disadvantage		1.47 **
Black × Impulsivity		.48 **
Native American × Impulsivity		.68 *
Black × 2+ drinks per day		4.50 **

*
p .05

**
p .01

p .001

Table 4

Logistic regressions with problem gambling (4+ symptoms in past year on three problem/pathological gambling scales) as the dependent variable and demographic, individual and alcohol abuse/dependence as the independent variables

Independent variables	Main effects only (Odds ratios and Significance)	Significant interactions between race and other variables controlling for main effects
Race (Whites & Others = Reference)		
Blacks	1.49 *	
Native Americans	1.90 ***	
Gender (0=female; 1=males)	1.89 ***	
Age (18 – 90+ years)	NS	
Socio-economic status (SES) (0–10)	.89 **	
Neighborhood disadvantage (standardized)	1.27 ***	
Casino within 30 miles (0=No; 1=Yes) (Geo-coded distance variable)	NS	
Gambling convenience (Self-report) (1–4)	1.80 ***	
Impulsivity (1–6)	1.52 ***	
Alcohol abuse/dependence (past year) (0,1)	2.47 ***	
Significant Interactions with Race		
Native American × Neighborhood disadvantage		1.30 *

*
p .05

**
p .01

p .001