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The Association Between Gambling Pathology and Personality Disorders

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Introduction

Pathological Gambling Disorder (PGD), characterized by damage or disruption, loss of control and behavioral dependence, has been recognized as a significant public health concern given its social and economic impact (National Research Council, 1999). In fact, the societal costs of PGD are estimated at \$5 billion annually due to losses in productivity, healthcare expenditures, and treatment costs (Gerstein et al., 1999). The American Psychiatric Association considers PGD as an impulse control disorder, indicated by meeting at least 5 out of 10 criteria in the Diagnostic and Statistical Manual of Mental Disorders¹ (American Psychiatric Association, 1994). However, there is ongoing debate on how to best characterize gamblers whose symptoms do not meet the diagnostic threshold of PGD (Toce-Gerstein et al., 2003a; Toce-Gerstein et al., 2003b), yet it is clear that these individuals warrant clinical attention as such problem gamblers (PG) also experience gambling consequences in the form of family disruption (Jacobs et al., 1989), financial instability, impaired work life and personal hardship (American Psychiatric Association, 2000; National Research Council, 1999).

Pathological Gambling and Personality Disorders

The lifetime prevalence of PGD in the general population ranges from 0.4% to 2.0% (Cunningham-Williams et al., 1998; Petry et al., 2005; Welte et al., 2001), yet prevalence rates are much higher among substance-abusing populations (Cunningham-Williams et al., 2000) and among those who are incarcerated (Templer et al., 1993).

Increased prevalence in these subpopulations has led researchers to theorize about the role of personality factors in the development of PGD (Blaszczynski & Nower, 2002). On a theoretical level, researchers have had a continued interest in the role of personality in addictive behaviors (Eysenck, 1997).

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¹Note that the PGD criteria did not change in the DSM-IV text revision (DSM-IV-TR; American Psychiatric Association 2000)

Per the DSM, there are three primary personality disorder clusters: Cluster A defined as odd or eccentric (i.e., Schizoid, Schizotypal and Paranoid); Cluster B characterized by erratic, dramatic, or labile emotions and behavior (Narcissistic, Borderline, Histrionic and Antisocial Disorders) and Cluster C personality disorder types described as having dependent and avoidant responses (i.e., Avoidant, Dependent, and Obsessive-Compulsive Personality). There is some evidence supporting associations between gambling and personality pathology, specifically associations with Antisocial Personality Disorder (ASPD). While ASPD population prevalence rates range from 0.6%-3.6% (Coid, 2003; Grant et al., 2004a), rates are 35% among those with gambling problems (Cunningham-Williams et al., 1998). Recent findings from the National Epidemiological Study of Alcohol and Related Conditions reported increased odds of ASPD among those with PGD (Petry, 2005). Similarly, treatment studies have also demonstrated an association between ASPD and gambling, showing ASPD rates of 14.5% (Ibanez et al., 2001) to 16.5% (Pietrzak & Petry, 2005). However, one study of PGD treatment seekers contradicted the ASPD connection in that it failed to identify any individuals with ASPD; their findings were potentially a result of methodological issues related to sample size, regional variation, and high levels of education (Specker et al., 1996).

Aside from research on ASPD, investigators have examined PGD comorbidity with other personality disorders, particularly relationships with other Cluster B personality disorders. Using treatment and epidemiological samples, investigators have identified significant relationships between Borderline Personality Disorder (Fernandez-Montalvo & Echeburua, 2004) and PGD as well as Histrionic Personality Disorder (Petry et al., 2005). Among treatment professionals, there has been interest in the relationship between Narcissistic Personality Disorder and PGD (Crockford & el-Guebaly, 1998; Petry, 2005), yet more specific research in this area is warranted.

Cluster A and C diagnoses have also been studied with respect to PGD. In their analysis of the NESARC data, Petry (2005) and colleagues identified increased odds of Paranoid and Schizoid Personality Disorders among individuals with PGD. Earlier research has also reported high percentages of the Cluster A and Cluster C disorders among treatment seeking gamblers (Steel & Blaszczyński, 1998). Various researchers have identified a relationship between Cluster C diagnoses and PGD in treatment samples (Specker et al., 1996; Steel et al., 1998), particularly for Avoidant Personality (Specker et al., 1996) and Obsessive-Compulsive Personality Disorder (Black & Moyer, 1998). For example, in a study of psychiatric outpatients, Henderson (2004) found that those with PGD displayed elevated scores on Avoidant, Compulsive, and Self-Defeating Personality Scales.

Personality disorders and PGD display a high degree of common comorbidity with mood and substance use disorders (Cunningham-Williams et al., 2000; Grant et al., 2004a; Grant et al., 2004b; Ibanez et al., 2001; Kim et al., 2006; Petry et al., 2005). Axis II disorders also display high levels of comorbidity with each other (Grant et al., 2005). Furthermore, theorists have identified a lack of diagnostic and conceptual clarity between substance abuse/dependence, PGD, and personality disorders (Blaszczyński et al., 1989; Rounsaville et al., 1998). These relationships complicate analysis of associations among these conditions. The presence of multiple comorbidities associated with PGD makes “the interpretation of discrete associations problematic” (Crockford et al., 1998).

This paper has three aims: 1) to assess the association between gambling pathology and personality disorders; 2) to determine whether this relationship remains when adjusting for socio-demographics, co-occurring substance abuse/dependence, and depressive symptoms; and 3) to describe the risk of gambling pathology by personality disorder. We hypothesized that individuals with greater amounts of personality pathology would show significantly greater likelihood of PG and PGD than those without co-occurring personality diagnosis when

controlling for potentially confounding substance abuse/dependence and depressive symptoms.

Materials and Methods

Sample

Using targeted community advertising (i.e., newspaper ads, flyers, etc.) in the St. Louis, Missouri area, we screened and enrolled 15-85 year old gamblers (n=153) for the Gambling and Personality Profile (GAPP) study, a clinical validation study of the newly developed Computerized Gambling Assessment Module (C-GAM[®]) (Cunningham-Williams, 2003). The C-GAM is a computerized, structured diagnostic interview, designed to assess lifetime and current prevalence of PG and PGD (overall) and for 11 specific gambling categories, according to all PGD-inclusive versions of the DSM and also criteria from the International Classification of Diseases (ICD-10) (World Health Organization, 1992). In addition to gambling behaviors, the C-GAM includes information about socio-demographic characteristics, gambling frequency, self-perceptions about gambling, health status, help-seeking behaviors, and clinically relevant gambling symptoms not currently codified in the DSM or ICD taxonomies.

We used the inclusion criterion of having gambled more than five times lifetime to enroll a diverse group of gamblers (i.e., diversity in gambling frequency, severity, recency, etc.) to test the psychometric properties of the C-GAM. An additional prerequisite for inclusion in the GAPP study was simultaneous enrollment in a larger, yet parallel psychometric study of the C-GAM, wherein participants were administered two structured interviews by trained, non-clinician interviewers, held one week apart, (i.e., GAMCO test-retest study). The GAPP study essentially added a clinical interview to the larger GAMCO study. The GAPP clinician interview randomly occurred one week before or one week after the non-clinician interviews and were administered by clinicians who were blinded to previous interview data. For more detail on the methodology of these two complementary studies, see Cunningham-Williams et al. (2007). All procedures were approved by the Washington University Institutional Review Board and confidentiality was further assured with a federal Certificate of Confidentiality.

Instrumentation

For the present analysis, we used only the DSM-IV PGD data from the C-GAM, for consistency with other DSM-IV based measures used. Gamblers were categorized into three groups based on the number of DSM-IV PGD criteria met: *Recreational Gamblers* (RG; n=64; 0 criteria), *Problem Gamblers* (PG; n=60; 1-4 criteria), and *Pathological Gamblers* (PGD; n=22; 5-10 criteria). The C-GAM has been shown to be internally consistent (Cunningham-Williams et al., 2005), to have good to excellent test-retest reliability for Caucasians and racial/ethnic minorities (Cunningham-Williams et al., 2007) as well as substance abusers (Cunningham-Williams, 2006), and also to be concordant with semi-structured clinical interviews (Cunningham-Williams & Ostmann, 2006).

DSM-IV personality disorders were operationalized using the Computer Assisted Structured Clinical Interview for DSM-IV Axis II Expert System[®] (CAS II ES[®]) (First et al., 2000). The CAS II ES is the computerized version of the SCID-II (First et al., 1997), yielding a diagnosis for 10 DSM-IV diagnoses and two provisional Axis II classifications, Passive-Aggressive and Depressive Personality. The CAS II ES also provides information regarding subclinical traits of personality disorders. The SCID-II has been shown to be reliable and internally consistent in diagnosing personality disorders using DSM-III-R (First et al., 1995; Segal et al., 1994) and DSM-IV diagnostic criteria (Maffei et al., 1997). We created count variables based on the number of personality disorder criteria endorsed in each personality disorder.

DSM-IV alcohol and drug use disorders were assessed using the drug and alcohol modules of the C-GAM[®] (i.e., GAM-DA[®]) (Cunningham-Williams et al., 2003), an instrument following the structure of the Substance Abuse Module (SAM) (Cottler, 1990; Cottler & Keating, 1990). The GAM-DA[®] includes DSM-IV diagnostic criteria for lifetime abuse/dependence on alcohol and on 11 different drug categories, as well as quantity and frequency of use and age of onset information. We created count variables based on the number of endorsed criteria for abuse/dependence on alcohol and drugs.

The 20-item Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977) measured various aspects of current depression, including depressed mood, guilt, helplessness, hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance over a one-week timeframe. With the exception of four CES-D items that are reverse scored, each item is scored on a 0-3 continuum with higher values denoting greater levels of depression. A score of 16 is considered a clinically significant level of depression (Weissman et al., 1986). The CES-D has been shown to be a valid and reliable instrument for measuring depression in community surveys (Roberts & Vernon, 1983).

Statistical Analysis

Excluding cases due to incomplete data on gambling, depression, and/or substance use disorders (n=7) resulted in a final data analysis sample of n=146. All analyses were computed using SAS[®] version 9.1 (SAS Institute Inc, 2000-2004). Bivariate statistical tests assessed the relationships between independent variables and both PG and PGD. These variables included socio-demographic indicators (i.e., gender, race/ethnicity, education, employment, income, and age) and clinical variables (i.e., criteria for personality disorders, alcohol and drug abuse/dependence, and depressive symptoms). We used Pearson Chi-square, Kruskal-Wallis Chi-square, and ANOVA procedures to calculate the bivariate relationships between sociodemographic and clinical variables and gambling. In analyzing the relationship between personality disorder counts and gambling status, Benjamini-Hochberg (1995) corrected p-values were computed to adjust for multiple comparisons.

We computed two multinomial logistic regression analyses using odds ratios to estimate the likelihood of PG/PGD in individuals based on the number of endorsed criteria of personality disorders using the RG group as the reference category. Personality disorders significant at the bivariate level were included in the multivariate models. Model I included socio-demographics (i.e., gender, race/ethnicity, education, income, and age), substance abuse variables, and personality disorders. In Model II, we included depressive symptoms along with Model I predictors. To assess for potential multicollinearity among the independent variables, we calculated the Variance Inflation Factors (VIF) for each multinomial model.

Results

The mean age of gamblers was 47 years (SD=18.2; range=18-79), 55% were women, and 30% were married. In terms of race/ethnicity, the majority of the sample was Caucasian (68%) and 26% was African American. Given the small sample size of other racial/ethnic groups (Asian, n=6; American Indian, n=1; Hispanic, n=1; Middle-Eastern, n=1), we combined them with African Americans (i.e., "African American/Others") for the remaining analyses of race/ethnicity. Regarding socioeconomic status, 60% were currently employed either full or part time, 36% had annual household incomes of less than \$25,000 in the past year, and the majority of the sample had a high school diploma/GED or less (58%).

In terms of lifetime gambling patterns, the most prevalent categories include slot machines (83%), lottery (86%), non video card games (76%), and bingo for money (60%). Other games endorsed by the sample were video poker (54%), pari-mutuels (48%), other casino games like

roulette/keno (46%), and sports (43%). About one-third of the sample played dice games (34%), with the least endorsed category being betting on the stock/options/commodities market (7%). About 40% of study participants also gambled and bet on other games not previously endorsed such as sweepstakes and animal fights, as well as on their own games of chance or skill (e.g. golf game).

Twenty percent of the sample (n=29) was diagnosed with a DSM-IV personality disorder. Among gamblers, Cluster C diagnoses were the most common, with Obsessive Compulsive Personality Disorder reported the most frequently. No individuals were diagnosed with Schizotypal, Narcissistic, and Histrionic Personality Disorder. Although information was collected about provisional diagnoses of Passive-Aggressive and Depressive Personalities, these diagnoses were not included in the analysis because there was low endorsement of these disorders (n=2) and a lack of extensive published literature on these conditions. Because personality disorder clusters are not mutually exclusive, seven individuals were diagnosed with more than one personality disorder.

Lifetime alcohol and drug abuse/dependence disorders were common in the sample (30%). Among those with substance abuse/dependence, 30% were alcohol positive only, 40% were drug positive only, and the remainder (30%) was positive for both. Depression scores in the sample ranged from 0-48, with 15% of respondents scoring above the clinical cutoff of 16.

Bivariate Analyses

Table 1 shows the bivariate relationship of socio-demographic characteristics by the three gambling categories. Race/ethnicity ($\chi^2=13.31$, $df=2$, $p=.001$), educational attainment ($\chi^2=9.83$, $df=2$, $p=.007$), household income ($\chi^2=17.28$, $df=6$, $p=.008$), and age ($F=4.23$, $df=2$, 143 , $p=.017$) were each significantly associated with gambling status. Gender was not significantly related to gambling status. African American/Others were more represented in the PG (51%) and PGD (26%) group compared with Caucasians (PG: 36%; PGD:10%). Those with a lower level of educational attainment were also more represented in these gambling severity groups. Employment was not significantly related to gambling status. However those with the lowest annual household incomes were most represented in the PGD group, with fewer PGDs among those with higher incomes, although among the PG group, this trend was not as strong. Tukey HSD Post-Hoc Tests were used to compare age differences related to gambling status while adjusting for multiple comparisons. These tests showed that PGs were significantly younger than RGs in the sample ($p<.05$), but PGDs were not significantly different from the PG and RG groups.

Among clinical variables, level of Avoidant Personality criteria, Borderline Personality criteria, and depressive symptoms were each significantly different across the three levels of gambling (Table 2). Using Tukey HSD Post Hoc analysis, depressive symptoms identified significant differences between RGs and both the PG and PGD groups. Specifically, the highest levels of each correlate corresponded to increased severity in gambling behavior. Symptom counts of all other DSM-IV Personality Disorder criteria were not significantly different across the three gambling levels. Additionally, variables representing drug and alcohol criteria were also nonsignificant.

Multivariate Analysis

Table 3 shows multinomial regression models (Models I-II) displaying odds ratios for PG and PGD with RGs as the reference group. Employment status was excluded from the multivariate analysis due to its variance being primarily accounted for by age, educational attainment, and income. Variance Inflation Factors were calculated for each multinomial model, and for all independent variables values ranged from 1.07 to a maximum of 1.41. Model I (n=143)

assessed the potential contribution of Avoidant, Borderline, and Histrionic criteria when adjusting for socio-demographic and substance abuse related variables. This model assessed the contribution of criteria of each cluster to increased odds of PG and PGD while adjusting for socio-demographic factors thereby adjusting comorbidity of personality subtypes. Each Borderline Personality criterion increased the proportional odds of PGD by 94% (OR=1.94, $p=.040$) after controlling for other variables in the model. There was a strong association between African American/Others and increased odds for both PG and PGD, yet higher education was protective of PG.

Model II added CES-D scores to adjust for the presence of depressive symptomatology. When depressive symptoms were added to this model, the Borderline Personality variable became nonsignificant. Higher depression scores were associated with increased odds of PG (OR=1.11; $p=.013$) and PGD (OR=1.11; $p=.022$), even after controlling for other clinical and socio-demographic variables. Increased odds of PG and PGD among African American/Others was robust after the inclusion of depressive symptoms in the model, as was decreased odds of PG for those with higher education.

Discussion

In summary, bivariate analysis showed that Avoidant Personality Disorder and Borderline Personality Disorder pathology were different based on gambling status. However, multivariate models that adjusted for socio-demographics and substance abuse pathology, showed increased BPD symptoms that were associated with higher odds of PGD, but not with PG. When current depressive symptoms were included in a multivariate model, associations between BPD and PGD were nonsignificant. Additionally, African American/Other status was a risk factor for PG and PGD, while low education was a risk factor for only PG.

Our findings are consistent with recent epidemiological and treatment studies showing the high levels of comorbidity between personality disorders and PGD (Krueger et al., 2006; Petry et al., 2005), although our findings were limited to BPD. Additionally, it is notable that the association between BPD and PGD was robust when substance abuse/dependence variables were included in the model, but did not remain when adjusting for depressive symptoms. Nonsignificant values for alcohol and drug criteria indicate that the relationship between Cluster B personality disorders is not a function of shared comorbidity with substance abuse/dependence. Previous research suggests that PGD and substance use disorders develop simultaneously, and may share common personality-related risk factors. Cunningham-Williams and colleagues (Cunningham-Williams et al., 1998) using data from the Epidemiological Catchment Area study, found that among problem gamblers alcoholism occurred within two years of gambling onset “in 65% of cases.” In fact, data exist pointing to a common genetic risk factor for both substance abuse and gambling (Slutske et al., 2000). Longitudinal studies have also identified personality traits associated with later gambling problems, independent of substance abuse pathology (Slutske et al., 2005).

Borderline Personality Disorder traits are part of a Cluster B personality disorders a group of cognitive, affective, and behavioral personality disorders marked by behavioral impulsivity and affective distress. The body of research on substance abuse/dependence and personality disorders underscores the associations among these disorders. Multiple studies have identified high rates of comorbidity between Cluster B and substance use disorder diagnoses in treatment and community samples (Casillas & Clark, 2002; Taylor, 2005), even when substance abuse-related personality disorder criteria are removed (Rounsaville et al., 1998). In examining the longitudinal development of PGD, Slutske and colleagues (2005) found that “the personality profile associated with problem gambling was strikingly similar to the profiles associated with alcohol, cannabis, and nicotine dependence”.

In Model II, it is notable that personality pathology did not predict increased odds of PGD when adjusting for depressive symptoms. Research has also shown that personality marked by negative affectivity, combined with a lack of behavioral inhibition, is present in individuals with PGD (Cunningham-Williams et al., 2005; Slutske et al., 2005; Steel et al., 1998). Although researchers have identified impulsivity as a risk factor, this construct is being refined in pathological gambling to encompass multiple dimensions including mood (Nower & Blaszczynski, 2006). Research suggests that depressive disorders such as Bipolar Disorder and Major Depression are highly comorbid with PGD (Kim et al., 2006), yet the nature of these relationships has not been fully delineated. A recent study implicating impulsivity as a mediator of depression and PG (Clarke, 2006) suggests that gambling may be an impulsive behavior used to offset dysphoria in at-risk individuals. It is possible that the BPD traits are associated with gambling in the presence of painful affective states. The cross-sectional nature of the present study leaves the question of causality unresolved.

The strong association found between depressive symptoms and PG and PGD is further complicated by the limitations in our operationalization. The CES-D instrument has been shown to be highly correlated with measures of state and trait anxiety and self-esteem (Orme et al., 1986), thereby decreasing its ability to discriminate depressive symptoms arising from a distinct mood disorder from those related to gambling, substance abuse/dependence, or personality. Furthermore, given that we did not have a lifetime measure of depressive symptoms, we were unable to fully explore its association with PG and PGD, as we did not have the breadth of instances of depressive symptoms to link with lifetime gambling behaviors.

Findings indicate a strong association between racial/ethnic minority status and PGD after adjusting for other socio-demographic variables, substance abuse/dependence, and personality disorders. This association is consistent with results from epidemiologic studies showing the highest rates of PGD among racial/ethnic minority groups, particularly African-Americans (Cunningham-Williams et al., 2005; Petry et al., 2005). We also identified increased odds of PG/PGD for individuals with lower educational attainment, consistent with other research (Gerstein et al., 1999). Research and public health initiatives should be directed toward higher risk racial/ethnic groups, particularly those with low educational attainment, to address the issue of increased prevalence in minority communities, and consider race/ethnicity while adjusting for socioeconomic status (Welte et al., 2004).

These findings are presented in the context of several important study limitations. This study was limited methodologically by sample size, thus restricting statistical power to assess PG and PGD risks based on categorical personality diagnoses (e.g., Narcissistic Personality Disorder), rather than personality disorder symptoms. Still, recent research has shown that various dimensional models predict DSM-IV personality disorder symptom counts (Bagby et al., 2005), suggesting a concurrent validity of DSM-IV criteria counts and dimensional models.

Additionally, the generalizability of our sample is limited due to the use of non-random (i.e., convenience) sampling. For instance, it is possible that the sample used in this study is not representative of the types and level of comorbidity in the general population of gamblers, leading to incorrect inferences about the relationship between gambling severity and personality disorders.

Because this research was not designed to evaluate a sample of individuals with personality disorders, the base rate of personality disorder is low, precluding an analysis of distinct contributions of each personality disorder to the odds of PG and PGD in a multivariate model. Although we adjusted for demographic and socio-economic factors, we were further limited in our ability to adjust for type and severity of co-occurring substance use and depressive disorders.

Despite the study limitations, these findings contribute to the current limited body of research implicating the diagnosis of a personality disorder as a risk factor for PG and PGD, when adjusting for the common co-occurrence of substance use disorders. Treatment of individuals with personality disorders should include assessment and monitoring of gambling behavior, irrespective of a substance abuse/dependence diagnosis. Given the associations found between personality disorders, depressive symptoms, and gambling, testing of causal models such as the Pathways Model (Blaszczynski et al., 2002; Clarke, 2006) is indicated. Our findings further implicate the importance of future research into the role of race/ethnicity and socio-economic status in the etiology and persistence of PG and PGD.

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Table 1
Socio-demographic and Mental Health Characteristics by Gambling Status (n=146)

Characteristic	Recreational Gambling (RG) n(row%)	Problem Gambling (PG) n (row%)	Pathological Gambling Disorder (PGD) n(row%)	X ²	P
Gender					
Male	24(36)	30(45)	12(18)	2.87 (df=2)	0.239
Female	40(50)	30(38)	10(13)		
Race/Ethnicity					
Caucasian	53(54)	36(36)	10(10)	13.31 (df=2)	0.001
African American/Other ^a	11(23)	24(51)	12(26)		
Educational Attainment					
<High School/GED	28(33)	42(49)	15(18)	9.83 (df=2)	0.007
>High School/GED	36(60)	18(30)	7(11)		
Current Employment					
Employed**	36(41)	39(42)	12(14)	1.26 (df=2)	0.533
Unemployed	28(47)	21(36)	10(17)		
Household Income (past 12 months)					
Less than \$25,000	15(29)	26(50)	11(21)	17.28 (df=6)	0.008
\$25,000-49,999	25(64)	8(21)	6(15)		
\$50,000-74,999	17(55)	12(39)	2(6)	F=4.23	0.017
\$75,000 or higher	7(33)	12(57)	2(10)		
Mean Age (SD)	51.2 (17.8)	42.0 (18.8)	47.2 (14.8)		

^a In addition to African Americans (26%), this category includes gamblers who self-identified as American Indian (<1%), Asian (4%), Latino(<1%), or Middle Eastern (<1%).

Table 2
Personality, Substance Abuse Criteria and Depressive Symptoms by Gambling Status (n=146)

Diagnostic Count	Range	Recreational Gambling (RG) M(SD)	Problem Gambling (PG) M(SD)	Pathological Gambling Disorder (PGD) M(SD)	K-W χ^2 (2 df)	P_{BH}
Personality Dx. ^c						
Paranoid	0-4	0.23(0.75)	0.47(1.03)	0.22(0.53)	3.17	0.300
Schizoid	0-4	0.23(0.64)	0.43(1.04)	0.59(1.22)	1.35	0.551
Schizotypal	0-2	0.14(0.39)	0.27(0.48)	0.27(0.55)	3.23	0.296
Antisocial	0-4	0.02(0.13)	0.27(0.95)	0.41(1.10)	5.03	0.176
Borderline	0-5	0.19(0.61)	0.42(1.06)	0.95(1.62)	10.45	0.023
Histrionic	0-4	0.03(0.25)	0.23(0.70)	0.27(0.63)	8.45	0.048
Narcissistic	0-3	0.20(0.51)	0.27(0.61)	0.41(0.80)	1.54	0.463
Avoidant	0-4	0.11(0.62)	0.57(1.70)	0.45(1.01)	12.09	0.016
Dependent	0-5	0.16(0.57)	0.28(0.78)	0.18(0.50)	1.45	0.551
Obsessive-Compulsive	0-4	0.80(1.31)	0.88(1.42)	1.00(1.35)	0.59	0.744
Substance Dx. ^c						
Alcohol Abuse/Dependence	0-11	0.88 (2.43)	1.07 (2.41)	2.18 (3.75)	4.25	0.222
Drug Abuse/Dependence	0-11	0.92 (2.64)	1.05 (2.12)	2.68 (4.03)	7.28	0.068
Depressive Symptoms	0-48	4.33 (4.98)	9.29 (10.57)	10.95 (8.82)	7.83 ^b	<0.001

^aKruskal-Wallis χ^2 ;

^bANOVA;

^cDx.:Diagnosis.

Multinomial Logistic Regression Predicting the Likelihood of Problem Gambling (PG) and Pathological Gambling Disorder (PGD)^a

Table 3

	Model I: OR (95% C.I.) n=143		Model II: OR (95% C.I.) n=141	
	Wald χ^2	PG	PGD	PG
Gender	1.016	0.73 (0.30,1.80)	0.54 (0.15,1.91)	0.59 (0.24,1.49)
Race/Ethnicity	8.820 *	2.82 * (1.06,7.51)	7.21 ** (1.82,28.63)	3.13 * (1.11,8.83)
Income	0.086	0.94 (0.63,1.41)	0.96 (0.52,1.78)	0.96 (0.64,1.46)
Age	5.081	0.98 (0.96,1.01)	1.02 (0.98,1.06)	0.98 (0.96,1.01)
Education	5.947 *	0.40 * (0.18,0.91)	0.33 (0.09,1.15)	0.40 * (0.17,0.93)
Avoidant Symptoms	4.006	1.79 (1.00,3.22)	1.40 (0.64,3.06)	1.50 (0.86,2.61)
Borderline Symptoms	6.646 *	1.12 (0.61,2.06)	1.94 * (1.03,3.66)	0.94 (0.49,1.78)
Histrionic Symptoms	1.503	2.56 (0.51,12.94)	2.04 (0.37,11.37)	2.34 (0.43,12.71)
Alcohol Abuse/Dependence	3.057	1.03 (0.86,1.23)	1.19 (0.97,1.46)	0.99 (0.82,1.20)
Drug Abuse/Dependence	2.838	0.89 (0.74,1.08)	1.04 (0.86,1.26)	0.85 (0.69,1.04)
Depressive Symptoms	---	---	---	1.11 * (1.02,1.20)
Model Statistics	Likelihood Ratio $\chi^2=52.91$ df=20; p<.0001 Nagelkerke R ² =0.36		Likelihood Ratio $\chi^2=58.57$ df=22; p<.0001 Nagelkerke R ² =.39	

^aReference category=Recreational Gambling (RG).

* p<.05;

** p<.01