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

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Abstract

We examined differences in the associations of gambling problem severity and psychiatric disorders among a nationally representative sample of 32,316 black and white adults. Black respondents were more likely than white ones to exhibit problem or pathological gambling and a stronger relationship between subsyndromal gambling and any mood disorder, hypomania, and any substance use disorder. Differences in the patterns of co-occurring disorders between syndromal and particularly subsyndromal levels of gambling in black and white respondents indicate the importance of considering race-related factors in mental health prevention and treatment strategies.

INTRODUCTION

Findings from clinical and community-based studies suggest that gambling and gambling problems are common among different racial and ethnic groups in the United States and elsewhere.[1,2] Investigations in the United States have generally,[3–6] but not uniformly,[7] found that, in comparison to whites, blacks are more likely to experience problem or pathological gambling. For example, a recent study that examined ethnicity and race differences in lifetime prevalence rates of problem or pathological gambling from the National Epidemiologic Survey on Alcohol and Related Conditions data found higher rates among black respondents (2.2%) in comparison to white ones (1.2%).[6]

Given the high co-occurrence of substance use, mood, anxiety, and personality disorders with pathological gambling, the treatment for one condition should routinely involve screening and possible concomitant treatment for comorbid psychiatric disorders.[4,8] However, the importance of systematically examining the psychiatric morbidity that may accompany a continuum of problem gambling severity (such as recreational or low-risk gambling, at-risk gambling, and problem gambling in addition to pathological gambling) among different population subgroups (e.g., gender, race) has been emphasized, and this focus is consistent with a public health approach to the study of gambling.[9-11] An increased understanding of racial differences among black and white adults concerning the prevalence of a range of problem gambling severity as well as associated psychiatric morbidity could help public health interventions as well as resource and program planning for gambling treatment programs.

The relatively few published studies that have examined race-related differences on gambling among blacks and whites have focused primarily on pathological or problem gambling and have not systematically examined the psychiatric correlates that may accompany recreational gambling. These studies have typically used lifetime (instead of past-year) measures of pathological gambling and psychiatric disorders (e.g., see[6]). However, in comparison to lifetime measures, past-year measures are less likely to be subject to recall bias, are more likely to afford a better test of psychiatric comorbidity because symptoms of the disorders being considered will have been present within 12 months of each other, and are arguably more important to clinicians and public health officials.[10,12] Consequently, we analyzed data from the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC) study to examine the relationships between sociodemographic characteristics and psychiatric disorders accompanying varying levels of past-year gambling problem severity among black and white respondents. We hypothesized that black respondents in comparison to white respondents would exhibit higher rates of problem or pathological gambling. Given that prior research suggests that the associations between substance use, mood, anxiety, and personality disorder and pathological gambling were stronger among blacks in comparison to whites,[4] we hypothesized that the rates of psychiatric disorders would be associated with past-year gambling problem severity in both black and white respondents, but the relationship would be stronger in black respondents as compared to white ones.

MATERIALS AND METHODS

Sample

The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) was conducted by the National Institute on Alcohol Abuse and Alcoholism and the US Census Bureau and sampled a nationally-representative group of US non-institutionalized residents (citizens and non-citizens) aged 18 and older.[12,13] Multi-stage cluster sampling was used to identify respondents: census sampling units, households, and then household members were sequentially sampled. While individuals residing in jails, prisons, or hospitals were not included, the sample was augmented with members of group living environments, such as group homes, shelters, dormitories, and facilities for housing workers.

The NESARC was designed to over-sample African American and Hispanic households, as well as individuals aged 18–24, to allow sufficient statistical power to investigate patterns of alcohol use in minority populations and young people. Weights have been calculated to adjust standard errors for these over-samples, the cluster sampling strategy, and non-responses.[14] The final NESARC sample consisted of 43,093 respondents with an overall response rate of 81 percent. For the purposes of the current study, we restricted the sample to 32,316 respondents 7,888 of whom self-identified as black (12.98%) and 24,428 as white

(87.13%) (percentages provided are weighted). All participants provided written study consent. This study of publicly accessible, de-identified data from the NESARC was presented to the Yale Human Investigations Committee and exempted from review under federal regulation 45 CFR Part 46.101(b).

Measures

Sociodemographics—Participants provided information about their race (black, white), gender (male, female), marital status (married, previously married, never married), education (less than high school, high school graduate, some college, college or higher), employment (full time, part time, not working), age, and income.

Psychiatric Disorders—Selected DSM-IV Axis I and II psychiatric disorder data were collected by trained lay interviewers using the Alcohol Use Disorder and Associated Disability Interview Schedule-DSM-IV version (AUDADIS-IV).[13,15] Not all Axis I or Axis II psychiatric disorders were assessed in the NESARC due to concerns about subject burden and time constraints.[16] The AUDADIS-IV is a structured diagnostic interview with demonstrated test-retest reliability, which has been found to be a useful tool for detecting psychiatric disorders in a community sample.[13] The following DSM-IV-related Axis I and II diagnostic variables (derived from AUDADIS-IV) are available on the publicly accessible NESARC database and were used in this study and grouped as follows (as done previously): [17] mood disorder (major depression, dysthymia, mania, hypomania); anxiety disorder (panic disorder, social phobia, simple phobia, generalized anxiety); substance use disorder (alcohol abuse/dependence, drug abuse/dependence, nicotine dependence); and personality disorder cluster A (paranoid, schizoid), cluster B (histrionic, antisocial), and cluster C (avoidant, dependent, obsessive-compulsive).

As previously done, we used past-year Axis I diagnoses with general medical condition and substance use exclusions; thus, these diagnoses can be viewed as orthogonal or "primary" as per DSM-IV/DSM-IV-TR guidelines.[9,15,18] In contrast to the past-year timeline for Axis I psychiatric diagnoses, Axis II diagnostic criteria were not restricted to the past year: respondents were asked how they felt or acted most of the time, irrespective of the situation, throughout their lives.

Respondents' answers to the gambling-related items from the AUDADIS-IV were used, as previously done, to classify them into one of three gambling groups: a) "no gamblers or low-frequency gamblers" (i.e., those reporting that they had never gambled more than five times per year in their lifetime); b) "low-risk or at-risk gamblers" (i.e., those reporting gambling more than five times in a year but who exhibited zero to 2 inclusionary criteria of pathological gambling in the previous year); and c) "problem or pathological gamblers" (i.e., those reporting 3 or more inclusionary criteria of pathological gambling in the previous year).[9] The AUDADIS-IV assessed the 10 DSM-IV diagnostic inclusionary criteria for pathological gambling.[15] Respondents who indicated that they had gambled five or more times in at least 1 year of their life were asked about inclusionary criteria of DSM-IV pathological gambling. The AUDADIS-IV assessed the 10 DSM-IV diagnostic inclusionary criteria for pathological gambling by asking 15 questions.[16] Consistent with previous reports, problem gambling was operationally defined as meeting 3–4 DSM-IV criteria and pathological gambling was operationally defined as meeting at least 5 DSM-IV criteria, consistent with the DSM-IV-TR.[9,19] Respondents with problem or pathological gambling were grouped together in this study because of the low proportion of participants who met criteria for pathological gambling (less than 1% of the sample), a strategy that has been employed in previous gambling studies.[3,9,20] Similarly, we grouped together low-risk or at-

risk gamblers in order to have sufficient power to test hypotheses with less frequently acknowledged diagnoses, particularly among black respondents.

Data Analysis

The primary research questions concerned race-related differences among black and white respondents in the association between past-year gambling problem severity and psychiatric disorders. To address these questions, data analyses proceeded in several steps. First, we examined using χ^2 the associations between gambling problem severity and socio-demographic characteristics (gender, marital status, education level, employment status, age, and income), stratified by race (black and white), in order to identify sociodemographic variables potentially influencing the relationship between race, gambling problem severity, and psychiatric disorders. Second, we examined unadjusted weighted rates of psychiatric disorders, stratified by both gambling problem severity and race. Third, we fit a series of logistic regression models with psychiatric variables as the dependent variable of interest and the 3-level gambling problem-severity variable (i.e., no gambling or low-frequency gambling [NG], low-risk or at-risk gambling [LRG], problem or pathological gambling [PPG]), race (black, white), and the interaction between race and gambling problem severity as the independent variables of interest, adjusting for potentially confounding sociodemographic variables (i.e., age, gender, marital status, income, education, employment). Our analysis began with examining psychiatric disorders grouped into Axis I and II categories. If significant findings were observed, 3 categories within each Axis were examined to identify further the nature of the findings, with Axis I categories including any mood disorder, any anxiety disorder, and any substance use disorder and Axis II categories including any Cluster A, any Cluster B, and any Cluster C. When significant associations were found between these categories and gambling problem severity and race, we pursued further analysis of the individual disorders. The NG category was used as a reference level for two sets of adjusted odds ratios: LRG versus NG and PPG versus NG. Interaction term odds ratios tested whether the adjusted odds ratios for black respondents were significantly different from those for white respondents. Due to characteristics of the study sample and the goal of estimating as accurately as possible the national rates of co-occurring psychiatric disorders, analyses were performed using NESARC-calculated weights and SUDAAN software.[21] Consequently, sample proportions are based on weighted percentages.

RESULTS

Sociodemographics

Forty-two percent of respondents were men (n = 13,694) and 58% were women (n = 18,622); 13% (n = 7,888) self-identified as black and 87% (n = 24,428) as white. Participants' ages ranged from 18 to 98 years old (M = 48.1, SD = 18.4). Half (n = 16,143) of the sample was married, 28 % (n = 9,012) was previously married, and 22 % (n = 7,161) was never married. While most participants had at least a high-school level of education (30% [n = 9,766] were high school graduates, 31% [n = 9,892] had some college education and 25% [n = 8,069] were college graduates), a minority (14%; [n = 4,589]) had never completed high school. Approximately one-half of respondents (51% [n = 16,383]) reported working full time, 10% (n = 3,221) were part time workers, and 39% (n = 12,712) did not have a job. The median annual household income was $42,989 a year (SE = $885).

Associations between gambling problem severity and sociodemographic characteristics were largely similar across race (Table 1), with the exception of education and employment: among blacks, gambling severity was not associated with education or employment, while among whites, significant differences were observed, with the PPG group, as compared to the NG and LRG groups, less frequently acknowledging a college level education (13% vs.

29% vs. 24%, respectively) and more frequently reporting part-time employment (13% vs. 11% vs. 10%, respectively).

Gambling Problem Severity

The majority of black and white respondents reported either no gambling or low-frequency gambling (65.7% and 63.9% for black and white men, respectively, and 77. 9% and 76.5% for black and white women, respectively) or "low-risk or at-risk" gambling (33.1 and 35.5% for black and white men, respectively, and 21.2% and 23.2% for black and white women, respectively). The prevalence rates of problem or pathological gambling were higher (p<0.0001) for black (0.96%) respondents in comparison to white (0.45%) respondents (1.20% and 0.64% for black and white men, respectively, and 0.90% and 0.28% for black and white women, respectively). Overall, 0.53% of the sample, and 0.71% of men and 0.36% of women, reported problem or pathological gambling.

Psychiatric Disorders

Table 2 summarizes the patterns of associations observed between gambling problem severity and psychiatric morbidity stratified by race (i.e., black vs. white). Significant associations between gambling severity were observed for any Axis I and any Axis II disorder for both blacks and whites, and significant associations were also found within each contributing category in the Axis I (mood, anxiety, and substance use) and Axis II (clusters A, B, and C) in both blacks and whites.

Adjusted odds ratios from multivariate models investigating the strength of associations between psychiatric disorders and gambling problem severity groups are presented for black and white respondents, using same-race NG as the reference group (Table 3). The odds of any Axis I or any Axis II disorder was elevated in association with LRG and PPG in both black and white respondents, and interactions analyses yielded similar relationships across race groups. Among the diagnostic groupings within each Axis (mood, anxiety, and substance use disorders for Axis I and clusters A, B, and C for Axis II), both black and white respondents demonstrated elevated odds in association with more severe levels of gambling. Interaction analyses indicated that these relationships were largely of a similar magnitude in black and white respondents with the exception that the relationship between LRG and any mood disorder (OR= 1.38, p=0.01), hypomania (OR=1.77, p=0.04), and any substance use disorder (OR=1.2, p=0.02) was stronger in blacks than in whites. The relationship between LRG and social phobia approached statistical significance at p<0.05, with a relatively stronger relationship observed in black participants than in white ones (OR=1.62, p=0.05). Conversely, the relationship between PPG and nicotine dependence approached statistical significance at p<0.05, with a relatively stronger relationship observed in white respondents than in black ones (OR=0.45, p=0.05).

DISCUSSION

This study is the first, to our knowledge, to systematically investigate differences between black and white adults in the associations between Axis I and Axis II psychiatric disorders and different levels of gambling problem severity in a nationally representative sample. The findings generally support our a priori hypotheses that (a) black respondents in comparison to white respondents would exhibit higher rates of problem or pathological gambling and (b) rates of psychiatric disorders would be associated with past-year gambling problem severity in both black and white respondents. Although patterns of co-occurrence appear largely similar across racial groups, the relationship between past-year gambling severity and several forms of psychopathology appears stronger in black respondents as compared to

white ones, specifically in the relationship between subsyndromal gambling and mood disorders (particularly hypomania) and substance use disorders.

Gambling Problem Severity

Our finding that black respondents exhibited higher rates of problem or pathological gambling than their white counterparts is consistent with prior research findings documenting increased frequencies of problem or pathological gambling in blacks in comparison to whites.[3,4] Furthermore, consistent with previous findings that racial minority women may be at particularly high risk of problem or pathological gambling,[2,8] we found that higher proportions of black problem or pathological gamblers, as compared with white ones, were women (57% v. 38%). These findings support the importance of attending to gender differences nested within cultural/racial groups to attenuate the risk of stereotyping and enhance treatment efficacy.[22,23] Future research might benefit from examining possible gender and racial differences in motivations to gamble and the extent to which different strategies may be needed to optimize treatment for men and women from different racial groups.

Gambling and Axis I Psychiatric Disorders

Our findings using a nationally representative sample largely corroborate those previously reported on the high rates of co-occurrence between problem or pathological gambling and Axis I psychiatric disorders among patients in treatment or seeking help.[8,10,24] We found elevated rates of mood, anxiety, and substance use disorders among both black and white PPG respondents. Study findings also extend those previously reported regarding the high rates of anxiety, depression, and substance-related disorders (including those related to alcohol, illicit drugs, and nicotine) among black and white callers to a gambling helpline[8] by specifying the types of mood (major depression, dysthymia, mania) and anxiety disorders (panic disorder with and without agoraphobia, social phobia, simple phobia, generalized anxiety disorder) that were associated with problem or pathological gambling and by documenting the increasing prevalence of Axis I psychiatric disorders accompanying levels of gambling problem severity.

Our findings confirm and expand upon prior epidemiological studies, showing a robust association between problem or pathological gambling and a range of psychiatric disorders. [3,4] In contrast to the Cunningham-Williams et al. study, which used DSM-III diagnostic criteria and a sample recruited from St. Louis, MO, this study employed DSM-IV diagnostic criteria and a nationally representative sample. Whereas the Petry et al. study used lifetime measures of Axis I psychopathology, we incorporated past-year measures, which are less prone to imprecision resulting from recall bias, afford a better test of psychiatric comorbidity because symptoms of the disorders being considered will have been present within 12 months of each other, and are arguably more relevant to clinicians and public health officials.[9,11] These studies also extend prior NESARC studies (ones examining differences in the relationship between gambling severity and other psychopathology as related to gender,[9] nicotine dependence,[17] or alcoholism[25]) by focusing on racial differences in psychopathology associated with gambling problem severity. Similar to the ECA study,[3] we found that the prevalence of Axis I psychiatric disorders increased with higher problem gambling severity, lending support to the conceptualization that gambling problems occur along a continuum[20,26] and suggesting that clinicians might benefit from assessing and addressing the psychiatric correlates of subsyndromal gambling and not only those pertaining to problem or pathological gambling.

While a largely similar pattern in the associations between gambling problem severity and Axis I disorders was observed in black and white study groups, a stronger relationship

between subsyndromal gambling and "any mood disorder" (and particularly hypomania) and "any substance use disorder" emerged in black respondents as compared to white ones. These findings expand upon prior research concerning the potential public health impact associated with subsyndromal levels of gambling[27] by specifying groups of Axis I disorders that appear to be particularly associated with low-risk or at-risk gambling among blacks. Irrespective of the underlying mechanism for this association (e.g., genetic, environmental), these findings indicate that subsyndromal gambling in black individuals may be associated with greater psychopathology than such gambling in whites. They also highlight the need for further research into the relationship between gambling and race and suggest that public health initiatives concerning recreational gambling should incorporate race-related considerations.

Gambling and Axis II Psychiatric Disorders

Prior to the NESARC, community studies have generally not included measures of both gambling problem severity and personality disorders (PDs). Results from this study confirm and expand upon prior studies demonstrating an association between PDs and PPG.[9,17] Despite some PDs showing larger odds ratio magnitudes in association with PPG in black as compared to white respondents (most notably dependent PD) and vice-versa (most notably histrionic PD), none of the interaction terms were statistically significant. The absence of significant interaction terms may be a function of the small sample of PPG respondents in our study; perhaps with a larger sample of PPG individuals, the odds ratios observed in this study may have become statistically significant. Overall, study findings suggest that clinicians should be alert to the possible presence of a personality disorder among both black and white patients with subsyndromal levels of gambling and not just among those presenting with PPG, especially since the presence of a PD may complicate the treatment of PPG.[28]

Limitations and Strengths

Several potential limitations are worth noting. The survey was cross-sectional and thus limits statements regarding causation among study variables. The low rates of past-year pathological and at-risk gambling necessitated the combining of past-year problem and pathological gambling, and past-year low-risk and at-risk gambling were also combined to facilitate comparisons, particularly amongst black respondents. Future research studies might benefit from separating non-gamblers from low-frequency gamblers, low-risk gamblers from at-risk gamblers, and problem gamblers from pathological gamblers, and analyzing possible differences on psychiatric outcome variables among these gambling subgroups. Currently, there is an absence of established standards for categorizing gambling problems along a continuum. Consistent with previous studies,[9,17,25] we operationally defined past-year non-gamblers and low-frequency gamblers as those who had not gambled more than 5 times per year in their lifetime, and we set the threshold for PPG at 3 or more inclusionary criteria; however, these categorizations are not based on empirically derived thresholds.[9,25]

Low rates of endorsement of some psychiatric disorders, such as dependent PDs, limit our ability to conduct meaningful comparisons. Additionally, due to concerns about response burden, the NESARC did not exhaustively assess Axis I and Axis II disorders; consequently, certain diagnoses, which may be clinically relevant to gambling problem severity, were not assessed, including non-gambling impulse control disorders, attention-deficit/hyperactivity disorder, post-traumatic stress disorder and borderline personality disorder. Future research examining the psychiatric correlates of problem gambling severity might benefit from the inclusion of measures that assess these diagnoses.

Despite these limitations, the current study represents an initial investigation of race-related differences in the psychiatric comorbidity of problem gambling severity among blacks and whites. The present study is the first, to our knowledge, to systematically investigate race-related differences in psychiatric disorders accompanying varying levels of past-year gambling problem severity among a nationally-representative sample of black and white respondents. The strong associations across race groups between mood, anxiety, substance use, and personality disorders, and gambling problem severity, offer support for the routine assessment of these psychiatric disorders in patients presenting for gambling treatment, as well as screening for problem gambling severity among patients seeking treatment for other psychiatric disorders. Study findings also highlight the importance of developing treatments for problem or pathological gamblers with co-occurring psychiatric disorders: currently there is a dearth of evidence-based treatments for individuals with co-occurring gambling and other psychiatric disorders. Brief intervention strategies that may prove cost-effective, such as motivational interviewing, may be particularly important to investigate in individuals with subsyndromal gambling disorders. Our findings concerning race-related differences in the associations between problem gambling severity and psychiatric comorbidity among black and white respondents suggests the need for further race-related research examining (a) possible underlying mechanisms (e.g., biological, genetic, environmental) that may explain these different comorbidity patterns, and (b) the extent to which different patterns of psychiatric comorbidity among blacks and whites may affect treatment seeking behaviors and outcomes. Such studies and related prevention efforts should carefully evaluate subsyndromal levels of gambling given race-related differences in their association with mood and substance use disorders.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1

Sociodemographic characteristics of black and white respondents by gambling problem severity.

Characteristics	White respondents							Black respondents						
	NG		LRG		PPG			NG		LRG		PPG		
	N/mean	%/se	N/mean	%/se	N/mean	%/se	P	N/mean	%/se	N/mean	%/se	N/mean	%/se	P
Gender							<.0001							<.0001
Male	6,928	43.6	3,802	58.6	68	68.2		1,862	39.5	1,001	54.6	33	51.1	
Female	10,431	56.4	3,157	41.4	42	31.8		3,897	60.5	1,052	45.4	43	48.9	
Marital status							<.0001							<.0001
Married	9,394	63.7	3,974	66.8	48	49.8		1,908	40.4	802	48.1	17	29.1	
Previously married	4,594	17.6	1,855	18.1	30	22.9		1,848	22.4	662	22.5	23	19.7	
Never married	3,371	18.8	1,130	15.1	32	27.2		2,003	37.1	589	29.4	36	51.3	
Education							<.0001							.52
Less than HS	2,096	11.5	787	10.8	18	15.9		1,241	19.6	425	19.5	22	22.2	
HS graduate	5,007	29.3	2,190	31.9	43	42.5		1,846	32.2	657	32.0	23	36.7	
Some college	5,197	30.5	2,283	32.9	35	28.1		1,713	32.1	642	32.8	22	33.2	
College or higher	5,059	28.7	1,699	24.4	14	13.4		959	16.1	329	15.6	9	7.9	
Employment							.0003							.25
Full time	8,554	51.4	3,664	55.8	63	55.5		2,953	53.9	1,114	57.2	35	43.7	
Part time	1,846	11.2	666	9.9	13	13.0		519	9.5	170	8.3	7	10.8	
Not working	6,959	37.5	2,629	34.3	34	31.5		2,287	36.6	769	34.5	34	45.4	
Age	46.4	0.2	48.3	0.3	41.7	2.1	<.0001	41.8	0.3	44.5	0.5	36.9	2.2	<.0001
Income	57,387	1116.7	60,303	1347.6	46,254	3512.0	.0004	38,368	1217.5	42,192	1167.5	34,541	4675.7	.013

Note: NG = no gambling or low-frequency gambling group; LRG = low-risk or at-risk gambling group; PPG = problem or pathological gambling group. Ns represent actual number in each category; % s indicate weighted percentages.

Table 2

Prevalence of psychiatric diagnoses by gambling problem severity among black and white respondents.

Psychiatric Diagnoses	White respondents							Black respondents						
	NG		LRG		PPG			NG		LRG		PPG		
	N	%	N	%	N	%	P	N	%	N	%	N	%	P
Any Axis I disorder	6855	40.2	3888	56.7	95	82.9	<.0001	1601	28.6	950	46.1	57	78.1	<.0001
Any mood disorder	1699	9.5	722	9.8	30	24.3	.005	452	7.9	206	10.6	26	34.6	.0003
Major depression	1384	7.7	539	7.2	23	15.9	.035	343	5.9	136	7.1	13	19.4	.038
Dysthymia	341	1.9	155	1.9	5	5.1	.4	100	1.7	36	1.8	7	11.2	.156
Mania	280	1.6	140	1.9	6	7.3	.064	74	1.0	47	2.8	13	17.8	.001
Hypomania	176	1.1	92	1.4	2	2.8	.139	56	1.1	45	2.4	1	0.6	.02
Any anxiety disorder	1980	11.3	958	13.5	35	30.6	<.0001	570	9.6	265	12.9	19	30.6	.002
Panic disorder w/ or w/o agoraphobia	405	2.3	184	2.5	9	9.2	.137	85	1.3	43	2.1	1	2.4	.205
Social phobia	515	3.0	246	3.3	13	7.7	.116	103	1.7	54	2.9	3	6.4	.09
Simple phobia	1220	7.1	639	9.1	24	21.1	<.0001	396	6.8	189	8.7	13	20.5	.023
Generalized anxiety disorder	400	2.1	172	2.4	9	8.9	.084	99	1.8	33	1.9	6	9.4	.269
Any substance use disorder	6334	37.4	3854	56.7	92	80.6	<.0001	1253	22.6	883	43.3	47	56.4	<.0001
Alcohol abuse/dependence	1225	7.3	843	12.7	37	34.6	<.0001	244	5.0	188	10.6	18	22.5	<.0001
Drug abuse/dependence	285	1.7	177	2.8	8	6.0	.0002	72	1.7	62	3.9	6	8.2	.004
Nicotine dependence	2051	12.3	1294	19.5	56	52.2	<.0001	481	8.6	294	14.5	23	25.4	.0001
Any Axis II disorder	2320	13.6	1286	18.5	58	51.1	<.0001	801	14.8	417	21.3	41	57.7	<.0001
Any Cluster A	934	5.2	479	6.6	27	24.9	<.0001	490	8.9	239	12.1	26	36.3	.0003
Paranoid	633	3.6	317	4.4	25	23.2	.0004	366	6.6	190	9.9	25	35.7	.0001
Schizoid	466	2.6	245	3.5	12	14.8	.001	237	4.5	116	5.6	15	24.1	.015
Any Cluster B	699	4.3	473	6.9	33	25.8	<.0001	211	4.3	159	8.7	21	31.6	<.0001
Histrionic	286	1.7	144	2.0	17	14.0	.0048	112	2.2	69	3.6	10	10.8	.015
Antisocial	477	3.0	367	5.5	24	20.6	<.0001	123	2.7	101	5.6	13	22.9	.0003
Any Cluster C	1575	9.2	802	11.8	34	27.9	<.0001	466	8.3	218	11.4	26	35.2	.0004
Avoidant	466	2.6	152	2.2	11	8.7	.011	103	1.8	42	2.3	6	8.4	.118
Dependent	86	0.6	34	0.5	3	2.4	.33	20	0.3	7	0.3	4	3.7	.206
Obsessive-Compulsive	1288	7.7	710	10.4	32	25.6	<.0001	404	7.3	196	9.9	25	32.8	.0008

Note: NG = no gambling or low-frequency gambling group; LRG = low-risk or at-risk gambling group; PPG = problem or pathological gambling group.

Table 3

Associations between psychiatric diagnoses and gambling severity among black and white respondents.

Psychiatric Diagnoses	Black respondents		White respondents		Interaction (black vs. white)	
	OR for LRG vs. NG	OR for PPG vs. NG	OR for LRG vs. NG	OR for PPG vs. NG	OR for LRG vs. NG	OR for PPG vs. NG
Any Axis I disorder	2.17***	8.89***	2.08***	6.89***	1.11(0.17)	1.27(0.58)
Any mood disorder	1.69***	5.86***	1.15*	2.59***	1.38(0.01)*	2.09(0.07)
Major depression	1.47*	3.55**	1.01	1.90*	1.33(0.07)	1.67(0.31)
Dysthymia	1.22	6.82***	1.14	2.43	0.99(0.97)	2.53(0.22)
Mania	2.49***	12.86***	1.47**	4.12**	1.67(0.06)	3.06(0.07)
Hypomania	2.85***	0.41	1.62**	2.02	1.77(0.04)*	0.20(0.2)
Any anxiety disorder	1.62***	4.26***	1.29***	3.26***	1.13(0.24)	1.16(0.71)
Panic disorder w/ or w/o agoraphobia	1.93**	1.68	1.19	3.82**	1.46(0.14)	0.39(0.39)
Social phobia	2.03**	3.92	1.16	2.46**	1.62(0.05)	1.46(0.65)
Simple phobia	1.52***	3.60***	1.38***	3.34***	0.99(0.93)	0.97(0.95)
Generalized anxiety disorder	1.30	5.61**	1.21	4.00**	0.97(0.92)	1.23(0.75)
Any substance use disorder	2.57***	4.17***	2.33***	6.74***	1.20 (0.02)*	0.65(0.31)
Alcohol abuse/dependence	2.47***	4.27***	2.15***	6.21***	1.27(0.12)	0.78(0.54)
Drug abuse/dependence	2.96***	3.38*	2.23***	2.90*	1.44(0.14)	1.35(0.65)
Nicotine dependence	1.98***	3.13***	1.94***	7.14***	1.05(0.68)	0.45(0.05)
Any Axis II disorder	1.66***	7.19***	1.54***	6.13***	1.09(0.36)	1.19(0.65)
Any Cluster A	1.59***	5.42***	1.41***	5.22***	1.11(0.38)	0.99(0.98)
Paranoid	1.85***	7.36***	1.38***	6.90***	1.30(0.07)	1.03(0.95)
Schizoid	1.36*	5.92***	1.48***	5.88***	0.92(0.63)	1.01(0.98)
Any Cluster B	2.27***	8.45***	1.90***	6.58***	1.30(0.12)	1.38(0.4)
Histrionic	1.90*	4.22***	1.40**	8.06***	1.36(0.21)	0.53(0.19)
Antisocial	2.24***	8.54***	2.13***	6.91***	1.20(0.34)	1.39(0.48)
Any Cluster C	1.52***	5.71***	1.37***	3.59***	1.09(0.49)	1.57(0.23)

	Black respondents		White respondents		Interaction (black vs. white)	
Psychiatric Diagnoses	OR for LRG vs. NG	OR for PPG vs. NG	OR for LRG vs. NG	OR for PPG vs. NG	OR for LRG vs. NG	OR for PPG vs. NG
Avoidant	1.55	4.41[**]	0.93	2.84[**]	1.58(0.09)	1.44(1.54)
Dependent	1.27	8.85[***]	1.02	3.33	1.19(0.77)	2.51(0.26)
Obsessive-compulsive	1.45[**]	6.02[***]	1.44[***]	4.03[***]	1.01(0.94)	1.49(0.29)

NG = no gambling or low-frequency gambling group; LRG = low-risk or at-risk gambling group; PPG = problem or pathological gambling group. Adjusted for age, gender, marital status, income, education, and employment.

[*] p<0.05,

[**] p<0.01,

[***] p<0.001.