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An Exploratory Study of Clinical Measures Associated with Subsyndromal Pathological Gambling in Patients with Binge Eating Disorder

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Abstract

Both binge eating disorder (BED) and pathological gambling (PG) are characterized by impairments in impulse control. Subsyndromal levels of PG have been associated with measures of adverse health. The nature and significance of PG features in individuals with BED is unknown. Ninety-four patients with BED (28 men and 66 women) were classified by gambling group based on inclusionary criteria for Diagnostic and Statistical Manual-IV (DSM-IV) PG and compared on a range of behavioral, psychological and eating disorder (ED) psychopathology variables. One individual (1.1% of the sample) met criteria for PG, although 18.7% of patients with BED displayed one or more DSM-IV criteria for PG, hereafter referred to as problem gambling features. Men were more likely than women to have problem gambling features. BED patients with problem gambling features were distinguished by lower self-esteem and greater substance problem use. After controlling for gender, findings of reduced self-esteem and increased substance problem use among patients with problem gambling features remained significant. In patients with BED, problem gambling features are associated with a number of heightened clinical problems.

Keywords

Binge eating; Gambling; Substance abuse; Obesity; Gender differences

Introduction

Binge eating disorder (BED), a research eating disorder (ED) diagnosis in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text-Revision (DSM-IV-TR; American Psychiatric Association 2000), is characterized by recurrent binge eating without the extreme weight compensatory behaviors that characterize bulimia nervosa. BED is a prevalent ED category, associated with obesity and with elevated rates of coexisting psychological, psychiatric and medical problems relative to obese persons without BED and to those observed in the formal ED diagnoses (Hudson et al. 2007; Allison et al. 2005; Grilo et al. 2008, 2009a; Javaras et al. 2008; Masheb and Grilo 2000; Wilfley et al. 2003).

In light of the complex heterogeneity of co-existing problems in patients with BED, research has attempted to identify meaningful subtypes or subgroups of patients that might have implication for clinical assessment or treatment planning. For example, research has subtyped patients with BED based on cognitive features, such as overvaluation of shape/weight (Grilo et al. 2008), or affective features, such as negative/depressive affect (Grilo et al. 2001c). Another important area of BED research involves the stratification of patients with BED based on current and past psychiatric comorbidities (Grilo et al. 2009b). Such research suggests important clinical differences between patients with BED with and without psychiatric comorbidities (Grilo et al. 2009b; Wilfley et al. 2000; Peterson et al. 2005). Here, we present data from a study of patients with BED classified by problem gambling features, with this status defined by the presence or absence of inclusionary criteria for pathological gambling (PG; American Psychiatric Association 2000).

Impulsivity and BED

Broadly speaking, BED may be conceptualized as characterized by impaired impulse control over eating behaviors (American Psychiatric Association 2000). High rates of other impulsive disorders, such as substance use disorder (SUDs), have been reported in patients with BED (Hudson et al. 2007; Javaras et al. 2008; Peterson et al. 2005; Luce et al. 2007; Wilson et al. 1993). In comparison to obese individuals who binge eat, obese individuals who do not binge eat have been reported to have reduced control over consumption of coffee, chocolate, non-chocolate candy, video games and gambling (Wilson et al. 1993). Studies additionally suggest a possible additive relationship between obesity features and gambling behaviors (Morasco et al. 2006; Desai et al. 2007). A positive association between body mass index (BMI) and symptom severity has been reported among individuals with PG (Morasco et al. 2006), and increased prevalence rates of obesity have been reported among subsyndromal and pathological gamblers (Desai et al. 2007). However, the clinical implications regarding the co-occurrence BED with syndromal and subsyndromal PG are not well understood.

Pathological and Subsyndromal Gambling

PG is classified in the DSM-IV as an impulse control disorder (ICD; American Psychiatric Association 2000) and is associated with behavioral and psychological impairments across multiple domains (Morasco et al. 2006; Desai et al. 2007; Petry et al. 2005; National Council on Problem Gambling AGA 1999; Shaffer and Korn 2002). Subsyndromal levels of PG (e.g., 'problem gambling,' 'at-risk gambling' and 'recreational gambling') are similarly associated with impairments and comorbidities (e.g., obesity, nicotine dependence, alcohol abuse/dependence), albeit typically to a lesser extent (Desai et al. 2007). Among recreational gamblers, differences in gambling-related characteristics (e.g., gambling motivations) have been reported between gamblers with and without problem gambling features (e.g., one or more DSM-IV diagnostic criteria; Pantalon et al. 2008), and greater rates of psychiatric comorbidities have been reported among recreational gamblers with problem gambling

features in comparison to those without (Grant et al. 2009). As such, it is important to investigate further the relationships between problem gambling features and clinical conditions like BED.

In the general adult population, both syndromal and subsyndromal PG are more prevalent among men (Gerstein et al. 1999). However, gender-related differences in problem gambling features in BED have not been systematically investigated. An improved understanding of the relationship and clinical implications may help advance prevention and treatment approaches. Gender-related differences in both syndromal and subsyndromal PG in the general population extend across a range of behavioral, psychological and gambling-related variables (Potenza et al. 2001; Martins et al. 2004; Tavares et al. 2001; Potenza et al. 2006). Whereas men are more likely to report sensation-seeking as a motivation for gambling, women are more likely to report escape motivations for gambling, and these differences appear reflected in the inclusionary diagnostic criteria for PG acknowledged across gender groups (Blanco et al. 2006). In general, externalizing disorders and behaviors that may be characterized by increased impulsivity appear particularly linked to gambling and PG in men, whereas internalizing disorders and behaviors like depression appear particularly linked to gambling and PG in women (Dannon et al. 2006; Desai and Potenza 2008; Blaszczynski et al. 1997). The extent to which these patterns may extend to syndromal and subsyndromal PG among patients with BED is not known.

The Current Investigation

Here we present novel data from a series of 94 patients with BED, classified by gambling status (presence or absence of problem gambling features). We hypothesized that: (1) problem gambling features would be more common in men than women with BED; (2) problem gambling features would be associated with multiple negative behavioral and psychological measures; (3) problem gambling features would be associated with more severe ED psychopathology; and (4) gender differences would be observed in the relationship between impulsivity, depression and problem gambling features in BED patients, with stronger associations between impulsivity and problem gambling features observed among men and stronger associations between depression and problem gambling features observed among women.

Methods

Participants

Participants were a series of 94 patients with BED (28 men and 66 women) evaluated for treatment studies at a university-based research program. The mean age of participants was 43.93 (standard deviation; SD = 8.94) years; 88% ($n = 83$) of participants were Caucasian and 83% ($n = 78$) had attended some college or more.

Participants were recruited by media ads seeking adults with binge eating problems. Study inclusion criteria required meeting DSM-IV full research criteria for BED and at least normal weight. Exclusion criteria included any current treatment for eating/weight problems, specific medical problems (e.g., diabetes, thyroid disease) and/or any medications that influence eating/weight, or severe psychiatric problems (e.g., bipolar disorder, psychotic disorders, current SUDs) requiring different treatments, and pregnancy. Primary reasons for exclusion of treatment-seeking respondents from this study were not binge eating, not meeting BED criteria, current treatments for eating/weight, medical conditions influencing eating/weight, low BMI, and purging behaviors. Very few respondents were excluded for psychiatric reasons and none were excluded due to SUDs. All participants provided written

informed consent and the study protocols were approved by the Yale Human Investigations Committee.

Procedures

Assessments were conducted by experienced doctoral-level research-clinicians who were trained in the administration of the study measures. BED diagnoses were determined using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I/P; First et al. 1996). Participants completed a battery of established measures described below.

Measures

Gender, race/ethnicity, education and age information were all obtained via self-report. BMIs were calculated based on self-reported weight and height measurements taken during intake via self-report. Obesity was defined as a BMI ≥ 30 .

Massachusetts Gambling Screen

The Massachusetts Gambling Screen (MAGS; Shaffer et al. 1994) is a 31-item self-report measure of gambling behaviors and includes items directly corresponding to each of the DSM-IV criteria for PG (e.g., 'During the past 12 months, have you gambled increasingly larger amounts of money to experience your desired level of gambling excitement?'). The reliability and internal consistency of the MAGS has been demonstrated in adult populations (May et al. 2001; reviewed in Weinstock et al. 2004).

Short Michigan Alcoholism Screening Test

Based on the Michigan Alcoholism Screening Test (MAST; Selzer 1971), the Short Michigan Alcoholism Screening Test (SMAST) is a 13-item self-report questionnaire assessing alcohol use behaviors and alcohol-associated impairments (Selzer et al. 1975). The reliability of the SMAST has been demonstrated previously (Selzer et al. 1975).

Drug Abuse Screening Test

The Drug Abuse Screening Test (DAST; Skinner 1982) is a 10-item self-report questionnaire assessing substance use behaviors. The total DAST score provides a quantitative measure of substance-use associated problems, and its reliability and validity has been demonstrated across a range of clinical disorders (Yudko et al. 2007).

Beck Depression Inventory

Total score on the Beck Depression Inventory (BDI-II; Beck et al. 1996), a 21-item self report measure, was used to assess depression level. The BDI-II is a widely-used measure with well-established reliability and validity across diverse patient groups.

Rosenberg Self-Esteem Scale

The Rosenberg Self-Esteem Scale (RSES; Rosenberg 1979) is a 10-item self-report measure of global self-esteem, on which participants rate items (e.g., 'On the whole, I am satisfied with myself.') on a 4-point Likert-type scale ranging from 'strongly agree' to 'strongly disagree.' The validity and reliability of the RSES in eating disordered populations has been demonstrated previously (Griffiths and Beumont 1999).

Impulse Control Scale (ICS)

The Impulse Control Scale (ICS; Plutchik and Van Praag 1989) is a 15-item self-report measure of impulsivity, on which participants rate items on a 4-point Likert-type scale ranging from 'never' to 'very often.' ICS items relate to a range of other impulsive

behaviors (e.g., ‘Do you find it hard to control your sexual feelings?’) and associated features of impulsivity (e.g., ‘Do you plan ahead?’).

Eating Disorder Examination-Questionnaire (EDE-Q)

The Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn and Beglin 1994) is a 32-item self-report version of the Eating Disorder Examination Interview, 12th Edition (EDE; Fairburn and Cooper 1993) that assesses eating disorder psychopathology. The EDE-Q focuses on the previous 28 days and assesses the frequency of binge episodes, defined as eating unusually large quantities of food while experiencing a subjective sense of loss of control. The EDE-Q also assesses different features of EDs (i.e., dietary restraint, eating concerns, weight concerns and shape concerns) and generates a total global score. The EDE-Q has demonstrated adequate test-retest reliability (Luce and Crowther 1999; Reas et al. 2006) and good convergence with the EDE (Grilo et al. 2001a, b) in studies with BED.

Gambling Groups

Previous gambling studies have employed differing inclusion criteria to define a range of subsyndromal gambling behaviors (e.g., recreational gambling, problem gambling). Here, problem gambling features were defined as acknowledgement of one or more past-year DSM-IV criteria for PG. Previous research using a similar classification (i.e. one or more DSM-III PG symptoms) has demonstrated clinically significant differences between gamblers endorsing one or more gambling-related problems in comparison to those without gambling-related problems (Cunningham-Williams et al. 1998). DSM-IV criteria were assessed using the twelve items from the MAGS which directly correspond to DSM-IV criteria for PG (questions 16–27; Shaffer et al. 1994). When more than a single MAGS item corresponded to the same DSM-IV criterion (e.g., tolerance), a single point was awarded for endorsing either item or for endorsing both items. Participants who had never gambled or who had gambled but did not acknowledge any DSM-IV criteria for PG were classified as non-problem gamblers.

Data Analysis

All statistical analyses were conducted using SPSS 16.0. Demographic comparisons were conducted using chi-square tests and analyses of variance (ANOVAs). Between-group differences on health/functioning and BED variables were assessed via ANOVAs. In order to account for differences in demographic variables (e.g., gender) between the two gambling groups and to explore any possible interaction effects, gender was added to the model as a fixed factor. SMAST and DAST scores were also added separately as fixed factors to the model during post-hoc analyses, in order to explore any substance-use-by-gambling-group interactions. Variables not meeting assumptions for homogeneity of variance were considered significant at the $P < 0.01$ level. All other results were considered significant at the $P < 0.05$ level.

Results

Demographic Characteristics

The results of demographic analyses are presented in Table 1. Among the BED patients, 18.7% ($n = 17$) met criteria for problem gambling features. Among BED patients with problem gambling features, 12 patients met one DSM-IV criterion for PG, one patient met two criteria, three patients met three criteria, and one patient met seven criteria. There were no significant differences between the gambling groups for race/ethnicity, education or age. However, there was a significant sex difference between the two groups, with a greater proportion of men acknowledging problem gambling features.

Behavioral, Psychological and ED Psychopathology Variables

Table 2 summarizes the findings for the behavioral, psychological and ED psychopathology variables. The two gambling groups did not differ significantly on BDI scores or ICS scores. Subjects with problem gambling features had significantly higher alcohol and drug use scores on the SMAST and DAST, and significantly lower self-esteem scores on the RSES than did subjects without problem gambling features. Subjects with problem gambling features had significantly higher BMIs ($F = 9.25$, $P = 0.003$). The two groups did not differ significantly on the EDE-Q total global score or in the frequency of binge eating episodes.

After controlling for gender (see Table 2), main effects of gambling group on SMAST ($F = 5.65$, $P = 0.020$), DAST ($F = 18.08$, $P < 0.001$) and RSES scores ($F = 6.15$, $P = 0.015$), as well as a non-significant trend toward a main effect of gambling group on BMI ($F = 3.93$, $P = 0.051$), were observed. A significant gender-by-gambling-group interaction was found for ICS scores ($F = 5.74$, $P = 0.020$). Post-hoc analyses to examine the nature of this interaction revealed that men in the problem gambling features group had higher ICS total scores in comparison to men in the group without problem gambling features ($F = 7.01$, $P = 0.014$). In contrast, no significant difference in ICS total scores was found among women.

After controlling for DAST scores, the main effect of gambling group on RSES scores remained ($F = 5.70$, $P = 0.019$). After including SMAST scores in the model as a fixed factor, there was a trend toward a main effect of gambling group on RSES scores ($F = 3.90$, $P = 0.052$). There were no significant main effects of DAST or SMAST scores on RSES scores.

Discussion

Here we present novel data from a series of 94 patients with BED stratified by problem gambling features and characterized on a range of behavioral, psychological and ED psychopathology measures. Surprisingly, only one subject (1.1% of the sample) acknowledged PG, although close to 20% of the sample acknowledged one or more inclusionary criteria for the disorder suggesting they show features of PG. Significant differences between the groups stratified by presence or absence of any inclusionary criteria for PG were observed, with the individuals with both BED and problem gambling features reporting greater illness severity in the domains of substance use, BMI and self-esteem.

Consistent with our first hypothesis, problem gambling features were more frequently reported by men than by women with BED. These findings are consistent with previous studies of both syndromal and subsyndromal PG in the general population (Gerstein et al. 1999) and among individuals seeking treatment for gambling problems (Potenza et al. 2001; Martins et al. 2004). These findings are also consistent with previous studies reporting higher frequencies of impulsive behaviors in other domains (e.g., substance use) among men versus women with BED (Grilo et al. 2009b; Barry et al. 2002; Tanofsky and Wilfley 1997).

Consistent with our second hypothesis, presence of problem gambling features was associated with heightened scores on multiple behavioral and psychological measures. Specifically, the problem gambling features group was characterized by reports of greater alcohol and drug misuse. These findings are consistent with previous reports of increased alcohol and drug use in both BED and problem gambling populations (Grilo et al. 2009b; Luce et al. 2007; Desai et al. 2007; Manwaring et al. 2006; White and Grilo 2006), and suggest that behavioral disinhibition observed in patients with BED may extend across a range of behaviors. Our findings may be interpreted multiple ways. First, it is possible that the increased frequencies of alcohol and substance use among BED patients with problem gambling features are attributable to the presence of multiple individual risk factors (i.e.,

relating to both gambling and binge-eating). Second, substance use may lead to impaired control (e.g., disinhibition) over such behaviors as eating and gambling. It is possible that individuals with BED who also have problem gambling features may have more global impairments in impulse-control, and are therefore more likely to engage in a range of other impulsive behaviors (e.g., substance use). Third, individuals may engage in substance use behaviors when they gamble, perhaps to enhance the hedonic qualities of gambling, and substance use during gambling might lead to more problematic levels of gambling. Fourth, these behaviors—binge eating, gambling, and substance use—may serve a common function, i.e., attempts to regulate negative affect. Finally, it is additionally possible that a heightened sensitivity to rewarding stimuli among individuals with both BED and problem gambling features might explain the elevated rates of substance and alcohol problems. Further research is required to determine whether the presence of problem gambling features in BED might represent a risk factor for substance use, vice-versa, a clinical marker indicating greater global impairments in impulse-control, or other possibilities.

BED patients with problem gambling features were characterized by lower self-esteem. Previous studies have demonstrated self-esteem impairments in BED (Barry et al. 2002; Tanofsky and Wilfley 1997) and other disorders involving poor impulse-control (e.g., SUDs, attention deficit hyperactivity disorder; Slomkowski et al. 1995; Emery et al. 1993). To date, little research has explored the relationship between problem gambling and self-esteem; however, our findings are consistent with a previous report of reduced self-esteem among non-BED problem gamblers (Delfabbro et al. 2006). Our findings are also consistent with previous research demonstrating greater self-esteem impairments among individuals with one or more psychiatric comorbidities in BED (Grilo et al. 2009a, b). Between-group differences in RSES remained after accounting for group differences related to gender and substance use behaviors, suggesting that individuals with co-occurring BED and problem gambling features may be particularly vulnerable to self-esteem impairments independent of other comorbidities.

We did not observe significant differences in BDI scores between the two gambling groups. Previous subtyping work in BED (Grilo et al. 2001c) reported higher levels of both ED specific and associated general psychopathology among BED patients with high BDI scores, and additionally demonstrated that BDI is an efficient clinical marker for identifying distress and broad psychopathology, and not just depression level (Grilo et al. 2001c). As such, the specific associations observed here between problem gambling and problems with low self-esteem and alcohol/drug misuse are unlikely attributable to differences in levels of depression or negative affect as measured by the BDI.

Consistent with epidemiological studies of BED, obesity was observed in a large proportion of patients with BED (American Psychiatric Association 2000). Consistent with our third hypothesis, BED patients with PG features had higher BMI than BED patients without PG features, although this finding only approached statistical significance after controlling for gender ($P = .051$). Whereas 100% of the participants in the problem gambling group were obese (i.e., BMI ≥ 30), only 75% of participants in the non-problem gambling group were obese. An additional 10.5% of participants in the non-problem gambling group were overweight (i.e., BMI ≥ 25). However, the higher frequency of obesity in the problem gambling group may reflect the higher proportion of males, and the extent to which problem gambling status makes a unique contribution to obesity in BED warrants additional investigation in larger samples. Previous research has reported a positive association between BMI and subsyndromal and syndromal PG (Morasco et al. 2006; Desai et al. 2007). Although it remains unknown whether problem gambling may be a risk factor for obesity in BED, obesity in BED may lead to problem gambling, and/or that the two behaviors share a common underlying etiology.

Contrary to our third hypothesis, no significant differences in other ED pathology variables were observed between gambling groups. Among patients with BED, those with and without problem gambling features had similar EDE-Q total scores and similar frequencies of binge-eating episodes. Previous studies comparing ED pathologies between patients with BED with and without psychiatric comorbidities have yielded conflicting results. Two studies have reported more severe ED pathologies among patients with comorbidities (Grilo et al. 2009a, b; Peterson et al. 2005), whereas one study has reported no association between psychiatric comorbidities and ED pathology (Wilfley et al. 2000). As such, further research is needed to explore the relationship between ED pathology and psychiatric comorbidities in BED.

Contrary to our fourth hypothesis, no gender-by-gambling-group interaction was observed for depression scores. These findings suggest that depressive features may contribute equally strongly to problem gambling features in men and women with BED, although additional studies using larger samples are needed to further substantiate this hypothesis. Consistent with our fourth hypothesis, a gender-by-gambling-group interaction was found for impulsivity as assessed by total ICS scores. Among men with BED, problem gambling features were associated with increased ICS scores and this association was not observed in women. Gender related differences in non-BED PG have been previously reported; e.g., differences in gambling preferences, substance and alcohol use (Potenza et al. 2001; Martins et al. 2004), disease progression (Tavares et al. 2001; Potenza et al. 2006) and health/functioning measures (Potenza et al. 2001; Potenza et al. 2001; Martins et al. 2004; Potenza et al. 2006) have been reported in subsyndromal and syndromal PG. Gender differences in the prevalence of psychiatric comorbidities have also been reported in syndromal PG, with substance and alcohol use disorders more frequently reported among men and depression and anxiety disorders more frequently reported among women (Dannon et al. 2006). As such, it is possible that gender specific differences in the underlying pathophysiologies of gambling may exist. While further research is required to support this hypothesis, particularly with respect to differences in impulsivity, such differences could have important treatment implications. For example, in a placebo-controlled trial of paroxetine for PG, measures of impulsivity correlated with gambling symptom severity at treatment onset, and during treatment changes in impulsivity correlated with changes in gambling severity across treatment conditions (Blanco et al. 2009). The extent to which such findings extend to individuals, and particularly men, with co-occurring BED and problem gambling features warrants additional investigation. Given the relatively small size of the problem gambling group ($n = 17$), findings of a gender-by-gamblinggroup interaction for impulsivity should be considered cautiously and warrant consideration for further research using larger samples.

Despite the increased frequency of problem gambling features among men as compared to women with BED found in this study, no main effect of gender was observed for any of the behavioral, psychological or ED variables included in these analyses. These findings suggest that problem gambling features may be a risk factor or marker for increased substance use, higher BMI and lower self-esteem across genders in BED. However, additional, larger studies are needed to investigate further this hypothesis.

Study Limitations

To our knowledge, this is the first study of gambling problems and its correlates in patients with BED. Given its exploratory and hypothesis-generating nature, this study is limited by several factors. First, this exploratory study did not correct for multiple comparisons and further studies using larger sample sizes are needed to substantiate these findings. Second, this study only included treatment-seeking BED patients, limiting generalizability of our findings to other populations (e.g., non-treatment seekers, community samples). Third, the relatively small number of participants meeting one or more DSM-IV criteria for

pathological gambling may have limited power for some of our analyses (e.g., comparisons controlling for gender) and did not allow for comparisons between participants with and without formal PG (five or more diagnostic criteria). Fourth, there is an absence of a comparison group of patients with similar gambling behaviors without BED. Fifth, this study did not screen for other ICDs. Future studies should explore the prevalence of other ICDs in BED, as well as the temporal interaction between BED, problem gambling features and other ICDs. A final limitation of this study is its reliance on self-report measures for assessing several domains including weight/height (and therefore BMI and obesity status), binge eating and eating disorder psychopathology, substance use and gambling behaviors. Self-reports of these sensitive issues may be biased or inaccurate, although it is possible that self-report might increase honest disclosure. With respect to self-reported weight/height, we note that studies of patients with BED have found that these patients are accurate reporters and that the discrepancies or degree of misreport are both small and are not related to eating disorder psychopathology or psychological features (Masheb and Grilo 2001; White et al. 2010). The self-report measures used to assess other domains such as eating disorder features, are reasonably well validated (Grilo et al. 2001a, b). Our study was strengthened by using structured clinical interviews to determine diagnoses and future research should employ multi-method assessments for eating, substance and gambling domains to build upon our findings.

Conclusion

Our findings suggest clinically relevant differences between treatment-seeking BED patients with and without problem gambling features. Specifically, we found a greater severity of substance-related problems, lower self-esteem, and higher BMI among BED patients with problem gambling features. Future studies with a larger sample of subjects meeting formal diagnostic criteria for PG and assessing a wider range of impulsive behaviors (e.g., other ICDs) in BED are needed to examine more completely the relationships between gambling, binge eating and other psychopathology. Further research is needed on the correlates of different psychiatric comorbidities in BED and how such co-morbidities might influence treatment outcomes in multiple (eating and non-eating) domains (Wilson et al. 2007). Such research should aid in the development of novel, more successful treatment strategies.

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Table 1

Demographic characteristics of binge-eaters classified by gambling status

	Problem gambling features (<i>n</i> = 17)		No problem gambling features (<i>n</i> = 77)		χ^2	<i>P</i>	df
	Total	%	Total	%			
Variables							
Sex (male ^a)	11	64.7	17	22.1	12.10	0.001	1
Race/ethnicity (caucasian ^b)	16	94.1	67	87.0	0.68	0.409	1
Education (any college ^c)	12	70.6	66	88.0	3.26	0.071	1
	Mean	St. Dev.	Mean	St. Dev.	<i>F</i>	<i>P</i>	
Age (years)	46.12	7.89	43.44	9.18	1.25	0.266	

The bold values signify that the findings were significant at a *P* < .05 level^aComparison = Female^bComparison = Other^cComparison = High School/GED

Table 2
Behavioral, psychological and eating disorder pathology characteristics of BED patients with and without problem gambling features

	Problem gambling features (n = 17)		No problem gambling features (n = 77)		ANOVA		GLM ^c	
	Mean	St. Dev.	Mean	St. Dev.	F	p	F	p
Behavioral and psychological variables								
Short Michigan alcoholism screening test total ^b	1.94	2.77	0.58	1.22	9.86	0.002	5.65	0.020
Drug abuse screening test total ^b	3.47	2.96	1.15	1.25	26.16	0.000	18.08	<0.001
Beck depression index total	20.94	12.43	17.68	9.57	1.43	0.234	–	–
Rosenberg self-esteem total	24.12	5.96	28.71	6.16	7.78	0.006	6.15	0.015
Impulse control scale total	22.47	4.49	21.68	4.83	0.39	0.537	–	–
Eating disorder pathology variables								
BMI	41.88	7.05	35.18	8.43	9.25	0.003	3.93	0.051
EDE-Q total	3.66	1.00	3.63	0.94	0.01	0.909	–	–
Binge episodes (28 days)	17.00	5.72	16.71	11.13	0.01	0.936	–	–

The bold values signify that the findings were significant at a $P < .05$ level

ANOVA Analysis of variance, GLM General linear model, BMI Body Mass Index, EDE-Q Eating Disorders Examination

^a Gender added as a fixed factor

^b Homogeneity of variances not assumed; results significant at the $P < .01$ level