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Pathological gambling severity and co-occurring psychiatric disorders in individuals with and without anxiety disorders in a nationally representative sample

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Abstract

While anxiety disorders (ADs) and pathological gambling (PG) frequently co-occur with each other and other Axis I and Axis II disorders, previous studies have not examined the relative influence of ADs on the co-occurrences between PG severity and non-anxiety psychopathologies. The current study used data from the National Epidemiologic Survey on Alcohol and Related Conditions ($N=43,093$) to examine the influence of past-year ADs on the associations between past-year PG severity measures based on DSM-IV criteria for PG and non-anxiety psychiatric disorders. The findings revealed that increased PG severity was associated with Axes I and II psychopathology in both the groups with and without ADs. Significant anxiety-by-gambling-group interactions were also observed, particularly with respect to mood and personality disorders. The interactions indicate a stronger relationship between PG severity and psychopathology in participants without ADs than in those with ADs. Future research should investigate specific factors contributing to the co-occurrence of anxiety, gambling, and other psychiatric disorders and how the co-occurrences might influence clinically relevant phenomena such as treatment selection or course.

Keywords

Gambling; Anxiety disorders; Co-morbid psychiatric disorders; Nationally representative population

1. Introduction

While most people gamble without developing a gambling problem, nationally representative surveys suggest that about 0.2–2% of adults engage in persistent, recurrent maladaptive gambling behavior that fulfills the Diagnostic and Statistical Manual of Mental Disorders IV-TR criteria for pathological gambling (PG) (American Psychiatric Association, 2000; Petry et al., 2005; Kessler et al., 2008). According to the DSM-IV TR, gambling behaviors are considered pathological if they disrupt ‘personal, family, or vocational pursuits’ and are not attributable to a Manic Episode. A diagnosis of PG involves meeting at least five inclusionary criteria that include a preoccupation with gambling, multiple failed attempts to control, cut back, or stop gambling, feelings of restlessness or irritability when attempting to cut back or stop gambling, and the loss of a significant relationship, job, or other opportunity because of the gambling (American Psychiatric Association, 2000). An additional 4% of the population has been estimated to experience problem gambling, often operationalized as meeting three or four inclusionary DSM-IV criteria for PG, rather than the five needed for PG (Shaffer et al., 1999; Grant et al., 2009). Both problem gambling and PG have been associated with significant clinical distress and adverse functioning in familial, occupational and financial realms (Slutske et al., 2000; Argo and Black, 2004). Levels of gambling falling below the threshold of problem gambling (e.g., meeting one or two inclusionary criteria (at-risk gamblers) or, amongst those meeting none, more frequent as compared to less frequent or no gambling (low-risk gamblers)) have also been associated with clinically relevant measures, such as co-occurring psychiatric disorders (Grant et al., 2009; Brewer et al., 2010). Given the large number of individuals with low-risk, at-risk, problem and pathological gambling behaviors (Desai and Potenza, 2008), there is a significant public health interest in understanding the clinical correlates of a broad range of gambling behaviors (Korn and Shaffer, 1999; Shaffer and Korn, 2002).

Problem gambling and PG frequently co-occurs with other psychiatric conditions including anxiety disorders (ADs). For example, approximately 40% of outpatients with PG may experience co-occurring ADs (Black and Moyer, 1998). In the National Co-morbidity Survey Replication, it was found that PG is often temporally preceded by panic disorder (PD), generalized anxiety disorder (GAD), and phobias; furthermore, 52% of participants with lifetime PG experienced phobias, 21.9% experienced PD, and 16.6% experienced GAD (Kessler et al., 2008). A recent longitudinal study demonstrated that PG is positively associated with the development of incident GAD (Chou and Afifi, 2011).

Similarly, when researchers collapse problem and pathological gamblers into a single diagnostic category (problem/pathological gamblers; PPG), high rates of co-morbidity between PPG and ADs have also been found. In the Epidemiologic Catchment Area study sample, the prevalence of PD, phobias, and GAD was 23.3%, 14.6%, and 7.7%, respectively, among adults with PPG. These findings are largely consistent with data from the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC), which indicated elevated rates of ADs among participants with past-year PPG (Desai and Potenza, 2008) or lifetime PG (Petry et al., 2005).

The co-occurrence of PPG and ADs has clinical relevance. Individuals may be more prone to developing gambling problems in the presence of ADs and other psychopathologies such as substance dependence (El-Guebaly et al., 2006). Co-occurrences between PG and ADs have been used to guide treatment selection (Grant and Potenza, 2006). In general, individuals with co-occurring disorders appear to fare worse in treatment (Potenza, 2007). Together, these findings suggest a clinically relevant relationship between PPG and ADs.

Both PG and ADs co-occur with other psychopathologies, including externalizing disorders (e.g., alcohol dependence and antisocial personality disorder) and internalizing disorders (e.g., depression and dysthymia) (de Graaf et al., 2002; Grant et al., 2004; Potenza et al., 2005; Chan et al., 2008). In the modeling of data from large samples of twins, PG has been found to share genetic contributions with both externalizing disorders (Slutske et al., 2000, 2001) and internalizing disorders (Potenza et al., 2005; Giddens et al., 2011). Externalizing disorders (e.g., alcohol abuse/dependence) have been found to influence the relationships between PPG and a broad range of internalizing and externalizing disorders (Brewer et al., 2010). However, analogous studies investigating how internalizing disorders like ADs influence the relationships between PPG and co-occurring psychopathologies have not been previously reported.

1.1. Research objectives and hypotheses

The current study used data from Wave 1 of the NESARC, a nationally representative sample of US individuals ages 18 and over, to investigate whether the relationship between PG severity (employing multiple gambling severity levels, as had been done previously), and other psychiatric disorders was modified by the presence or absence of ADs. PG severity was operationalized as a four-level categorical variable, rather than a binary diagnostic variable, in light of the evidence reviewed above demonstrating that gambling problems fall on a continuum, and that symptoms not meeting full diagnostic criteria for PG are nevertheless clinically significant. This approach has been used in prior research (Desai and Potenza, 2008; Grant et al., 2009; Brewer et al., 2010). Previously, we found that the prevalence of psychopathology was positively associated with PG severity among persons without nicotine dependence and without alcohol abuse/dependence (Grant et al., 2009; Brewer et al., 2010). In contrast, this “dose-dependent” relationship between PG severity and psychopathology was not consistently observed among participants with nicotine dependence and among those with alcohol abuse/dependence. Furthermore, the magnitude of the association between PG severity and psychopathology was generally lower among participants with substance use disorders compared to those without. These findings suggested that these substance use disorders accounted for some of the risk for psychopathology associated with more severe gambling behaviors or PG. Given these findings, we hypothesized that the magnitude of the association between PG severity and psychopathology would be greater for individuals without ADs, compared to those with ADs. We also hypothesized that ADs would specifically influence the relationship between PG severity and mood disorders given the clustering of mood disorders and ADs within an internalizing group of disorders (Krueger et al., 1998; Krueger, 1999).

2. Method

2.1. Sample

The Wave 1 NESARC sample and sampling methodologies have been described extensively in prior work (Grant et al., 2003, 2004). To summarize, the NESARC data were collected from a nationally representative sample consisting of civilian non-institutionalized participants ages 18 and older. In order to reach sufficient statistical power to examine minority and younger aged groups, there was overrepresentation of African American, Hispanic, and young-adult (aged 18–24 years) individuals. The weights of the sample were adjusted for standard errors due to the over-sampling, the cluster sampling technique and the non-response rate. Of those selected for inclusion and contacted, 43,093 individuals agreed to participate (81.0% response rate); participants were surveyed using DSM-IV-based structured clinical interviews (see below). All respondents gave written consent to participate. As the current study used the publicly accessible de-identified data, it was exempted from further IRB review.

2.2. Measures

The NESARC study administered the Alcohol Use Disorder and Associated Disabilities Interview Schedule-Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, version (AUDADIS-IV), a structured assessment tool, which was administered by trained lay interviewers. This instrument has been reported to have high reliability and validity in identifying psychiatric disorders in community samples (Grant et al., 2003). Based on DSM-IV criteria from AUDADIS-IV algorithms, the NESARC data set contains diagnostic psychiatric variables for the Axis I disorders (major depression, PD, GAD, social phobia, simple phobia, dysthymia, mania, hypomania, alcohol abuse/dependence, drug abuse/dependence, and nicotine dependence) and the Axis II disorders (paranoid, schizoid, antisocial, histrionic, avoidant, dependent, and obsessive-compulsive personality disorders).

The questionnaire allows one to distinguish past-year from lifetime diagnoses. As in prior studies (Desai and Potenza, 2008; Grant et al., 2009; Brewer et al., 2010), we selected past-year measures of Axis I disorders given their lesser susceptibility to recall bias and their clinical relevance with respect to co-occurring disorders. As stated previously, we created four PG severity groups based on approaches from prior work (Desai and Potenza, 2008; Grant et al., 2009; Brewer et al., 2010). The groups were as follows: non-gamblers/low-frequency gamblers (reporting <5 episodes of gambling in a single year in their lifetime); low-risk gamblers (reporting >5 episodes of gambling in a single year and no inclusionary criteria for PG in the past year); at-risk gamblers (reporting one or two inclusionary criteria for PG in the past year); and PPG (reporting ≥3 inclusionary criteria for PG in the past year). As there was a low frequency of PG (<1% of the sample reported ≥5 symptoms), the problem and pathological categories were combined, as was done previously (Desai and Potenza, 2008; Grant et al., 2009; Brewer et al., 2010).

We stratified our sample into two groups: those who met criteria for any AD in the past year (diagnosis of PD, GAD, social phobia, or simple phobia) versus those who did not. This approach of grouping similar disorders under a broader diagnostic category has been done in research on substance use disorders (Liu et al., 2009). We did not stratify our sample according to the individual ADs because it would limit our ability to make statistically meaningful comparisons.

2.3. Analysis

We modeled our analyses on the techniques used in previously published studies of Wave 1 NESARC data (Grant et al., 2009; Brewer et al., 2010), where analyses proceeded in several steps. The primary research questions concerned differences in the associations between PG severity and Axis I and Axis II disorders according to AD status. To investigate, we first examined the association between PG status and socio-demographic variables according to AD status, in order to identify those socio-demographic variables that might confound the association between PG severity, AD status, and other psychiatric disorders. Next, we calculated the unadjusted, weighted prevalence of psychiatric disorders according to PG severity, stratified by AD status. Statistical significance was determined by the Wald Chi-Squared test.

Finally, we fit a series of logistic regression models to examine the relationship between PG severity and psychopathology, stratified by AD status. In order to obtain the effect of PG severity according to AD status, all models included the main effects of these variables as well as the interaction term (PG severity AD status). Furthermore, all models were adjusted for those socio-demographic covariates found to be significantly associated with PG severity (age, race/ethnicity, marital status, education, employment, and income). We first investigated the broad categories of “any Axis I disorder” and “any Axis II disorder” as

dependent variables. Given the findings of significant effects for the categories of “any Axis I disorder” and “any Axis II disorder” at robust significant levels ($p < 0.001$ within the AD and non-AD groups), we examined the models for specific psychiatric disorders by each AD category to determine which disorders may have been contributing most to the observed findings.

We present the odds ratio (OR) for the effect of PG severity among participants with ADs separately from the effect of PG severity among participants without ADs, in other words, the AD-specific effect of PG severity. We also present the AD vs. Non-AD interaction OR. This OR is the ratio of the AD-specific effects (OR among AD/OR among those without AD); statistically significant interaction ORs indicate that AD status modified the association between PG severity and psychopathology. Given the design elements of the study, data were analyzed using SUDAAN software and the NESARC-calculated weights.

3. Results

The sample consisted of 38,333 (88.9%) participants without ADs and 4760 participants (11.1%) with one or more past-year ADs. In the entire sample ($N=43,093$), prevalence estimates for GAD, PD with agoraphobia, PD without agoraphobia, simple phobia, and social phobia were 2.06%, 0.56%, 1.55%, 7.13% and 2.75%, respectively. Amongst the group with ADs, the respective percentages were 18.45%, 5.08%, 13.95%, 64.29%, and 24.81%. The chi-square analyses identified socio-demographic variables that varied by PG severity and presence or absence of ADs. Amongst individuals with ADs, gender, education, and race/ethnicity were associated with PG severity (Table 1). Among individuals without ADs, differences were noted across gambling groups in all socio-demographic variables at $p < 0.05$ (Table 1). Thus, all socio-demographic variables were included in subsequent multivariate models.

The unadjusted prevalence estimates of both Axis I and Axis II disorders were associated with PG severity across AD and non-AD groups (Table 2). In multivariate-adjusted logistic regression modeling, we found that PG severity was significantly associated with the broad categories of any Axis I disorder and any Axis II disorder among individuals with and without ADs (Table 3). Since these associations were significant ($p < 0.001$), we performed a post-hoc analysis examining each of the contributing psychiatric diagnoses within the categories of Axis I and Axis II disorders, stratified according to AD status.

PG severity was associated at $p < 0.05$ with all Axis I disorders (except for hypomania and drug abuse/dependence) among individuals without ADs (Table 3). All Axis II disorders had associations at $p < 0.05$ at each PG severity level, with the exception of dependent personality disorder. For dependent personality disorder, small cell sizes made the comparison between low risk gamblers and non/low-frequency gamblers unstable.

Among respondents with ADs, multivariate logistic regression modeling demonstrated that PG severity was associated at $p < 0.05$ with the Axis I disorders of alcohol abuse/dependence, drug abuse/dependence and nicotine dependence. In general, a “dose-dependent” relationship between PG severity and Axis I psychopathology was observed (Table 3). All Axis II disorders were associated at $p < 0.05$ with PG severity with the exception of avoidant, antisocial and dependent personality disorders. Notably, statistically robust findings were more frequently observed among at-risk gamblers compared to PPGs, particularly for cluster A and cluster C disorders (Table 3).

Interaction ORs demonstrated that the association between PG severity and psychopathology differed as a function of AD status (Table 3). Interaction ORs significant at $p < 0.05$ were observed for multiple Axis I disorders, particularly for mood disorders. These

interactions were found for major depression and mania among at-risk gamblers, dysthymia among PPG, and nicotine dependence among low-risk gamblers (Table 3). Across all disorders, the interaction ORs were less than one, which indicated that the magnitude of the association between PG severity and Axis I psychopathology was lower among individuals with ADs compared to those without ADs. With regard to Axis II psychopathology, interaction ORs significant at $p < 0.05$ were observed for schizoid, antisocial, avoidant, and dependent personality disorders among PPG and for antisocial personality disorder among at-risk gamblers. Similar to the pattern we observed in relation to the Axis I psychopathology, interaction ORs were below one, indicating that the strength of the association between PG severity and Axis II psychopathology was lower among individuals with ADs compared to those without ADs.

4. Discussion

This study investigated the relationships between PG severity, ADs, and other psychopathology in a large, nationally representative sample. Our initial hypotheses were largely supported. First, higher prevalence estimates of psychopathologies in the AD group as compared to the non-AD group were observed for most Axes I and II disorders. Second, although respondents with ADs typically demonstrated higher prevalence estimates for psychiatric disorders, significant gambling-by-anxiety suggested a weaker relationship between PG severity and psychopathology in the group with ADs, as compared to the group without ADs. Third, amongst the Axis I disorders showing significant gambling-by-anxiety group interactions, the majority were mood disorders, although nicotine dependence and multiple Axis II disorders were also implicated. These findings suggest that ADs may be accounting for some of the variance in the relationships between PG severity and psychiatric disorders, and specifically for internalizing disorders, tobacco smoking and multiple personality disorders. Implications of these findings are discussed below.

4.1. Relationships between gambling severities, anxiety disorders and psychopathology

The prevalence of psychopathology increased with increasing PG severity, for both individuals with and without ADs. These findings were consistent with prior studies that examined the relationship between PG severity and other psychiatric disorders in clinical and community samples (Crockford and El-Guebaly, 1998; Cunningham-Williams et al., 1998; Argo and Black, 2004; Grant et al., 2009). We extend the findings of prior studies by investigating a broader range of PG severity stratified by AD status. Across all levels of PG severity, individuals with ADs typically demonstrated higher prevalence estimates for a broad range of psychiatric disorders compared to individuals without ADs. These differences were most pronounced for mood and personality disorders. Notably, as PG severity increased, the relative difference in the prevalence of psychopathology between individuals with ADs compared to those without ADs appeared to diminish.

4.2. The influence of anxiety disorders

4.2.1. Mood disorders—Anxiety-by-gambling group interactions were identified at varying levels of PG severity for major depression (at-risk gambling), mania (at-risk gambling), and dysthymia (PPG). Co-occurring ADs may modify the relationship between PG severity and mood disorders because ADs belong to a category of disorders characterized by internalizing behaviors (Krueger et al., 2002). That is, given the grouping together of ADs and mood disorders within a common structure of psychiatric disorders, some of the variance for mood disorders in the co-occurrence with PPG would be accounted for by ADs. Unlike ADs and many other psychiatric disorders (Krueger et al., 2002), PG has not been formally mapped onto internalizing or externalizing disorder groups. Internalizing behavior, directed toward the self, contrasts with externalizing patterns of behavior, which

are expressed through acting out. Although PG has not been formally examined as a potentially internalizing or externalizing disorder, it may display patterns of both, and this may in part explain its relationships to both groups of disorders. With respect to anxiety, individuals with greater PG severity may relieve feelings of anxiety by gambling (Burton et al., 2000; Fong, 2005), may become anxious or shameful following heavy gambling and gambling losses (Yi and Kanetkar, 2010), or may have pre-existing risk factors for both gambling and ADs (consistent with shared genetic contributions to PG and ADs—see Giddens et al., 2011), or some other explanations might exist. The current findings suggest that some of the relationships between anxiety and gambling disorders might extend to gambling and mood disorders, suggesting the possibility of a biologic contribution that is relevant to mood, anxiety and gambling disorders.

4.2.2. Nicotine dependence—An anxiety-by-gambling group interaction was observed for nicotine dependence at the low-risk level of gambling. In a prior study using NESARC data, researchers found that nicotine dependence modified the association between PG severity and numerous Axes I and II disorders (Grant et al., 2009). In contrast, we found that AD status more narrowly influenced the relationship between PG severity and select internalizing disorders. This pattern is consistent with the notion that AD groups with mood disorders in an internalizing construct whereas nicotine dependence relates more broadly to psychiatric conditions.

The observed anxiety-by-gambling interaction for nicotine dependence has both public health and theoretical implications. Because this pattern was observed for low-risk gambling, a prevalent level of gambling behavior, it suggests anxiety, smoking and gambling behaviors may be related in a significant manner for a large group of people. The extent to which people might alternately use non-problematic levels of gambling or tobacco smoking as alternate methods of coping is a possibility that warrants direct investigation. Additionally, factors that might underlie the interaction between anxiety, smoking and gambling (e.g., stress responsiveness or emotional regulation) could be identified and targeted in prevention and treatment efforts.

4.2.3. Personality disorders—Arguably the most surprising findings of the study were related to the Axis II disorders. Anxiety-by-gambling group interactions were observed for schizoid, antisocial, avoidant and dependent personality disorders at the level of PG severity, with additional interactions observed for antisocial personality disorder at lower PG severity levels. As personality features are considered to be determined at early life stages and persist throughout its course, the findings suggest that personality features may contribute to the development of anxiety and gambling disorders. Generally, individuals with personality disorders may use less problem-based strategies and engage in more dysfunctional coping styles (Volbrath et al., 1994). This pattern may extend to the use of gambling as a means for coping. Additional investigation into the specific environmental and biological factors conjointly influencing ADs, PPG and specific Axis II disorders are needed to guide prevention and treatment strategies.

4.3. Clinical implications

The data from the present study reveal several important findings. First, PPG in individuals with and without ADs was associated with a broad range of psychopathology. Second, even low-risk gambling in individuals without ADs was positively associated with multiple psychiatric disorder including nicotine dependence and antisocial personality disorder. As PG is a public health concern that may influence financial, social and emotional domains, future research should target non-pathological gambling behaviors. Furthermore, the differential relations between specific forms of psychopathology with PG severity level in

AD and non-AD groups may provide insight into motivations to gamble in specific psychiatric groups. Clinically, the extent to which low-risk, at-risk, and problem gambling might contribute to the development or maintenance of multiple psychopathologies warrants additional investigation. These findings also have clinical relevance in considering how best to identify and treat individuals with co-occurring psychopathologies. Third, the findings suggest that PG severity lies along a spectrum that has a complex pattern of associated psychopathologies that is influenced by specific co-occurring disorders like ADs. The extent to which PG severity, including low-risk, at-risk, and problem/pathological gambling behaviors, may contribute to the development or maintenance of multiple psychiatric disorders has possibly far-reaching implications for clinicians providing care within mental health care settings.

4.4. Limitations

The study has several limitations. First, given the cross-sectional study design, temporal relationships could not be identified. Future longitudinal studies could elucidate the nature of observed associations. Second, as there were low rates of PG, the most severe gambling category combined PG with problem gambling. Third, low rates of dependent personality disorder in the group with low-risk gambling and without ADs precluded our ability to make meaningful comparisons for this variable. Fourth, although the thresholds for categorizing PG severity groups have been used previously (Desai and Potenza, 2008; Grant et al., 2009; Brewer et al., 2010; Barry et al., 2011; Yip et al., 2011), they are not based upon empirically tested thresholds. However, their derivation from the inclusionary criteria does provide a clinically relevant and widely used foundation that is easily reproduced and accessible to both clinicians and researchers. Lastly, a limitation of our study was grouping ADs into one category. ADs are heterogeneous disorders (Hollander et al., 2008) and different treatments might be appropriate for each disorder (Siev and Chambless, 2007); this approach was taken to have statistical power to make meaningful comparisons. Future studies should examine subgroups of ADs such as panic disorder and generalized anxiety disorder and their relationship to PG and co-morbid psychopathologies, particularly as differences in environmental contributions to the co-occurrence of PG and specific ADs have been observed (Giddens et al., 2011).

5. Conclusion

This study is the first to our knowledge to investigate the influence of ADs on the relationship between PG severity and a broad range of psychopathologies in a nationally representative sample. The findings, which suggest a complex relationship between ADs, PG severity and both multiple Axis I (particularly mood disorders) and Axis II disorders, may serve as a foundation for future hypothesis-driven investigations into the PG severity and ADs and the development of improved prevention and treatment strategies.

6. Disclosure

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grant reviews for the National Institutes of Health and other agencies; has guest-edited journal sections; has given academic lectures in grand rounds, CME events and other clinical or scientific venues; and has generated books or book chapters for publishers of mental health texts.

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Table 1
Socio-demographic characteristics according to gambling problem severity, stratified by Anxiety Disorder status.

Characteristic	With an anxiety disorder				χ^2	p	Without an anxiety disorder				χ^2	p				
	Non/LF-gamblers (n=4515 (94.61%))	Low-risk gamblers (n=179, 3.99%)	At-risk gamblers (n=41, 0.95%)	Problem/ pathological gamblers (n=24, 0.46%)			Non/LF-gamblers ^{a,b} (n=36,334,97.4%)	Low-risk gamblers (n=766,2.15%)	At-risk gamblers (n=118,0.3%)	Problem/ pathological gamblers (n=50, 0.11%)						
<i>Gender</i>																
Male	1299 (31.98)	72 (42.11)	22 (68.63)	11 (39.13)	4.24	0.008	16034 (49.25)	464 (67.99)	70 (66.52)	30 (30.51)	19.3	<0.0001				
Female	3216 (68.02)	107 (57.89)	19 (31.37)	13 (60.87)			20300 (50.75)	302 (32.01)	48 (33.48)	20 (69.49)						
<i>Education</i>																
Less than high school	795 (15.47)	44 (22.77)	11 (34.87)	5 (16.14)	3.2	0.003	6600 (15.51)	137 (14.68)	21 (13.49)	11 (21.06)	3.81	<0.001				
High school graduate	1318 (29.77)	52 (29.79)	11 (30.65)	10 (39.52)			10533 (29.09)	244 (33.21)	41 (38.95)	18 (39.54)						
Some college	1453 (33.32)	60 (35.61)	8 (13.78)	8 (40.57)			10529 (29.75)	250 (32.34)	36 (27.46)	19 (37.16)						
College or higher	949 (21.44)	23 (11.83)	11 (20.7)	1 (3.77)	0.81	0.56	8672 (25.65)	135 (19.77)	20 (20.1)	2 (2.24)	3.43	0.0053				
<i>Employment</i>																
Full time	2121 (47.87)	91 (52.09)	20 (56.93)	13 (41.3)			18912 (54.00)	438 (59.8)	64 (50.48)	34 (76.71)						
Part time	529 (12.34)	23 (14.56)	3 (6.28)	1 (8.87)	1.53	0.18	3518 (10.28)	70 (8.6)	17 (18.7)	4 (3.99)	2.6	0.025				
Not working	1865 (39.79)	65 (33.35)	18 (36.8)	10 (49.84)			13904 (35.72)	258 (31.6)	37 (30.82)	12 (19.3)						
<i>Marital status</i>																
Married	2161 (59.07)	72 (50.15)	17 (58.9)	6 (31.67)	3.84	0.013	18978 (62.55)	364 (57.12)	48 (46.63)	21 (43.78)	3.76	0.0149				
Previously married	1265 (20.06)	48 (22.05)	10 (16.78)	7 (15.68)			9236 (16.97)	192 (16.91)	29 (20.58)	14 (22.22)						
Never married	1089 (20.87)	59 (27.8)	14 (24.32)	11 (52.65)			8120 (20.48)	210 (25.97)	41 (32.8)	15 (34.00)						
<i>Race</i>																
White race ^c	3561 (86.42)	126 (79.7)	26(64.08)	15 (65.71)	2.15	0.1	27630 (83.00)	565 (82.83)	67 (66.64)	32 (72.36)	3.76	0.0148				
Black race	838 (10.36)	43 (13.59)	13 (23.27)	7 (19.59)			7206 (11.55)	178 (13.72)	42 (20.69)	17 (25.24)						
Hispanic ethnicity	757 (9.45)	19 (5.24)	4 (2.61)	3 (2.52)			7197 (11.94)	125 (8.58)	14 (6.8)	10 (13.08)			4.28	0.008		

^aNumbers in table represent weighted percentages.
^bNon/LF=non or low-frequency gamblers.
^cRace and ethnicity categories are not mutually exclusive.

Table 2
Percentage of respondents acknowledging psychiatric diagnoses according to gambling problem severity, stratified by Anxiety Disorder Status.

Diagnosis	With an anxiety disorder				χ ²		Without an anxiety disorder				χ ²		
	Non/LF-gamblers ^a	Low-risk gamblers	At-risk gamblers	Problem/pathological gamblers	Non/LF-gamblers ^a	Low-risk gamblers	At-risk gamblers	Problem/pathological gamblers	Non/LF-gamblers ^a	Low-risk gamblers	At-risk gamblers	Problem/pathological gamblers	p
Any axis I disorder	66.47	85.1	82.59	91.48	38.35	68.33	71.22	85.1	34.54	<0.0001			
Major Depression	25.36	29.53	16.49	34.34	4.77	6.72	10.98	17.3	1.66	0.005			
Dysthymia	7.53	7.81	15.9	2.63	1.08	1.85	3.23	3.70	1.88	0.14			
Mania	7.05	9.18	9.16	27.39	0.93	2.03	5.00	7.68	3.88	0.02			
Hypomania	2.44	4.74	4.53	1.69	0.94	3.7	2.28	1.4	3.69	0.02			
Alcohol ab/dep ^b	12.16	26.12	29.54	39.38	7.46	21.6	24.13	45.32	20.27	<0.0001			
Drug ab/dep	4.3	10.44	3.34	14.25	1.59	5.29	6.92	1.49	4.71	0.005			
Nicotine dep	24.38	36.73	51.99	65.11	10.82	26.25	34.47	47.82	14.91	<0.0001			
Any axis II disorder	40.86	53.61	69.05	71.43	11.27	25.52	45.22	52.88	19.47	<0.0001			
Paranoid	16.51	29.49	48.63	40.7	2.73	5.44	15.51	22.28	7.37	0.0003			
Schizoid	10.87	13.98	35.3	10.7	2.09	3.98	8.91	16.27	4.05	0.01			
Antisocial	8.68	13.98	35.1	22.85	2.81	9.43	11.88	28.37	12.49	<0.0001			
Histrionic	6.73	12.93	16.39	41.59	1.11	3.66	9.12	6.98	5.47	0.0021			
Avoidant	12.01	12.78	22.64	15.17	1.11	2.74	2.84	11.66	2.63	0.057			
Dependent	2.67	3.02	4.91	3.35	0.22	0	1.25	4.9	12.00	<0.0001			
Obsessive-compulsive	22.49	32.91	39.61	34.58	5.95	12.01	18.54	19.85	9.07	<0.0001			

^aNon/LF=non or low-frequency gamblers.

^bab/dep=abuse or dependence.

Table 3
Adjusted associations between gambling problem severity and psychiatric diagnoses, stratified by anxiety disorder (AD) status.

Diagnosis	With an anxiety disorder			Without an anxiety disorder			Interaction OR for AD group vs. non-AD group		
	OR for low-risk vs. non-LF-gamblers ^a	OR for At-Risk vs. non-LF-gamblers	OR for prob/path vs. non-LF-gamblers	OR for low-risk vs. non-LF-gamblers	OR for at-risk vs. non-LF-gamblers	OR for prob/path vs. non-LF-gamblers	Low-risk gamblers	At-risk gamblers	Prob/path gamblers
<i>Any axis I disorder</i>	2.78***	2.07	5.23*	3.1	4.08***	9.26***	0.9	0.51	0.56
Major Depression	1.23	0.64	1.2	1.5*	2.45***	4.24***	0.82	0.26*	0.28
Dysthymia	1.04	2.56	0.25	1.79*	3.00	3.5	0.58	0.85	0.07*
Mania	1.3	1.12	3.31	2.02*	4.85***	7.08**	0.64	0.23*	0.47
Hypomania	1.84	1.73	0.37	3.57	1.9	1.03	0.52	0.91	0.36
Alcohol ab/dep ^b	2.34***	2.54*	3.62**	2.79***	3.18***	8.82***	0.84	0.8	0.41
Drug ab/dep	2.29***	0.51	1.72	2.64	3.06	0.52	0.87	0.17	3.29
Nicotine dep	1.58*	3.01*	4.6*	2.62***	3.95***	6.03***	0.6*	0.76	0.76
<i>Any axis II disorder</i>	1.56*	2.82*	2.88	2.48***	6.00***	7.57***	0.63*	0.47	0.38
Paranoid	1.96***	4.29***	2.28	1.91**	5.71***	7.5	1.03	0.75	0.3
Schizoid	1.24	3.76***	0.72	1.78*	4**	7.15***	0.70	0.94	0.1**
Antisocial	1.38	3.74	3.24	2.84***	3.51***	9.84***	0.49*	1.06	0.23*
Histrionic	1.89*	2.31	6.5***	2.94***	6.95***	4.78**	0.64	0.33	1.36
Avoidant	0.99	1.98	0.9	2.41**	2.33	10.27***	0.41	0.85	0.09**
Dependent	1.06	1.62	0.77	Unstable	5.17*	25.27***	Unstable	0.31	0.03***
Obsessive-compulsive	1.71*	2.3*	1.82	2.08***	3.6***	3.87***	0.82	0.64	0.47

^aNon/LF=non or low-frequency gamblers.

^bab/dep=abuse or dependence.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.