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Stress Moderates the Relationships Between Problem-Gambling Severity and Specific Psychopathologies

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Abstract

The purpose of this study was to examine the extent to which stress moderated the relationships between problem-gambling severity and psychopathologies. We analyzed Wave-1 data from 41,869 participants of the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC). Logistic regression showed that as compared to a non-gambling (NG) group, individuals at-risk gambling (ARG) and problem gambling (PPG) demonstrated higher odds of multiple Axis-I and Axis-II disorders in both high- and low-stress groups. Interactions odds ratios were statistically significant for stress moderating the relationships between at-risk gambling (versus non-gambling) and Any Axis-I and Any Axis-II disorder, with substance-use and Cluster-A and Cluster-B disorders contributing significantly. Some similar patterns were observed for pathological gambling (versus non-gambling), with stress moderating relationships with Cluster-B disorders. In all cases, a stronger relationship was observed between problem-gambling severity and psychopathology in the low-stress versus high-stress groups. The findings suggest that

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perceived stress accounts for some of the variance in the relationship between problem-gambling severity and specific forms of psychopathology, particularly with respect to lower intensity, subsyndromal levels of gambling. Findings suggest that stress may be particularly important to consider in the relationships between problem-gambling severity and substance use and Cluster-B disorders.

Keywords

gambling; stress; comorbidity; adverse life events; stressful events

1. Introduction

Gambling is a widespread recreational activity in many countries, with up to 80% of the population participating in some gambling activities (Kessler et al., 2008; Wardle, 2011). Although most individuals gamble recreationally and do not develop gambling-related problems, a smaller, but significant, percentage of gamblers develop problem-gambling concerns including debt, financial problems, and loss of relationships and/or jobs (Clarke et al., 2006; Hodgins et al., 2011). Gambling behavior may be conceptualized along a clinical continuum, ranging from no gambling to gambling disorder, previously called pathological gambling (PG) in earlier versions of the *Diagnostic and Statistical Manual* (Shaffer et al., 1999; American Psychiatric Association, 2002; Petry, 2005). A recent report estimated that 12-month prevalence rates of gambling disorder ranged from 0.5% in Denmark and in the Netherlands to 7.6% in Hong Kong, with an average across jurisdictions of 2.3% (Williams et al., 2012). The first wave of the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC) was conducted in the United States in 2001–2002. A total of 43,093 adults were interviewed, and past-year and lifetime estimates of PG in the sample were 0.2% and 0.4%, respectively; past-year estimates of problem/pathological gambling (PPG) were found to be 0.7% in men and 0.4% in women (Petry et al., 2005; Desai and Potenza, 2008). In contrast, other research has suggested higher prevalence estimates, although in some of these studies screening measures were employed to generate estimates, which thus may lead to inflated estimates (Shaffer and Hall, 2001; Williams et al., 2012). Recently, gambling disorder was reclassified in the *Substance-Related and Addictive Disorders* section of the DSM-5 (American Psychiatric Association, 2013), due to multiple parallels between substance-use and gambling disorders (Potenza, 2006; Petry et al., 2014).

Psychological models for PG have been proposed, and many have considered stress as an important factor (Blaszczynski and Nower, 2002; Sharpe, 2002). Stress has been defined (Lazarus, 1996) as an event that, “occurs when an individual perceives that the demands of an external situation are beyond his or her perceived ability to cope with them.” Recently Blaszczynski and Nower (2017) validated a new etiological instrument to assess people with gambling problems, in which stress-coping and childhood maltreatment variables represent two important factors that assist in identifying different subgroups of individuals with pathological gambling, highlighting the importance that stress could have in the pathophysiology of the disorder. The association of stressful life events with psychiatric disorders has been widely studied, especially for depressive disorders (Tao et al., 2011;

Anders et al., 2012; Rueda and Valls, 2016). Moreover, stress is a well-known factor that contributes to the development, maintenance and relapse of several externalizing disorders, including in addictions the use of alcohol (King et al., 2003; Dawson et al., 2005; Keyes et al., 2012; Young-Wolff et al., 2012) and drugs (Blanco et al., 2014; Myers et al., 2014). Generally, stress may trigger cravings (Sinha, 2007), and daily stress has been linked to urges to gamble (Elman et al., 2010). In addition, problem gamblers, especially women, often gamble as a way to deal with anxiety and negative emotions (Coman et al., 1997). These findings may be attributable in part to stress systems, particularly as early life trauma has been linked to gambling problems later in life (Hodgins et al., 2010), particularly for women seeking treatment for problem gambling (Petry and Steinberg, 2005). Additionally, findings from population-based surveys indicate relationships between problem-gambling severity and a broad range of psychopathologies (Cunningham-Williams et al., 1998; Desai and Potenza, 2008; Kessler et al., 2008). For example, previous work has linked problem-gambling severity to other psychiatric comorbidities, including mood (Bischof et al., 2013; Lister et al., 2015), anxiety (Giddens et al., 2012; Bischof et al., 2013), and substance-use disorders (Ledgerwood et al., 2009; Bischof et al., 2013). Moreover, studies have evaluated whether some comorbidities disorders could moderate the relationship between problem-gambling severity and other psychiatric disorders. In several prior studies of NESARC data (Grant et al. 2009a; Brewer et al., 2010; Giddens et al. 2012), other psychiatric disorders (relating to tobacco use, alcohol use and anxiety, respectively) moderated the relationships between problem-gambling severity and psychopathology, with weaker relationships typically observed in the groups with psychopathology. These findings suggest that these co-occurring disorders in part account for some of the relationship between problem-gambling severity and psychopathology. Other work suggests that alcohol-use disorder may influence the relationship between pathological gambling and other psychiatric comorbidities, particularly for Cluster B personality disorders (Abdollahnejad et al., 2014). However, despite the evidence of association between stress and gambling disorder on the one hand, and gambling disorder and other psychiatric comorbidities on the other hand, to date, little is known about how stress may moderate the relationships between problem-gambling severity and psychopathologies, particularly in general U.S. adult community samples.

Some studies of stress and gambling have focused on adolescent and/or adult university student samples, with some findings indicating that adverse life events in the previous year were related to an increased likelihood to be engaged in addictive behaviors including gambling (Lee et al., 2012). Furthermore, more severe gambling has been linked to a greater number of stressful or major negative life experiences (Bergevin et al., 2006). However, another study found no clear relationship between gambling and stressful events during the past year, suggesting that stress may influence gambling behaviors in certain groups or under certain circumstances (Lightsey and Hulsey, 2002). Along these lines, a positive relationship between gambling behaviors and being the victim of violence has been found among young men, but not in women (Froberg et al., 2013). A separate study also found that only negative experiences that had directly affected youth were associated with monthly gambling, while adverse events that happened to significant others were only related to occasional gambling (Storr et al., 2012).

Although existing studies suggest relationships between stress, gambling and psychopathology, multiple knowledge gaps exist in the literature. As many findings are derived from convenience samples of adolescents, university samples, or treatment-seeking individuals, data from large population-based samples would aid in determining relationships to guide public health recommendations around reducing the negative effects of problem gambling. Therefore, we investigated relationships between stress, problem-gambling severity and psychopathologies in the NESARC. We hypothesized that greater problem-gambling severity would be associated with higher reported stress and with more psychopathology in both high- and low-stress groups. Given that stress has been linked to multiple Axis-I and Axis-II disorders in a number of studies, we expected that stress would moderate relationships between problem-gambling severity and psychopathologies, particularly mood, anxiety and substance-use disorders. We also hypothesized that stress would account for some of the variance in the relationship between elevated problem-gambling severity and psychopathologies. In particular and consistent with prior findings that specific psychopathologies moderated the relationship between problem-gambling severity and other psychopathologies by weakening relationships (Grant et al. 2009a; Brewer et al., 2010; Giddens et al. 2012), we hypothesized that with weaker relationships would be observed between problem-gambling severity and other psychopathologies in a high-stress versus a low-stress group. Furthermore, we expected that these effects would be observed at both intermediate and high levels of problem-gambling severity.

2. Method

2.1. Sample

We analyzed data from Wave 1 of the NESARC (Desai and Potenza, 2008; Grant et al., 2009a; Brewer et al., 2010). The NESARC is a nationally representative survey of non-institutionalized U.S. adults aged 18 years and older. The Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS-IV), a structured diagnostic interview which has shown good test–retest reliability and validity of DSM-IV diagnoses (Grant et al., 2003; Ruan et al., 2008) and was administered face-to-face to respondents by lay interviewers. A more thorough description of the NESARC methodology is described in detail elsewhere (Grant et al., 2004; Grant and Dawson, 2006). The overall survey response rate was 81% for Wave 1 (Grant et al., 2009b). Our sample consists of 41,935 participants who provided data on gambling behavior and perceived stress.

2.2. Measures

Sociodemographic variables included in our analysis were gender (male/female), age (as a continuous variable), race/ethnicity (white, black, other and Hispanic, each determined independently), marital status (married or cohabitating; divorced, separated, or widowed; or never married), education level (less than high school, high school only, college degree or higher than a college degree), employment status (full-time, part-time, other), and annual income (<$20000, $20000–$34999, $35000–$69999, and =$70000). Gambling behavior was assessed through the AUDADIS-IV interview. Specifically, all participants were asked if they ever have gambled at least five times in any year during their lifetime. Those who responded affirmatively were screened with the 15 items that assessed for PG, and consistent

with DSM-IV, AUDADIS-IV diagnoses of PG, required meeting at least five of the 10 DSM-IV criteria. Both lifetime and past-year gambling behaviors were investigated. In our study, we focused on the past-year timeframe. Past-year and lifetime prevalence of the majority of the psychiatric disorders were assessed in the AUDADIS-IV questionnaire. Specifically, with regard to Axis-I psychiatric disorders, past-year major depressive disorder, dysthymia, mania, hypomania, panic with and without agoraphobia, social phobia, specific phobia, generalized anxiety disorder, and alcohol-, tobacco- and drug-use disorders were investigated. With regard to Axis-II psychiatric disorders, lifetime antisocial, avoidant, dependent, histrionic, obsessive–compulsive, paranoid, and schizoid personality disorders were assessed.

In the background information section, the AUDADIS-IV comprised 12 questions that assessed stress events in the past 12 months. Specifically, stress related to the following were assessed: death of a family member or close friend; serious illness/Injury of a family member or close friend; having anyone new coming to live with you; being fired or laid off; being unemployed and looking for a job for longer than a month; trouble with a boss or coworkers; changes in jobs, jobs responsibilities, or work hours; separation, divorce, or breaking off of a stable relationship; serious problems with neighbor, friend or relative; financial crisis, bankruptcy, or not being able to pay bills on time; you or a family member having trouble with the police, getting arrested or going to jail; and, you or a family member being a victim of any crime. In line with previous work (Verplaetse et al., 2016), we used a median split to create two categories: a low past-year stress group (i.e., 0 or 1 event), and a high past-year stress group (i.e., two or more events).

2.3. Statistical analysis

Our sample was divided into three problem-gambling-severity groups: (1) NG: low-frequency or non-gambling (never gambled five or more times in any one year in a lifetime); (2) ARG: low-risk or at-risk gambling (gambled five or more times in any one year, and met no more than two DSM-IV criteria for PG in the past year); (3) PPG: problem or pathological gambling (met three or more DSM-IV criteria for PG in the past year) (American Psychiatric Association, 1994). First, we analyzed differences in socio-demographic characteristics and psychiatric disorders between people with low past-year stress and high past-year stress by problem-gambling severity, using chi-square tests for categorical variables and student *t*-tests for continuous variables. Second, we performed logistic regression analyses adjusting for socio-demographic variables (i.e., gender, age, race/ethnicity, marital status, education level, employment status, and annual income) to examine within the low past-year stress and the high past-year stress groups the relationships between problem-gambling severity levels (at-risk gambling versus non-gambling and problem gambling versus non-gambling) and any Axis-I disorder and any Axis-II disorder. If findings were significant (odds ratios with 95% confidence intervals [95%Cis] that did not include 1), we further examined the groups of Axis-I (mood, anxiety, and substance-use disorders) and Axis-II (Cluster-A, Cluster-B and Cluster-C) disorders contributing to the findings. Next, we generated interaction odds ratios to examine the extent to which the strengths of the relationships between problem-gambling severity and psychopathologies differed in the low past-year stress and high past-year stress groups. The analyses of the

individual disorders are attached as supplemental material. Analyses were performed using SUDAAN 10.1.

3. Results

Among the 41,935 participants, 23,338 (55.65%) were classified in the low past-year stress group, while 18,597 (44.35%) were classified in the high past-year stress group. A significant relationship was observed between the stress and problem-gambling-severity groups, with a larger proportion of individuals with problem gambling in the high past-year stress group ($p<.0001$; Table 1). Chi-square analyses indicated that individuals with greater problem-gambling severity were more likely to experience all 12 of the stressful events investigated (Table 1).

Differences in sociodemographic variables were also observed. Briefly, the gambling behavioral groups differed on measures of gender, age, marital status, education, employment, race/ethnicity, and annual income in both the high and low past-year stress groups (Table 2).

3.1. Relationships between problem-gambling severity and psychopathologies by stress level

Chi-square analyses and regression analyses are displayed (Tables 3 and 4, respectively). In both the low past-year stress and high past-year stress groups and compared to the non-gambling group, both the at-risk and problem gambling groups showed elevated odds of any Axis-I and any Axis-II disorder (Table 4). Subsequent analyses indicated that these effects were related to elevated odds of all three groupings of Axis-I disorders (mood, anxiety and substance-use disorders) and all three groupings of Axis-II disorders (Cluster-A, Cluster-B and Cluster-C disorders) for both levels of problem-gambling severity and for both stress groups, with the possible exception of mood disorders in the at-risk versus non-gambling problem-gambling-severity level in the high past-year stress group in which the lower end of the confidence interval (95%CI) was 1.00 (Table 4).

Interaction odds ratios indicated that stress moderated the relationships between problem-gambling severity and some but not all psychopathologies, and these appeared significant for both at-risk and problem gambling groups (Table 4). In all cases, interaction odds ratios indicated stronger relationship between problem-gambling severity and psychopathology in the low past-year stress versus the high past-year stress groups. Specifically, in the at-risk gambling versus non-gambling comparisons, stronger relationships were observed in the low past-year stress versus the high past-year stress groups for any Axis-I disorder, any substance-use disorder, any Axis-II disorder, and any Cluster-A and Cluster-B disorder. In the problem gambling versus non-gambling comparisons, stronger relationships were observed in the low past-year stress versus the high past-year stress groups for Cluster-B disorders.

4. Discussion

This is the first study to examine how stress might moderate relationships between problem-gambling severity and psychopathologies in a large, nationally representative sample of U.S. community-dwelling adults. Our findings partially supported our hypotheses. Consistent with our *a priori* hypotheses, greater problem-gambling severity was associated with higher reported stress and with more psychopathology in both the high and-low past-year stress groups. Furthermore, the strengths of the relationships between problem-gambling severity and some psychopathologies were moderated by stress, and in line with our *a priori* hypotheses, stronger relationships were seen in the low past-year stress versus high past-year stress groups. The directionality of these findings in conjunction with the data presented in Table 1 suggests that, given that stress is associated with increased problem-gambling-severity levels, stress accounts for some of the variance in the relationships between problem-gambling-severity level and psychopathologies across at-risk and problem gambling levels, particularly with respect to substance-use disorders and Cluster-B personality disorders. This latter aspect was partially consistent with our *a priori* hypotheses as we had also expected to see relationships with mood and anxiety disorders in the at-risk gambling versus low-frequency/non-gambling groups. Implications of the findings are discussed below.

Bivariate analysis showed that 71.7% of individuals with problem gambling belonged to the high past-year stress group, and individuals with problem gambling appeared more likely to experience all of the individual stressors queried. These results are consistent with those from previous studies which have reported a positive association between problem gambling and negative life events (Ciarrocchi and Richardson, 1989; Bergevin et al., 2006; Peltzer et al., 2006). Of particular note in the current study is the difference in financial stressors encountered by the problem gambling group as compared to the at-risk and non-gambling groups, consistent with the financial concerns individuals with problem gambling often encounter due to gambling behaviors (Potenza et al., 2001). As financial debt has been linked to suicidality in problem gamblers (Ledgerwood et al., 2005), the potential impact of these stressors warrants additional investigation among community and clinical samples.

Overall, individuals with problem gambling had greater prevalences of psychiatric disorders compared to at-risk and non-gamblers. In keeping with previous findings (Taber et al., 1987; Specker et al., 1996; Peltzer et al., 2006), the prevalence rates in the high past-year stress group were higher than in the low past-year stress group, with 78.76 % of high past-year stress individuals with problem gambling having at least one Axis-I disorders compared to 62.29% of individuals with problem gambling in the low past-year stress group. These findings are consistent with prior studies observing increased likelihoods of psychiatric disorders among gamblers with high stress levels (Taber et al., 1987; Specker et al., 1996; Kausch et al., 2006). They also suggest that negative life events may contribute to the development of a general vulnerability for psychiatric disorders or that individuals with psychiatric disorders may be more likely to encounter perceived stressors. As the prevalence rates of any personality disorder was greater in individuals with problem gambling in the high past-year stress group (60.70%) compared to those in the low past-year stress group (40.04%) and Axis-II, as compared to Axis-I, disorders are thought to fluctuate less over

time, the possibility that individuals with psychiatric disorders may be more likely to encounter perceived stressors warrants consideration and investigation in longitudinal studies.

Logistic regression analyses showed stronger associations between problem-gambling severity and specific psychiatric disorders in the low past-year stress as compared to the high past-year stress group, suggesting that people with high stress level are more likely to experience psychopathology regardless of gambling behavior; in other words, that some of the relationship between subsyndromal pathological gambling and psychopathology is accounted for by stress. In other words, these findings suggest that some of the variance in the relationships between problem-gambling severity and specific psychopathologies is accounted for by stress, as discussed below.

Many psychiatric disorders showed differences across stress groups in the strengths of the associations with at-risk gambling, with significant moderating effects of stress observed in relationships with substance-use disorders and Cluster-B personality disorders. Some of these relationships extended to the problem gambling group, particularly with respect to Cluster-B personality disorders, which have been found to have genetic and environmental contributions to their co-occurrence with gambling disorder (Slutske et al., 2001). Interestingly, the current findings resonate with a study of adolescents, which found no association between high levels of stress, pathological gambling and drug abuse (Lee et al., 2012), suggesting that it is important to consider developmental contributions. However, it should be noted that other studies have suggested that among individuals with gambling problems there is a relationship between alcohol and drug abuse and stressors like physical trauma (Kausch et al., 2006).

The moderating effect of stress on the relationship between at-risk gambling and Cluster-B personality disorders may be in line with prior findings indicating that the relationships between personality disorders and problem gambling was related to a history of sexual abuse (Specker et al., 1996). Previous work has found that people with problem gambling and a substance-use disorder history were more likely to take greater risk on a risk-taking test compared to people with only pathological gambling (Ledgerwood et al., 2009). The moderating effects of stress on relationships between problem-gambling severity and substance-use disorders and Cluster-B personality disorders raises the possibility that stress may link to other constructs; e.g., genetic vulnerability factors linked to impulsiveness (Lobo and Kennedy, 2009). Future studies should examine how stress and impulsivity may interact with respect to problem-gambling severity and its relationships to psychiatric comorbidities.

Our results complement those of previous studies which have linked the severity of gambling disorder with other psychiatric comorbidities, including mood (Bischof et al., 2013; Lister et al., 2015), anxiety (Bischof et al., 2013) and substance use disorders (Ledgerwood et al., 2009; Bischof et al., 2013). Moreover, these findings are in keeping with a previous study that found a stronger relationship between problem gambling severity and psychopathology in subjects without anxiety disorder compared to those with anxiety disorder (Giddens et al, 2013). Recent work also suggests that alcohol-use disorder may contribute importantly to the relationship between pathological gambling and other

psychiatric comorbidities, particularly Cluster B personality disorders (Abdollahnejad et al., 2014).

Taken together, the findings contribute to a larger literature suggesting complex relationships between stress, problem-gambling severity and psychopathologies (Lightsey and Hulsey, 2002; Scherrer et al., 2007; Tang and Oei, 2011). Consistent with the current findings, prior studies suggest that stressful events (particularly those relating to interpersonal problems) and their subjective appraisal have an influence on the course of gambling disorder (Elman et al., 2010). In addition, previous studies have found important gender-related differences in the relationships between gambling behaviors and negative life events. Being a victim of violence was associated with gambling problems only in men (Froberg et al., 2013), while in a treatment-seeking sample of individuals with gambling disorder, women showed higher scores on the Daily Stress Inventory scale (Tschibelu and Elman, 2011). Further research into gender-related differences in the types of adverse life events are needed to better understand the complex relationships between stress, gambling behaviors, and psychopathologies.

The results of our study should be interpreted in light of both strengths and limitations. First, the large nationally representative sample size is a strength, lending robustness to the results which is unbiased by help-seeking or access to medical/mental health care. Second, this is the first study to analyze the possible moderating effects of stress on the relationships between problem-gambling severity and psychopathologies. Study limitations include the age of the data (collected in 2001–2002), relatively small numbers of individuals with problem/pathological gambling, lack of validated stress measure, and the cross-sectional study design that cannot speak to potentially causal links between stress, problem-gambling severity and psychopathology. Further longitudinal studies are needed to investigate temporal relationships. Furthermore, the moderating effects of stressful life events in the last 12 months were examined. Future studies examining the potential influences of early life traumas are warranted. Moreover, the severity of the adverse life events was not assessed, as these data were collected as dichotomous variables. Third, although the AUDADIS-IV was used as a structured diagnostic interview, it was administered face-to-face and based on self-report (Grant and Dowson, 2006), and data were not confirmed by the use of medical records, potentially yielding recall bias. However, the influence of recall bias was potentially mitigated in the current study by the focus on past-year diagnostic measures.

In conclusion, our work supports some of our *a priori* hypotheses and are consistent with some previous findings. As a history of abuse and adverse life events has been found to associate with poor prognoses amongst individuals with substance-use problems (McCabe et al., 2016), further research is needed in order to better understand the potential role of stress in the development and maintenance of gambling disorders. Such findings have the potential to lead to improved prevention and treatment efforts, particularly if early childhood traumas, which have been linked to gambling disorder (Specker et al., 1996; Kausch et al., 2006; Scherrer et al., 2007), may be targeted effectively.

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HIGHLIGHTS

- Greater problem-gambling severity was associated with higher reported stress.
- The strengths of the relationships between problem-gambling severity and some psychopathologies are moderated by stress, particularly with respect to substance-use disorders and Cluster-B personality disorders.
- A stronger relationship is observed between problem-gambling severity and psychopathology in the low-stress versus high-stress groups.

Table 1

Life stress events by gambling behavior (total sample n=41935)

		NG n (%)		ARG n (%)		PPG n (%)		χ^2	*p* value
Low past-year stress level		17811	(57.82)	5461	(50.12)	66	(28.33)	**264.12**	**<.0001**
High past-year stress level		12995	(42.18)	5435	(49.88)	167	(71.67)		
Did any of your family members or close friends die?	Yes	9534	(31.05)	3901	(35.83)	107	(45.92)	**103.44**	**<.0001**
	No	21168	(68.95)	6986	(64.17)	126	(54.08)		
Did any of your family members or close friends have a serious illness or injury?	Yes	10323	(33.65)	4290	(39.43)	98	(42.06)	**122.55**	**<.0001**
	No	20359	(66.35)	6591	(60.57)	135	(57.94)		
Did you move or have anyone new come to live with you?	Yes	4426	(14.39)	1685	(15.47)	58	(24.89)	**26.75**	**<.0001**
	No	26339	(85.61)	9210	(84.53)	175	(75.11)		
Were you fired or laid off from a job?	Yes	1837	(5.97)	763	(7.00)	30	(12.88)	**32.01**	**<.0001**
	No	28939	(94.03)	10130	(93.00)	203	(87.12)		
Were you unemployed and looking for a job for more than a month?	Yes	2719	(8.84)	1009	(9.26)	48	(20.60)	**40.16**	**<.0001**
	No	28054	(91.16)	9884	(90.74)	185	(79.40)		
Have you had trouble with your boss or a coworker?	Yes	2183	(7.09)	1094	(10.04)	59	(25.32)	**191.86**	**<.0001**
	No	28586	(92.91)	9797	(89.96)	174	(74.68)		
Did you change jobs, job responsibilities or work hours?	Yes	6219	(20.21)	2523	(23.16)	76	(32.62)	**61.01**	**<.0001**
	No	24553	(79.79)	8371	(76.84)	157	(67.38)		
Did you get separated or divorced or break off a steady relationship?	Yes	1935	(6.29)	749	(6.88)	25	(10.73)	**11.65**	**.0030**
	No	28837	(93.71)	10143	(93.12)	208	(89.27)		
Have you had serious problems with a neighbor, friend or relative?	Yes	1614	(5.25)	706	(6.48)	33	(14.16)	**55.37**	**<.0001**
	No	29147	(94.75)	10188	(93.52)	200	(85.84)		
Have you experienced a major financial crisis, declared bankruptcy or more than once been unable to pay your bills on time?	Yes	3315	(10.78)	1514	(13.90)	74	(31.90)	**167.78**	**<.0001**
	No	27439	(89.22)	9378	(86.10)	158	(68.10)		
Did you or a family member have trouble with the police, get arrested or get sent to jail?	Yes	1544	(5.02)	745	(6.84)	33	(14.16)	**84.34**	**<.0001**
	No	29213	(94.98)	10139	(93.16)	200	(85.84)		
Were you or a family member the victim of any type of crime?	Yes	1819	(5.91)	845	(7.76)	34	(14.59)	**71.23**	**<.0001**
	No	28940	(94.09)	10047	(92.24)	199	(85.41)		

NG = Gambled <5x in one year

ARG = Gambled at least 5 times in one year and reported 0–2 past-year DSM criteria (low-risk gambling/At-risk gambling)

PPG = Gambled at least 5 times in one year and reported 3–10 past-year DSM criteria (problem/pathological gambling)

Low stress level = 0 or 1 event

High stress level = 2 or more events

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Table 2

Sociodemographic characteristics according to gambling behavior and stress level

	Low past-year Stress Group					High past-year-Stress Group				
	NF n (%)	**ARG n (%)**	**PPG n (%)**	χ^2	***p***	**NG n(%)**	**ARG n (%)**	**PPG n (%)**	χ^2	***p***
Gender				*45.49*	***<0.0001***				*44.22*	***<0.0001***
Male	7142 (44.81)	3037 (60.15)	45 (70.71)			4822 (41.97)	2819 (56.83)	88 (62.01)		
Female	10669 (55.19)	2424 (39.85)	21 (29.29)			8173 (58.03)	2616 (43.17)	79 (37.99)		
Education				7.99	***<0.0001***				4.97	***<0.0003***
Less than high school	3637 (16.99)	842 (13.10)	15 (20.18)			2268 (15.50)	813 (13.62)	33 (19.11)		
High school graduate	5214 (29.57)	1736 (31.93)	22 (35.99)			3567 (27.25)	1594 (29.90)	58 (38.14)		
Some college	4598 (26.52)	1616 (30.36)	20 (28.28)			4161 (33.12)	1897 (34.83)	51 (27.52)		
College or above	4362 (26.92)	1267 (24.61)	9 (15.54)			2999 (24.13)	1131 (21.66)	25 (15.23)		
Employment				6.40	***<0.0002***				3.77	***<0.0080***
Full time	8880 (51.81)	2902 (56.87)	43 (64.15)			6721 (52.84)	3007 (56.36)	88 (51.69)		
Part time	1587 (9.39)	462 (8.83)	6 (12.66)			1547 (12.69)	528 (10.38)	19 (12.45)		
Other	7344 (38.80)	2097 (34.29)	17 (23.19)			4727 (34.47)	1900 (33.26)	60 (35.85)		
Marital status				11.01	***<0.0001***				11.23	***<0.0001***
married/cohabitating	9609 (64.61)	3140 (69.35)	30 (53.73)			6097 (56.49)	2706 (59.68)	62 (43.94)		
widowed/separated/divorced	4563 (16.96)	1434 (16.87)	21 (23.82)			3260 (17.25)	1475 (19.29)	39 (17.63)		
Never married	3639 (18.43)	887 (13.43)	15 (22.45)			3638 (26.26)	1254 (21.03)	66 (38.43)		
Race/Ethnicity				*6.87*	***<0.0001***				*6.80*	***<0.0001***
White race	9889 (69.44)	3558 (78.25)	35 (68.42)			7096 (69.24)	3228 (72.67)	71 (55.70)		
Black race	3041 (9.84)	906 (8.56)	18 (15.83)			2784 (12.79)	1165 (12.60)	60 (24.63)		
Other	923 (7.49)	226 (5.18)	5 (9.91)			543 (5.52)	266 (6.67)	13 (12.55)		
Hispanic ethnicity	3958 (13.23)	771 (8.01)	8 (5.84)			2572 (12.45)	776 (8.02)	23 (7.12)		
Household income				12.34	***<0.0001***				10.21	***<0.0001***
0 to <20k	5123 (22.11))	1184 (15.81)	15 (23.94)			3912 (24.01)	1286 (18.08)	47 (25.64)		
$20k to <35K	3871 (19.74)	1133 (18.82)	17 (19.80)			2848 (20.59)	1217 (20.43)	37 (22.17)		
$35k to <70k	5277 (32.16)	1867 (35.74)	20 (28.56)			3947 (32.97)	1810 (35.68)	56 (34.61)		
$70k+	3540 (25.99)	1277 (29.64)	14 (27.70)			2288 (22.43)	1122 (25.90)	27 (17.59)		
Age in years Mean (SE)				46.84	***<0.0001***				44.09	***<0.0001***

Low past-year Stress Group					High past-year-Stress Group			
NF n (%)	ARG n (%)	PPG n (%)	χ^2	*p*	NG n(%)	ARG n (%)	PPG n (%)	χ^2	*p*
47.23 (0.28)	50.44 (0.31)	42.52 (2.05)			40.84 (0.22)	43.79 (0.28)	40.15(2.16)		

NG = Gambled <5x in one year

ARG = Gambled at least 5 times in one year and reported 0–2 past-year DSM criteria (low-risk gambling/At-risk gambling)

PPG = Gambled at least 5 times in one year and reported 3–10 past-year DSM criteria (problem/pathological gambling)

Low past-year stress level = 0 or 1 event

High past-year stress level = 2 or more events

Table 3

Chi-square findings of psychiatric disorders according to problem-gambling severity and stress levels.

	Low past-year stress				High past-year stress			
Diagnosis	**NG n (%)**	**ARG n (%)**	**PPG n (%)**	***p***	**NG n (%)**	**ARG n (%)**	**PPG n (%)**	***P***
Any Axis-I Disorder[1]	3081 (17.84)	1528 (28.64)	39 (62.29)	**<0.0001**	4962 (39.23)	2551 (48.27)	137 (78.67)	**<0.0001**
Any Mood Disorder	806 (4.39)	276 (5.00)	8 (9.96)	0.1699	2008 (15.29)	862 (15.01)	60 (31.58)	**0.0017**
Any Anxiety Disorder	1250 (7.01)	526 (9.31)	13 (24.82)	**<0.0001**	1962 (15.08)	952 (17.67)	52 (32.28)	**0.0002**
Any Substance-Use Disorder	1589 (9.79)	991 (19.39)	31 (54,21)	**<0.0001**	2832 (23.62)	1716 (34.18)	100 (58.62)	**<0.0001**
Any Axis-II Disorder[2]	1353 (7.52)	669 (12.22)	25 (40.04)	**<0.0001**	2711 (21.13)	1415 (26.27)	102 (60.70)	**<0.0001**
Any Cluster-A Disorder	578 (2.87)	246 (4.16)	12 (15.93)	**0.0010**	1364 (9.73)	641 (10.92)	58 (33.77)	**<0.0001**
Any Cluster-B Disorder	265 (1.53)	208 (3.87)	11 (22.79)	**<0.0001**	904 (7.58)	585 (10.99)	57 (30.79)	**<0.0001**
Any Cluster-C Disorder	895 (5.15)	386 (7.21)	16 (20.19)	**<0.0001**	1678 (13.26)	832(16.059	59 (33.26)	**<0.0001**

[1] past-year

[2] lifetime

NG = Gambled <5x in one year

ARG = Gambled at least 5 times in one year and reported 0–2 past-year DSM criteria (at-risk gambling)

PPG = Gambled at least 5 times in one year and reported 3–10 past-year DSM criteria (problem gambling)

Low past-year stress level = 0 or 1 event

High past-year stress level = 2 or more events

Table 4

Adjusted logistic regression model analyses for relationships between problem-gambling severity and psychiatric disorders

	Low past-year stress				High past-year stress				Interaction OR: Low vs. high past-year stress			
	ARG vs. NG		PPG vs. NG		ARG vs. NG		PPG vs. NG		ARG vs. NG		PPG vs. NG	
	AOR	$IC_{95\%}$	AOR	$IC_{95\%}$	AOR	$IC_{95\%}$	AOR	$IC_{95\%}$	OR	$IC_{95\%}$	OR	$IC_{95\%}$
Any Axis-I Disorder	2.02	1.82–2.23	7.04	3.94–12.57	1.56	1.43–1.71	6.30	3.70–10.71	1.29	1.13–1.47	1.12	0.50–2.51
Any Mood Disorder	**1.38**	**1.14–1.66**	**2.40**	**1.04–5.53**	1.13	1.00–1.28	**2.83**	**1.93–4.14**	1.22	0.98–1.51	0.85	0.34–2.14
Any Anxiety Disorder	**1.57**	**1.38–1.80**	**5.19**	**2.59–10.43**	**1.39**	**1.25–1.54**	**3.26**	**2.09–5.09**	1.13	0.95–1.35	1.59	0.70–3.60
Any Substance-Use Disorder	**2.30**	**2.03–2.60**	**8.61**	**4.77–15.54**	**1.74**	**1.57–1.92**	**4.67**	**3.24–6.72**	**1.32**	**1.13–1.54**	1.84	0.93–3.65
Any Axis-II Disorder	**1.80**	**1.60–2.03**	**7.38**	**4.41–12.36**	**1.38**	**1.26–1.51**	**5.62**	**3.74–8.45**	**1.31**	**1.13–1.52**	1.31	0.68–2.54
Any Cluster-A Disorder	**1.71**	**1.39–2.10**	**5.76**	**2.63–12.63**	**1.25**	**1.09–1.43**	**4.44**	**2.73–7.22**	**1.36**	**1.06–1.75**	1.30	0.52–3.26
Any Cluster-B Disorder	**2.73**	**2.14–3.49**	**13.48**	**6.33–28.70**	**1.52**	**1.32–1.75**	**4.70**	**3.16–7.00**	**1.80**	**1.38–2.35**	**2.87**	**1.23–6.69**
Any Cluster-C Disorder	**1.47**	**1.28–1.70**	**4.62**	**2.53–8.44**	**1.29**	**1.15–1.45**	**3.43**	**2.24–5.25**	1.14	0.95–1.37	1.35	0.63–2.86

AOR = adjusted odds ratio; $IC_{95\%}$ = 95% confidence Interval; OR = odds ratio

NG = Gambled <5x in one year

ARG = Gambled at least 5 times in one year and reported 0–2 past-year DSM criteria (at-risk gambling)

PPG = Gambled at least 5 times in one year and reported 3–10 past-year DSM criteria (pathological gambling)

Low past-year stress level = 0 or 1 event

High past-year stress level = 2 or more events