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## Comparison of personality risk factors in bulimia nervosa and pathological gambling

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### Abstract

**Objective:** The objective of the study was to assess the predictive value of personality profiles to classify individuals with bulimia nervosa (BN), pathological gambling (PG), and a nonpsychiatric comparison group while controlling for sex.

**Methods:** The sample comprised 270 BN (241 women, 29 men), 429 PG (42 women, 387 men), and 96 comparison (nonpsychiatric) subjects (35 women, 61 men). All patients were consecutively admitted to our Psychiatry Department and were diagnosed according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* criteria. We administered the Temperament and Character Inventory–Revised as well as other clinical indices. Multinomial and binary logistic regression models adjusted for age and stratified by sex were used to assess the predictive value of personality in relation to group status.

**Results:** In comparison to controls, high Novelty Seeking ( $P < .001$ ) was specifically associated with a diagnosis of PG. Independently of sex, low Self-Directedness was associated with both BN ( $P < .001$ ) and PG ( $P < .001$ ). Some sex-specific differences were also observed; namely, women with BN and PG displayed higher Harm Avoidance and Cooperativeness than control women, whereas men with PG reported higher Reward Dependence and Persistence than control men.

**Conclusions:** Our results suggested that, whereas there are some shared personality traits between BN and PG when compared with healthy controls, there are also some sex- and diagnostic-specific personality traits that weigh against the consideration of BN as an impulse control disorder.

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### 1. Introduction

The *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (DSM-IV-TR) impulse control disorders include pathological gambling (PG), pyromania, kleptomania, intermittent explosive disorder, and trichotillomania, as well as impulse control disorders not otherwise specified. Overall, these disorders are characterized by a “failure to resist an impulse, drive, or temptation to perform an act that is harmful to the person or to others” (see APA, 2000) [1]. This clinical description might also be applicable to some symptoms of eating disorders (EDs), especially bulimia nervosa (BN). In this

respect, shared vulnerabilities have been described in impulse control disorders and EDs. In particular, BN and PG have been hypothesized to be associated with dysfunction in the brain’s reward system [2–5]. Such underlying processes might explain the reinforcing efficacy of both gambling and binge eating and purging. Insofar as personality profiles are hypothesized to reflect underlying neurotransmitter function [6–8], they may be a valuable window into the nature of this dysfunction and a means to identify similarities and differences between the 2 disorders both in men and women.

Although many studies of EDs have explored impulsivity as a behavior or as a personality trait, the relation between EDs and *diagnosed* impulse control disorders has rarely been investigated. The few studies that have studied impulse control disorders in individuals with EDs report a lifetime prevalence ranging from 3% to 24% [9]. These numbers and

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the association of these disorders to impulsivity have led some authors to propose the existence of a subgroup of eating-disordered patients, specifically BN patients, called *multi-impulsive bulimia* [10–12]. This subgroup of patients displays more frequently comorbidity with alcohol abuse and other impulsive behaviors such as self-harm, shoplifting, and others, as well as a family history of alcohol abuse. In general psychiatric populations, individuals who also present with impulse control disorders tend to report earlier age of onset and greater severity of the primary disorder, greater comorbidity, and poorer prognosis [13,14].

The literature on the personality profile of individuals with PG is quite inconsistent. Most studies focus on impulsivity and sensation seeking, so studies addressing the general personality profile of these patients are scarce and inconclusive. Whereas some studies report high scores on impulsivity [15,16], others do not find differences in comparison to healthy controls [17]. Some have resolved these disagreements by proposing the existence of subgroups of pathological gamblers [18].

In contrast, the literature on personality of BN patients is more consistent, with reports of high impulsivity, lack of goal direction, harm avoidance, and, paradoxically, sensation seeking, together with increased rates of cluster B and, to a lesser degree, cluster C personality disorders [19–22]. The relatively frequent presence of impulsivity (both as a trait and as behavior) in BN has favored the consideration of this diagnosis as an impulse control disorder. However, scarce evidence exists to evaluate this proposition.

On the other hand, although sex differences on personality traits and profiles are well known in the literature [23–25], studies that analyze this topic in-depth are lacking both in BN and PG. The markedly different sex distribution in both disorders (higher proportion of men in PG and of women in BN) is surely one of the main causes of this theoretical flaw. Bulimic men report greater body satisfaction, lower drive for thinness, higher perfectionism, greater interpersonal distrust, and more frequent homosexuality than bulimic women [26–28]. The functional significance of both bulimic symptoms and gambling could also differ across the sexes [29].

Given this proposed association between BN and impulse control disorders, we assessed the predictive value of personality profiles to classify individuals with BN (with no history of PG), individuals with PG (with no history of an ED), and healthy control subjects while controlling for the effect of sex.

Theoretically, as temperamental features predate the onset of axis I psychiatric disorders, we applied a different approach to the measure of these differences by using personality as a predictive factor of diagnosis, instead of simply comparing personality profiles among groups. We hypothesized that BN would share some similarities in personality traits with other impulse control disorders (namely, PG) but that there would also be differences between both disorders enough to consider BN as a different diagnosis in relation to impulse control disorders. Secondly,

we hypothesized that there would be sex-specific differences between both disorders.

## 2. Methods

### 2.1. Participants

The sample comprised 270 BN patients (241 women, 29 men), 429 PG patients (42 women, 387 men), and 96 nonpsychiatric subjects (comparison group [CG]) (35 women, 61 men). All participants with PG or BN were diagnosed according to the DSM-IV criteria using a semistructured clinical interview, that is, the Structured Clinical Interview for DSM-IV Axis I Disorders [30], conducted by experienced psychologists and psychiatrists. All interviewers were trained in the administration of the Structured Clinical Interview for DSM-IV Axis I Disorders, although formal interrater reliability was not computed for this study. The PG and BN participants were consecutive referrals for assessment and treatment at the Department of Psychiatry of the University Hospital of Bellvitge in Barcelona.

The mean age of individuals with BN was 25.8 years (SD = 6.7) (men: 25.0 years, SD = 6.2; women: 25.9, SD = 6.8). Mean age of onset of the disorder was 19.3 years old (SD = 6.4) (men: 19.9, SD = 6.5; women: 19.2, SD = 6.4). Mean duration of illness was 6.6 years (SD = 5.1) (men: 5.1, SD = 3.5; women: 6.7, SD = 5.3). Eighty-seven percent ( $n = 235$ ) were purging subtype. This percentage did not differ by sex (89.7% men vs 87.1% women;  $P = .699$ ).

In PG patients, the mean age was 38.9 years (SD = 12.5) (men: 38.4, SD = 12.5; women: 43.7, SD = 12.0). Mean age of onset of the disorder was 32.7 years old (SD = 12.0) (men: 32.6, SD = 12.0; women: 33.9, SD = 12.1). The mean duration of illness was 6.1 years (SD = 6.1) (men: 5.8, SD = 5.7; women: 5.8, SD = 8.2). In this group, 93.5% ( $n = 401$ ) were mainly slot machine gamblers and the remaining 6.5% ( $n = 28$ ) were mainly bingo, casino, lottery, or card players. The distribution of the main gambling problem by sex was statistically different (slot machines: 95.6% men vs 87.5% women;  $P = .001$ ).

Psychiatrically healthy subjects (CG) were recruited from individuals visiting the hospital for routine blood tests. None of the controls had a history of mental illness or had current substance abuse or dependence. All controls came from the same catchment area as our patients. Their mean age was 38.0 years (SD = 13.6) (men: 35.6, SD = 12.6; women: 42.1, SD = 14.5).

For the present analysis, from an initial sample of 537 ED and 698 PG, the following individuals were excluded: (a) participants with anorexia nervosa ( $n = 122$  ED) or ED not otherwise specified ( $n = 146$  ED and  $n = 3$  PG); (b) patients with a psychotic episode ( $n = 29$  PG); (c) patients who could not complete the assessment because of cognitive impairment, visual deficits, neurological diseases, etc ( $n = 2$  ED and  $n = 117$  PG); (e) patients who

voluntarily neglected the assessment ( $n = 3$  ED and  $n = 45$  PG); (*f*) patients older than 65 years ( $n = 21$  PG); and (*g*) patients with invalid or incomplete Temperament and Character Inventory–Revised (TCI-R) questionnaire ( $n = 2$  ED and  $n = 56$  PG). Entry into the study was between March 2003 and September 2005.

We obtained written informed consent from all participants. This study was approved by the Ethics Committee of our hospital.

## 2.2. Assessment

### 2.2.1. Temperament and Character Inventory–Revised

The TCI-R [31] is a 240-item questionnaire with a 5-point Likert scale format. This questionnaire, as in the original TCI version [32], is a reliable and valid measure of 7 dimensions of personality: 4 temperament (Harm Avoidance, Novelty Seeking, Reward Dependence, and Persistence) and 3 character dimensions (Self-Directedness, Cooperativeness, and Self-Transcendence). Performances of the Spanish versions of both the original questionnaire [33] and the revised version [23] have been well documented. Reliability of the different temperament and character dimensions in the Spanish adaptation ranged between 0.77 and 0.84.

### 2.2.2. South Oaks Gambling Screen

The South Oaks Gambling Screen (SOGS) [34]—Spanish adaptation by Echeburúa et al [35]—is a 20-item diagnostic questionnaire that discriminates among probable pathological gamblers (total score higher than 4), problematic gamblers (total score from 3 to 4) and nonproblematic gamblers (total score lower than 3). The Spanish validation of this questionnaire shows high reliability and validity [35]. Test-retest reliability was very good (0.98) and so was internal consistency (0.94). Convergent validity with regard to the *DSM, Revised Third Edition* criteria for PG was estimated as 0.92.

### 2.2.3. Bulimic Investigatory Test Edinburgh

The Bulimic Investigatory Test Edinburgh (BITE) [36] contains 33 items that measure the presence and the severity of bulimic symptoms. There are 2 subscales: the symptomatology scale (30 items), which determines the seriousness of the symptoms, and the severity scale (3 items). The cutoff point for the symptomatology scale scores for the present study were as follows:  $<10$ , no symptomatology; 10 to 20, subthreshold symptoms; and  $>20$ , threshold symptoms. The symptom scale showed high internal consistency ( $\alpha = .82$ ) in the Spanish adaptation [37], whereas the severity scale displayed an  $\alpha$  coefficient of .63.

## 2.3. Procedures

This was a cross-sectional comparison of 2 clinical groups and a psychiatrically healthy CG to detect specific traits that characterize both BN and PG.

All participants completed the TCI-R. The PG participants completed the SOGS, and the BN participants completed the BITE for descriptive purposes.

### 2.3.1. Statistical analyses

Statistical analyses were carried out with the SPSS version 13 (SPSS, Chicago, IL). Given the well-known sex differences in prevalence and clinical presentations of both ED and PG, we stratified analyses by sex to measure the contribution of this variable. We also entered age in the analyses as a covariate, as the distribution of this variable was not the same across groups.

As noted above, we used personality traits as independent variables, with group status (BN, PG, CG) as the dependent variable. This statistical approach to the measure of personality differences has already been used in previous reports [38].

To test whether the 7 TCI-R factors (as quantitative independent variables) could explain the diagnostic status of the participants (dependent variable with  $k = 3$  categories: PG, BN, CG), multinomial regression models with “enter” procedures were applied. The estimation of parameters was calculated by using the CG condition as a reference group. Odds ratios (ORs) were obtained for each parameter, and the Nagelkerke  $R^2$  was used to measure the global predictive capacity of the model.

We then assessed the ability of the TCI-R to predict the diagnostic status of the participants by considering only the clinical groups (PG and BN). Binary logistic regression analyses (enter procedure) were performed. The global predictive capacity of the model was measured with Nagelkerke  $R^2$  coefficient.

## 3. Results

### 3.1. Psychometric assessment of BN and PG patients

Mean BITE scores for male BN patients were 20.7 (SD = 7.1) on the symptomatology subscale and 11.4 (SD = 6.2) on the severity subscale. Mean scores on this test for female BN patients were 24.7 (SD = 3.8) and 14.8 (SD = 6.0), respectively. Sex differences in BITE scores were statistically significant ( $P = .005$  both subscales), with women scoring higher than men.

The PG men displayed a mean SOGS score of 10.2 (SD = 3.1), whereas women scored 10.5 (SD = 3.5). This difference was not statistically significant ( $P = .712$ ). Mean TCI-R factor scores adjusted for age by sex are shown in Table 1.

### 3.2. Predictive capacity of TCI-R scores with respect to group (patients vs CG)

The results of multinomial analyses measuring the predictive capacity of total TCI-R scores to determine the diagnostic status of subjects showed that both in men and women, high Novelty Seeking (men: OR = 1.04, 95%

Table 1  
Mean (and standard error) TCI-R scores by sex and group

	Male			Female		
	CG (n = 61)	PG (n = 387)	BN (n = 29)	CG (n = 35)	PG (n = 42)	BN (n = 241)
Novelty Seeking	99.9 (1.9)	110.1 (0.8)	102.9 (3.1)	101.8 (2.9)	118.0 (2.8)	102.8 (1.1)
Harm Avoidance	98.8 (2.4)	100.7 (0.9)	116.4 (3.8)	94.5 (4.0)	111.0 (3.8)	119.3 (1.5)
Reward Dependence	108.8 (2.1)	102.1 (0.8)	99.1 (3.4)	97.4 (3.2)	108.1 (3.0)	103.0 (1.2)
Persistence	109.2 (2.9)	113.8 (1.1)	102.3 (4.6)	114.5 (3.8)	112.1 (3.6)	105.7 (1.5)
Self-Directedness	147.6 (2.9)	129.9 (1.1)	110.2 (4.5)	142.4 (3.7)	113.7 (3.5)	111.8 (1.4)
Cooperativeness	143.4 (2.2)	135.3 (0.9)	126.2 (3.5)	130.8 (3.5)	138.0 (3.4)	134.9 (1.4)
Self-Transcendence	63.3 (2.0)	65.4 (0.8)	72.8 (3.2)	64.0 (2.8)	70.5 (2.7)	68.1 (1.1)

Means adjusted for age.

confidence interval [CI] = 1.02–1.07,  $P = .001$ ; women: OR = 1.10, 95% CI = 1.04–1.16,  $P = .001$ ) and low Self-Directedness (men: OR = 0.96, 95% CI = 0.94–0.98,  $P < .001$ ; women: OR = 0.88, 95% CI = 0.83–0.94,  $P < .001$ ) predicted the presence of PG in comparison to nonpsychiatric comparison subjects, whereas only low Self-Directedness predicted the presence of BN (men: OR = 0.93, 95% CI = 0.89–0.96,  $P < .001$ ; women: OR = 0.87, 95% CI = 0.82–0.92,  $P < .001$ ).

When considering the variable sex, high Harm Avoidance differentiated both PG and BN patients from the CG only in women (PG: OR = 1.07, 95% CI = 1.02–1.12,  $P = .006$ ; BN: OR = 1.06, 95% CI = 1.01–1.11,  $P = .015$ ). The same effect was observed for Cooperativeness (PG: OR = 1.13, 95% CI = 1.06–1.21,  $P < .001$ ; BN: OR = 1.13, 95% CI = 1.06–1.20,  $P < .001$ ).

In men, low Reward Dependence and high Persistence differentiated PG from the CG (Reward Dependence: OR = 0.97, 95% CI = 0.95–0.99,  $P = .016$ ; Persistence: OR = 1.03, 95% CI = 1.01–1.05,  $P = .003$ ). In addition, BN male patients differed from male CG only in their lower Self-Directedness (OR = 0.93, 95% CI = 0.89–0.96,  $P < .001$ ).

The adjustment of multinomial models was moderate for men (Nagelkerke  $R^2 = 0.393$ ) and good for women (Nagelkerke  $R^2 = 0.712$ ).

### 3.3. Predictive capacity of TCI-R scores in differentiating BN from PG subjects

The results of the analyses measuring the predictive capacity of TCI-R factors to distinguish PG from BN participants showed that lower Novelty Seeking predicted BN status in comparison to PG status both in men (OR = 0.94, 95% CI = 0.91–0.98,  $P = .002$ ) and women (OR = 0.92, 95% CI = 0.88–0.96,  $P < .001$ ). At a trend level, lower Self-Directedness predicted BN status in comparison to PG status also in men (OR = 0.97, 95% CI = 0.93–1.00,  $P = .078$ ) and women (OR = 0.96, 95% CI = 0.92–1.01,  $P = .060$ ).

A sex-specific distinction between BN and PG emerged such that men with BN had higher scores on Self-Transcendence than men with PG (OR = 1.04, 95% CI = 1.00–1.07,  $P = .044$ ). Adjustment was moderate to good both in men (Nagelkerke  $R^2 = 0.484$ ) and women (Nagelkerke  $R^2 = 0.623$ ).

## 4. Discussion

We examined shared and differential personality profiles of individuals with BN and PG in comparison to a psychiatrically healthy CG by using personality as a predictor of group status and controlling for sex and age.

When comparing the 2 clinical groups to the CG, PG was associated with high Novelty Seeking and low Self-Directedness, echoing several previous studies of PG [39–41]. In addition, also confirming previous studies [9,21,22,42], lower Self-Directedness was associated with BN in comparison to CG. This association suggests that bulimic patients, independently of sex, show poor organizational abilities, immaturity, and poor goal-directed behavior. However, no higher levels of sensation seeking were observed in these patients. This result contradicts previous studies [43,44], but it is supported by our large sample size and the fact that we controlled our analyses for sex. Supporting our first hypothesis, we may conclude that, although personality similarities exist between BN and PG, there are also BN-specific personality features that distinguish it from such impulse control disorder.

With respect to sex-specific differences, high Harm Avoidance and Cooperativeness differentiated both BN and PG patients from controls only in women. This finding suggests that female BN and PG patients are socially anxious, easily fatigable, cautious, insecure, and at the same time empathic, friendly, and compassionate. In contrast, male PG differed from the male CG only with regard to low Reward Dependence and high Persistence. These traits suggest independence, coldness, and low dependence on social reinforcement, as well as ambition, perseverance, and hardworking behavior. Therefore, supporting our second hypothesis, observable sex differences characterized both BN and PG. The literature on sex differences in personality of BN patients is scant [24,26,27]. We were unable to find any studies of this type in patients with PG, as most studies on sex differences in this disorder focus on clinical—not personality—differences [45,46]. Several studies consistently report high Harm Avoidance, low Self-Directedness, and, to a lesser degree, high Novelty Seeking in BN [19–21]. With the exception of high Novelty Seeking, our findings reflect those previously reported. However, previous studies have hardly explored sex differences. Woodside and

colleagues [24] did address personality sex differences in EDs (in general) and found that men with EDs were less harm avoidant, less reward dependent, less cooperative, and less perfectionist than women. In fact, our male BN patients differed from the male CG only in their lower Self-Directedness, whereas women showed a more defined personality profile (Harm Avoidance, Cooperativeness, and low Self-Directedness). We know from studies on sex differences in the general population that men and women differ on some personality features. Therefore, the sex differences observed in our sample may mirror basic sex differences in the general population rather than disorder-specific patterns. This fact might explain why women from both clinical groups were more similar to each other than to men within their diagnostic group. Our findings suggest that previous findings in the field may be sex specific, so future studies should carefully attend to sex differences.

A direct comparison of PG and BN revealed that, although both disorders shared common personality traits, such as low Self-Directedness, there were also disorder-specific traits (eg, individuals with BN reported lower Novelty Seeking than those with PG). These findings replicate a previous study conducted in female BN and PG individuals [9]. In both men and women with BN, Novelty Seeking did not differ significantly from the CG. Although this finding contradicts other studies that have identified higher sensation seeking in individuals with BN than controls [43], it is also possible that the impulsivity captured by the TCI-R Novelty Seeking scale may be characteristic of only a subgroup of BN cases (eg, those who presented other comorbid disorders) [9].

Some disorder-specific sex differences also emerged; that is, men with BN reported higher Self-Transcendence than men with PG. This result suggests that BN men are more spiritual (or they report more mystical/bizarre experiences) than PG men. We found no previous literature on this feature in BN, although anorexia nervosa has been associated with increased spirituality by some authors [47]. Of note, high Self-Transcendence has been associated with higher risk of suicide in eating-disordered patients [42]. A deeper understanding of the nature of high Self-Transcendence in bulimic men is required to interpret this finding accurately.

The present study should be evaluated within the context of several limitations. The sex distribution of both clinical groups was unequal, reflecting the expected sex distribution in the community and in clinical practice. Although we addressed this imbalance via stratification, some subgroups (BN men and PG women) were quite small, which could impact our statistical power to observe differences. Second, given the hypothesized role of impulsivity in both BN and PG, a specific measure of impulsivity should be used in future studies comparing these 2 populations—either a self-report measure or a neurocognitive test tapping dimensions of impulsivity that may influence risk for both BN and PG. Third, the CG was

considerably smaller than the clinical groups. In this respect, a case-control design would have been preferable; however, case-control designs are difficult to conduct in clinical settings, where people free of illness are difficult to find. Nonetheless, we were able to ascertain a respectable comparison sample of 93 psychiatrically healthy participants. Finally, our CG might not be representative of the general population given that they were people visiting the hospital for medical reasons, so our results should be interpreted with caution.

In conclusion, after controlling for sex and age, our results suggest that although individuals with BN and PG share some common character traits (eg, low Self-Directedness), some diagnostic-specific temperament traits are also present (eg, high Novelty Seeking in PG). Although patients with BN are often found to have higher sensation seeking when compared with patients with anorexia nervosa [19,43,48,49], our findings illustrate the relevance of the pathological CG chosen. In our study, Novelty Seeking in BN was significantly lower than that seen in individuals with an impulse control disorder. Bulimic patients did not differ from the CG on this trait. These results challenge the conceptualization of BN as a variant of impulse control disorders. Based on our personality data and on recent studies, impulsivity might be of particular relevance only in individuals with BN who have comorbid impulse control disorder [9] or cluster B personality disorders [50]. Further advances in characterizing similarities and differences across syndromes and across sexes would be clarified with the addition of neurobiological and genetic data.

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