The relevance of personality traits in impulsivity-related disorders: From substance use disorders and gambling disorder to bulimia nervosa

AMPARO DEL PINO-GUTIÉRREZ[1,2], SUSANA JIMÉNEZ-MURCIA[2,3,4]*, FERNANDO FERNÁNDEZ-ARANDA[2,3,4]*,
ZAIDA AGÜERA[2,3], ROSER GRANERO[3,5], ANDERS HAKANSSON[6], ANA B. FAGUNDO[2,3], FERRAN BOLAO[7],
ANA VALDEPÉREZ[8], GEMMA MESTRE-BACH[2,3], TREVOR STEWARD[2,3], EVA PENELO[5], LAURA MORAGAS[2],
NEUS AYMAMÍ[2], MÓNICA GÓMEZ-PEÑA[2], ASSUMPTA RIGOL-CUADRAS[1], VIRGINIA MARTÍN-ROMERA[5] and
JOSÉ M. MENCHÓN[2,4,9]

[1]Department of Nursing in Public Health, Mental Health, and Maternal and Child Health, School of Nursing,
University of Barcelona, Barcelona, Spain
[2]Department of Psychiatry, Bellvitge University Hospital-IDIBELL, Barcelona, Spain
[3]Ciber Fisiopatología Obesidad y Nutrición (CIBERobn), Instituto de Salud Carlos III, Barcelona, Spain
[4]Departament of Clinical Sciences, School of Medicine, University of Barcelona, Barcelona, Spain
[5]Departament de Psicobiologia i Metodologia, Universitat Autònoma de Barcelona, Barcelona, Spain
[6]Division of Psychiatry, Department of Clinical Sciences, Lund University, Lund, Sweden
[7]Department of Internal Medicine, Bellvitge University Hospital-IDIBELL, Barcelona, Spain
[8]Department of Psychiatry, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain
[9]CIBER Salud Mental (CIBERSAM), Instituto Carlos III, Barcelona, Spain

Background and aims: The main aim of this study was to analyze and describe the clinical characteristics and shared personality traits in different impulsivity–compulsivity spectrum disorders: substance use disorders (SUD), gambling disorder (GD), and bulimia nervosa (BN). The specific aims were to compare personality differences among individuals with pure SUD, BN with and without SUD, and GD with and without SUD. In addition, we assessed the differential predictive capacity of clinical and personality variables in relation to diagnostic subtype. *Methods:* The sample comprised 998 subjects diagnosed according to DSM-IV-TR criteria: 101 patients were diagnosed with SUD, 482 with GD, 359 with BN, 11 with GD + SUD, and 45 patients with BN + SUD. Various assessment instruments were administered, as well as other clinical measures, to evaluate their predictive capacity. *Results:* Marked differences in personality traits were observed between groups. Novelty seeking, harm avoidance, self-directedness, cooperation, and self-transcendence best differentiated the groups. Notably, novelty seeking was significantly higher in the two dual pathology subgroups. Patients with dual pathology showed the most dysfunctional personality profiles. *Discussion and conclusion:* Our results indicate the existence of shared dysfunctional personality traits among the groups studied, especially in novelty seeking and self-directedness.

Keywords: bulimia nervosa, dual disorders, gambling disorder, impulsivity, personality, substance use disorders

INTRODUCTION

From a nosological perspective, controversy remains regarding the utility of dimensional versus categorical classifications of mental disorders. Although categorical models have been shown to be effective in many respects, dimensional approaches allow for grouping together a series of symptoms that overlap and complement one another, forming a continuum along which different disorders share common features (Berlin & Hollander, 2014; Jiménez-Murcia, Granero, Moragas et al., 2015). In this context, it has been suggested that the dimensional model may avoid some of the inherent limitations of categorical systems (el-Guebaly, Mudry, & Zohar, 2012; Jiménez-Murcia, Granero, Fernández-Aranda, et al., 2015). Various authors have questioned the empirical validity of diagnoses based on categorical models (Haslam et al., 2014; Krueger & Piasecki, 2002) and have raised concerns about the fact that a consensus among experts decides the limits between specific mental disorders, for example eating disorders (ED) (Fairburn, Cooper, & Shafran, 2003; Gleaves, Lowe, Snow, Green, & Murphy-Eberenz, 2000; Gordon, Holm-Denoma,

* Corresponding authors: Susana Jiménez-Murcia, PhD; Department of Psychiatry, Bellvitge University Hospital-IDIBELL, c/Feixa Llarga s/n, L'Hospitalet de Llobregat, Barcelona 08907, Spain; Phone: +34 93 260 79 88; Fax: +34 93 260 76 58; E-mail: sjimenez@bellvitgehospital.cat; Fernando Fernández-Aranda, PhD; Department of Psychiatry, Bellvitge University Hospital-IDIBELL, c/Feixa Llarga s/n, L'Hospitalet de Llobregat, Barcelona 08907, Spain; Phone: +34 93 260 79 88; Fax: +34 93 260 76 58; E-mail: ffernandez@bellvitgehospital.cat

Smith, Fink, & Joiner, 2007). Other researchers have even proposed combining categorical and dimensional models (Helzer, van den Brink, & Guth, 2006). In fact, the DSM-5 has included dimensional criteria of severity for the majority of disorders to establish whether clinical status is mild, moderate, or severe according to presented symptoms (American Psychiatric Association, 2013).

The impulsivity–compulsivity construct, one that is supported by the work of authors, such as Blanco et al. (2009), Bottesi, Ghisi, Ouimet, Tira, and Sanavio (2015), Fineberg et al. (2010), Hollander and Wong (1995), Leeman and Potenza (2012), McElroy, Phillips, and Keck (1994), Lavender et al. (2017), and Stein, Clemons, Newport, Shapiro, and Christophersen (2000), place gambling disorder (GD), behavioral addictions (sex, shopping, and gaming), substance use disorders (SUD), bulimia nervosa (BN), binge ED, and anorexia nervosa of the binging/purging type toward the impulsive end of the impulsive–compulsive spectrum. In contrast, disorders, such as restrictive-type anorexia nervosa, body dysmorphic disorder, hoarding disorder, excoriation, hair-pulling disorder, and obsessive–compulsive disorder, are placed toward the compulsive end of the spectrum. All these disorders share certain features such as the search for immediate gratification (which is highly present in the early stages of the disorders situated at the impulsive end of the continuum), as well as characteristics associated with compulsivity aimed at relieving negative emotions (becoming more common as impulsive disorders progress). Moreover, shared neurobiological features have been described between GD, SUD, and ED, specifically related to the reduced activation of the ventral striatum during reward anticipation, suggesting the possibility that this feature could be a biomarker for addictions.

SUD, GD, and ED (more specifically, BN) intuitively appear to be related to a common susceptibility linked to certain personality dimensions, including impulsivity and temperamental traits (Claes, Müller, et al., 2012; Engel & Cáceda, 2015; Hadad & Knackstedt, 2014). They also share features such as a sense of urgency and explosive, unpremeditated behavior (Salvo & Castro, 2013), as well as the intense and repetitive desire to perform an act despite it having negative consequences (Hamilton et al., 2015). In fact, recent studies have concluded that high levels of impulsivity are associated with GD, SUD, BN, and personality disorders (Farstad et al., 2015; Fischer & Smith, 2008; MacLaren & Fugelsang, 2011).

These conditions also show a substantial overlap in prevalence reports. For instance, high rates of SUD have been observed in patients diagnosed with ED, with rates ranging from 22% to 50% (Calero-Elvira et al., 2009; Krug et al., 2008; Root et al., 2010; Trace et al., 2013). Likewise, GD shows high rates of comorbidity with other disorders, particularly substance use. A meta-analysis of 11 studies demonstrated a mean prevalence of comorbid SUD of 57.5% in GD (Lorains, Cowlishaw, & Thomas, 2011), and other authors have reported similar comorbidity rates (Kessler et al., 2008; Martin, Usdan, Cremeens, & Vail-Smith, 2014).

There is evidence that SUD, GD, and ED are heterogeneous disorders involving various subgroups or subtypes that develop as a result of certain vulnerability factors

(Janiri, Martinotti, Dario, Schifano, & Bria, 2007; Jiménez-Murcia et al., 2013; Mallorquí-Bague et al., 2016). Previous research has identified a subset of patients with ED, particularly those with BN or binge ED (Jiménez-Murcia, Granero, Moragas, et al., 2015), who are characterized by a particular behavioral dysregulation including SUD and impulsive behaviors (Thompson-Brenner et al., 2008). Likewise, in GD, it has been suggested that there may be a subset of subjects with high levels of impulsivity and sensation seeking, early age of onset, greater severity of gambling behavior, and a higher prevalence of comorbid SUD (Blaszczynski & Nower, 2002; Jiménez-Murcia et al., 2009, 2010).

Previous studies of personality traits have described both differences and overlap between SUD, GD, and ED. According to Cloninger's model, personality is a complex hierarchical system which can be arranged in different psychobiological dimensions of temperament and character (Cloninger, Przybeck, Svrakic, & Wetzel, 1994). Personality traits are the substrate and the context in which more complex, differentiated forms of psychopathology (Widiger & Mullins-Sweatt, 2007) are expressed. In Cloninger's Temperament and Character Inventory, patients with GD and SUD appear to score high on novelty seeking and low on cooperation and self-directedness (Janiri et al., 2007). These findings are consistent with other studies in GD and BN samples, with and without SUD, or other impulse-related disorders (Alvarez-Moya et al., 2007; Fernandez-Aranda, Jiménez-Murcia, et al., 2006; Krug et al., 2009). Similarities in personality profiles between BN and GD have also been described, including alterations in the temperament dimension of reward dependence (Atiye, Miettunen, & Raevuori-Helkamaa, 2015; Reuter et al., 2005; Sodersten & Bergh, 2006) and, in male patients, elevated scores in harm avoidance and lower scores in self-directedness (Claes, Jiménez-Murcia, et al., 2012). By contrast, the differential factor between BN and GD patients was the presence of lifetime weight fluctuations (Claes, Jiménez-Murcia, et al., 2012).

Patients who exhibit novelty seeking and impulsivity, and those with antisocial and borderline personality disorder, are considered vulnerable to SUD (Simmons & Havens, 2007). Although several authors suggest the existence of an "addictive personality" predisposing subjects to ED, GD, or SUD (Goodman, 2008), there is no conclusive empirical evidence to confirm this theory (Franques, Auriacombe, & Tignol, 2000). However, neurobiological and imaging data do support the existence of common features of addictive and ED (Volkow, Wang, Tomasi, & Baler, 2013), and there is strong biological support for impulsivity-related features in substance dependence (Parvaz, Alia-Klein, Woicik, Volkow, & Goldstein, 2011).

From both a conceptual and diagnostic point of view, the potential value of dimensional models is a topic of growing interest in the scientific community, and several studies have described risk factors that are shared by different behavioral addictions such as GD, compulsive eating, and SUD (Granero et al., 2017; Jiménez-Murcia, Granero, Moragas, et al., 2015; Monzani, Rijsdijk, Harris, & Mataix-Cols, 2014; Probst & van Eimeren, 2013). Some of these studies highlight similarities in clinical features and

comorbidity (Berlin & Hollander, 2014; Hollander, 2008), whereas others focus on overlap in terms of emotion regulation and personality, genetic, and neurobiological factors (Granero et al., 2014; Mestre-Bach et al., 2016; Volkow et al., 2013). Research on shared personality traits associated with GD, SUD, and BN could therefore contribute to knowledge about similar characteristics across conditions and be useful in developing preventive interventions for such disorders. However, most research on personality traits, including this study, has been cross-sectional and does not allow for determining causality. Nonetheless, the identification of personality traits that are specific to each disorder could improve our understanding of why some people engage in these dysfunctional behaviors and others do not.

Based on dimensional theories of the classification of mental disorders, and considering the impulsive–compulsive spectrum, our hypothesis is that patients with SUD, GD, and BN show similarities in certain personality traits (specifically, high novelty seeking and harm avoidance, and low self-directedness). We also hypothesize that BN and GD patients who present a comorbid SUD may potentially display more pronounced shared personality traits than do patients diagnosed with SUD without a comorbid condition. Thus, the aim of this study was to analyze shared and differential personality traits among SUD, GD, and BN patients, and to compare each of these groups with dual disorder patients (i.e., GD + SUD and BN + SUD). We also sought to examine the differential predictive capacity of clinical variables and personality in relation to diagnostic subtype, with SUD as the category of reference.

METHODS

Participants

The initial sample comprised $n = 1,009$ patients who were consecutively seeking treatment at the Substance Use Disorders, Pathological Gambling, and Eating Disorder Units at Bellvitge University Hospital (Barcelona, Spain), and who were diagnosed according to DSM-IV-TR criteria

(American Psychiatric Association, 2000). Just over half of the participants (54%) were male.

From the initial sample (1,009 participants), 11 cases were excluded from the analysis: two due to language difficulties, one who obtained a score below 24 on the Mini Mental State Examination, due to mental retardation, and eight due to missing data. The final sample included $N = 998$ participants: 101 who met diagnostic criteria for SUD, 482 for GD, 359 for BN, 45 for BN + SUD, and 11 for GD + SUD. In the case of patients within the SUD group, these patients either presented a heroin/opioid (17.8%) or alcohol SUD (82.2%). However, for patients in the BN + SUD or GD + SUD groups, only alcohol SUD cases were permitted. Patients in these subgroups with other SUDs were referred to treatment centers specializing in these SUDs. Table 1 shows the sociodemographic characteristics of the sample of the study and the result of the comparison between the different groups.

Measures

Demographic/clinical information, including age, education, occupation, and marital status, was obtained via a semi-structured interview.

Assessment of impulse control disorders and substance abuse/dependence. Lifetime history of an impulse control disorder and alcohol and drug abuse/dependence were assessed via the Structured Clinical Interview for DSM-IV Axis I Disorders (First, Gibbon, Spitzer, & Williams, 1996).

Assessment of gambling disorder and bulimia nervosa severity. The *South Oaks Gambling Screen* (Lesieur & Blume, 1987) and the *Diagnostic questionnaire for pathological gambling according to DSM-IV criteria* (Stinchfield, 2003) were used to assess GD severity in GD patients. The Spanish validations of both these questionnaires have showed high reliability and validity. These instruments were only completed by GD patients.

The Eating Disorder Inventory-2 (Garner, 1991) was used to examine ED severity in BN patients. This is a reliable and valid 91-item multidimensional self-report

Table 1. Demographic characteristics of the sample ($N = 998$)

	SUD ($n = 101$)	BN ($n = 482$)	GD ($n = 359$)	SUD + BN ($n = 45$)	SUD + GD ($n = 11$)	p
Age, mean (*SD*)	44.9 (9.1)	26.9 (7.8)	41.8 (13.6)	25.1 (5.0)	36.8 (8.0)	<.001
Sex (males), %	79.2	5.0	88.6	8.9	100	<.001
Civil status, %						
Single	47.5	71.3	25.8	85.3	36.4	<.001
Married	23.8	21.2	56.6	0	36.4	
Divorced	25.7	7.2	14.3	14.7	27.3	
Widowed	3.0	0.3	3.4	0	0	
Employment status (employed), %	26.0	40.5	66.3	41.2	54.5	<.001
Education level, %						
Primary	69.1	56.2	73.5	44.8	90.0	<.001
Secondary	23.7	13.9	26.5	20.7	10.0	
University	7.2	29.9	0	34.5	0	

Note. SUD: substance use disorders; BN: bulimia nervosa; GD: gambling disorder; *SD*: standard deviation.

questionnaire assesses cognitive and behavioral characteristics that are typical of EDs, and its Spanish validation has shown good psychometric properties (Garner, 1998). This questionnaire was only completed by BN patients.

Temperament and Character Inventory – Revised (TCI-R) (Cloninger, 1999). This is a reliable, valid questionnaire comprising 240 items scored on a 5-point Likert-type scale. Like the original TCI (Cloninger et al., 1994), the revised version measures seven personality dimensions. Four of them related with temperament: harm avoidance (fearful, pessimistic vs. courageous, energetic), novelty seeking (curious, impulsive vs. reflective, orderly), reward dependence (sociable, sensitive vs. cold, socially insensitive), and persistence (hardworking, perseverant vs. indolent, erratic) and three character dimensions: self-directedness (responsible, goal-directed vs. insecure, inept), cooperativeness (helpful, empathic vs. hostile, aggressive), and self-transcendence (imaginative, unconventional vs. controlling, materialistic) (Svrakic & Cloninger, 2010). The performance of the Spanish version of both the questionnaire (Gutierrez-Zotes et al., 2004) has been documented. The instrument showed excellent internal consistency (mean $\alpha = .87$). This instrument was administered to all study participants.

Procedure

The sample comprised patients who were consecutively seeking treatment at the aforementioned units of Bellvitge University Hospital. This public hospital is certified as a tertiary care center (high specialization) for the treatment of addictive behaviors and EDs, and it oversees the treatment of very complex cases. The catchment area of the hospital includes over two million people to the south of the Barcelona metropolitan area. All participants were interviewed and assessed by clinical psychologists and physicians with over 15 years experience in the diagnosis and treatment of these disorders. Semi-structured interviews focusing on different aspects of the problem, the clinical status of the patient, and DSM-IV-TR diagnostic criteria (American Psychiatric Association, 2000) were first conducted. Subsequently, all the scales and questionnaires described above were individually completed by patients. Once the interviews and psychological assessment were complete, clinical psychologists and physicians examined the results for each case. Based on the clinical and psychometric findings, the treatment of choice for each patient, and its duration, was decided upon by consensus; treatment could be psychological therapy alone or in combination with pharmacological treatment, and be either individual- or group-based, although treatment was always based on a manualized CBT protocol.

Statistical analysis

Statistical analysis was carried out using the SPSS 20 for Windows. Demographic variables were compared among groups using the chi-square test for categorical variables and one-way ANOVA for quantitative measures. ANOVA models, adjusted for the covariates age and sex, compared the TCI-R mean scores between the five diagnostic profiles. Due to the multiple comparisons, Finner's correction was

applied to the omnibus test and Bonferroni's correction to post-hoc comparisons. A multinomial regression model was adjusted to explore the incremental validity of personality traits (measured though TCI-R scores) to predict the presence of each specific diagnostic profile, selecting the SUD group as the reference category. In this modeling, we entered age and sex in the first step/block and TCI-R scores in the second step/block. Changes in McFadden's R^2 between the first and second steps were computed to assess the incremental validity of the model.

In this study, the magnitude for the effect sizes has been estimated through Cohen's d coefficient in the ANOVA ($|d| > 0.50$ was considered moderate effect size and $|d| > 0.80$ high effect size) and through 95% confidence interval for the OR parameters in the multinomial regressions.

Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. The Institutional Review Board of Bellvitge University Hospital approved the study. All subjects were informed about the study and all provided informed consent.

RESULTS

Comparison of personality profiles between groups

Table 2 shows the ANOVA models comparing TCI-R mean scores between diagnostic profiles, adjusted for the covariates sex and age. Statistically significant differences were observed in all temperament and character dimensions, except for the subscales of reward dependence and persistence. The mean score on novelty seeking was significantly higher in the two dual pathology subgroups (with higher scores in GD + SUD, followed by BN + SUD). As for harm avoidance and self-directedness, patients who reported BN (with and without SUD) showed a more dysfunctional profile. On the cooperativeness subscale, the SUD subgroup was significantly more dysfunctional than were the two dual pathology subgroups (BN + SUD and GD + SUD). Similar results were found for the self-transcendence character dimension, with the highest scores being recorded in the SUD group, followed by the two dual pathology groups.

Ability of personality to predict a diagnosis of SUD

Table 3 presents the hierarchical multinomial regression results, which assess the incremental predictive capacity of TCI-R profiles in relation to a diagnosis of SUD. Sex and age, entered in the first step/block as covariates, yielded a high R^2 coefficient when included in the first step of the model ($R^2 = .374$). The next inclusion of the TCI-R profile significantly increased the predictive capacity, but at a lower capacity ($\Delta R^2 = 8.3\%$, $p = .001$). The final results obtained in the second block/step indicate that, adjusted for sex and age, the personality dimensions associated with a diagnosis other than SUD were novelty seeking, self-directedness, cooperativeness, and self-transcendence. The SUD group was characterized by higher scores in novelty seeking (but

Table 2. Comparisons of TCI-R scores between clinical profiles

| | α | Adjusted means and standard deviation | | | | | | | | | ANOVA adjusted for age and sex (p value and post-hoc comparisons) | | | | | | | | | | |
		SUD (n = 101)		BN (n = 482)		GD (n = 359)		SUD + BN (n = 45)		SUD + GD (n = 11)		Group p*	SUD versus BN	SUD versus GD	SUD versus SUD + BN	SUD versus SUD + GD	BN versus GD	BN versus SUD + BN	BN versus SUD + GD	GD versus SUD + BN	GD versus SUD + GD	SUD + BN versus SUD + GD
Novelty seeking	.723	107.84	14.51	98.95	15.34	112.00	15.57	108.83	17.49	120.64	19.04	<.001	**8.89**	−4.16	−0.99	−12.80	**−13.05**	**−9.88**	**−21.69**	3.17	−8.63	−11.80
Harm avoidance	.847	107.89	18.54	117.70	19.69	100.54	17.99	119.48	15.94	95.82	20.20	<.001	**−9.81**	**7.35**	−11.59	12.07	**17.16**	−1.78	**21.88**	**−18.94**	4.72	**23.66**
Reward dependence	.770	100.47	18.36	102.25	15.79	102.91	16.95	97.05	15.91	97.77	14.45	.210	−1.78	−2.44	3.42	2.70	−0.66	5.20	4.48	5.86	5.14	−0.71
Persistence	.878	114.00	19.91	107.84	20.87	110.22	21.42	100.34	20.96	112.93	17.41	.069	6.16	3.78	**13.66**	1.07	−2.38	7.50	−5.09	9.88	−2.70	−12.59
Self-directedness	.863	119.95	19.49	114.47	19.66	126.66	20.50	106.43	17.81	119.99	18.41	<.001	5.48	**−6.71**	**13.52**	−0.04	**−12.19**	8.04	−5.52	**20.23**	6.67	−13.56
Cooperativeness	.789	129.52	17.84	133.18	17.79	137.81	18.65	127.11	19.68	132.59	15.96	.001	−3.65	**−8.29**	2.41	−3.07	−4.63	6.06	0.58	**10.70**	5.21	−5.48
Self-transcendence	.824	79.96	13.89	65.85	13.95	65.10	15.57	71.92	15.52	75.49	12.50	<.001	**14.11**	**14.87**	8.04	4.48	0.75	−6.07	−9.64	−6.82	−10.39	−3.57

Note. Bold values indicate significant post-hoc comparison. α: Cronbach's α values; SUD: substance use disorders; BN: bulimia nervosa; GD: gambling disorder.
*Finner's correction.

only when compared with BN without SUD), higher scores in harm avoidance (when compared with GD with and without SUD), higher scores in self-directedness and self-transcendence (except when compared with the comorbid GD + SUD group), and lower scores in cooperativeness. Reward dependence and persistence yielded no statistically significant OR, which indicates the lack of differences between groups.

Figure 1 contains a radar chart with the mean scores reported the personality traits for each diagnostic subtype. Due the difference scale range for the dimensions/scales, z-standardized scores have been plotted. This graphic indicates that the SUD group was characterized by high scores in self-transcendence and self-directedness and low scores in harm cooperativeness. For novelty seeking, the highest scores were obtained in the two dual pathology groups, whereas for harm avoidance the highest levels were related to the presence of BN.

DISCUSSION

In this study, we analyzed shared and differential personality features across three disorder groups (SUD, GD, and BN) and two dual diagnosis groups (GD + SUD and BN + SUD). More specifically, we aimed to explore the differences in personality traits between groups located toward the impulsive end of the impulsive–compulsive spectrum, and to determine the predictive capacity of personality to identify specific diagnostic profiles, selecting the SUD group as the reference category.

The personality dimensions that best differentiated the groups were novelty seeking, harm avoidance, self-directedness, cooperativeness, and self-transcendence. The dual pathology groups (GD + SUD and BN + SUD) had the highest scores in novelty seeking, which is in line with our hypothesis. This result is consistent with studies showing that GD patients with SUD exhibit higher levels of sensation seeking, impulsivity, risk-taking, and carelessness (Evren, Evren, Yancar, & Erkiran, 2007; Ibáñez et al., 2001; Janiri et al., 2007; Jiménez-Murcia et al., 2009). Moreover, and also in agreement with previous research, our patients with BN (with and without an associated SUD) had the highest levels of anxiety, worry, fear, immaturity (i.e., high harm avoidance), and difficulties in establishing goals and objectives to guide their lives (i.e., low self-directedness) (Berg, Crosby, Wonderlich, & Hawley, 2000; Cassin & von Ranson, 2005; Fernandez-Aranda, Jiménez-Murcia, et al., 2006). However, contrary to our original hypothesis, BN patients did not present high scores in novelty seeking if no comorbidity with SUD was present.

Higher scores on self-transcendence or spirituality were associated most strongly with a diagnosis of SUD, followed by the two dual pathology groups (GD + SUD and BN + SUD). This result is in agreement with those of other studies in SUD patients (Herrero, Domingo-Salvany, Torrens, & Brugal, 2008; Simmons & Havens, 2007), and also with research that has identified the dimension of self-transcendence as a risk factor associated with the presence of comorbid SUD in GD samples (Jiménez-Murcia et al., 2009).

Table 3. Results obtained from the step/block multinomial regression models

	BN versus SUD		GD versus SUD		BN + SUD versus SUD		GD + SUD versus SUD	
	p	OR	*p*	OR	*p*	OR	*p*	OR
Step/block 1: sex and age								
Sex (males)	**<.001**	**0.006**	**.047**	**1.828**	**<.001**	**0.001**	—	—
Age (years)	**<.001**	**0.824**	.092	0.985	**<.001**	**0.001**	.114	0.956
Step/block 2: TCI-R scores								
Sex (males)	**<.001**	**0.009**	**.021**	**2.380**	**<.001**	**0.012**	—	—
Age (years)	**<.001**	**0.818**	.515	0.992	**<.001**	**0.794**	.289	0.963
Novelty seeking	**.001**	**0.948**	.159	1.015	.556	0.989	.093	1.047
Harm avoidance	.320	0.985	**<.001**	**0.963**	.480	0.987	**.034**	**0.941**
Reward dependence	.246	1.017	.723	0.996	.605	0.990	.125	0.955
Persistence	.706	1.004	.356	0.993	.247	0.984	.618	0.991
Self-directedness	**.001**	**0.949**	**.038**	**0.979**	**.002**	**0.943**	.219	0.970
Cooperativeness	**.016**	**1.036**	**<.001**	**1.044**	**.048**	**1.035**	**.044**	**1.057**
Self-transcendence	**<.001**	**0.921**	**<.001**	**0.931**	**.015**	**0.955**	.665	0.989

Note. Bold values indicate significant parameters. —: not estimable due to the variable being constant; SUD: substance use disorders; BN: bulimia nervosa; GD: gambling disorder
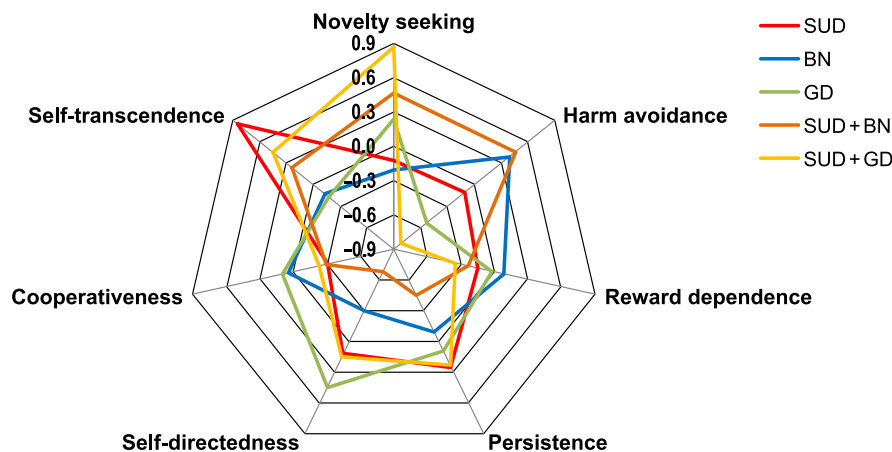

Figure 1. Radar chart illustrating the TCI-R mean *z*-standardized scores for the study groups. SUD: substance use disorders; BN: bulimia nervosa; GD: gambling disorder.

In addition to higher scores on self-transcendence, and in agreement with other studies (Angres & Nielsen, 2007; Jiménez-Murcia et al., 2009), our results also show an association between the diagnosis of SUD and lower scores on cooperativeness. Although self-directedness was found to be significantly lower in BN and in the dual pathology groups, followed by SUD and GD, all groups showed lower mean scores than the normal Spanish population, as we hypothesized (Gutierrez-Zotes et al., 2004). With regard to the character configurations described by Cloninger (1999), our results for subjects with SUD coincide with the presence of features such as suspicion and immaturity, high susceptibility, lack of logic, and unconventional behavior not geared toward realistic goals.

In summary, our initial hypothesis was partially confirmed, insofar as the three diagnostic groups (SUD, GD, and BN) presented similarities in some personality traits, especially novelty seeking and self-directedness. The association between impulsivity and risk of developing a

psychiatric disorder has previously been demonstrated (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001), while high levels of novelty seeking appear to act as a vulnerability factor for SUD (Angres & Nielsen, 2007). It should also be noted that our dual pathology groups presented the most dysfunctional personality traits. The results uphold the utility of designing comprehensive and integrated treatment programs for these disorders, while taking into account the specific differential characteristics of each condition (Rosenblum et al., 2014). More longitudinal studies are now needed to examine social factors and other variables associated with poor prognosis, such as differential comorbidities.

As it is possible that personality features may differ according to the type of substance dependence, the results for our SUD group should not automatically be generalized to patients suffering from SUD other than the ones included here. Note, however, that this study aimed to include a sample of patients with confirmed substance use diagnosis,

and inclusion was based both on clinical assessment and structured instruments. As such, the present data appear to identify a clinical population of subjects with SUD requiring intense out-patient treatment or in-patient detoxification.

Limitations

The results of this research must be interpreted keeping in mind certain limitations. First, its cross-sectional design does not allow us to determine causality among the variables assessed. Second, the age and gender distribution of groups was unequal, reflecting the common tendencies found when treating these conditions. Whereas BN is more prevalent in females, the opposite is true for SUD and GD. The fact that this study was carried out in a clinical setting and that the patients forming our sample were consecutively recruited explains why such sociodemographic differences were present between groups. Nonetheless, both gender and age were included as covariates in our comparisons and no bias was identified when comparing adjusted and unadjusted results. Due to the strong associations reported in the scientific literature between patients' sex and age and the other variables considered in this work (diagnostic subtype and personality traits), these two variables were included as covariates in all the statistical analysis and therefore no bias in the results are due to the potential confounding effects of them. We have also tested the existence of potential additional confounding effects due to other sociodemographic features measured in the sample (patients' academic level, employment, and civil status), and no bias have been identified attributable to these external variables: no association has been found between the sociodemographic profile with personality dimension scores and unadjusted and adjusted results had no differences in practical terms. It is worth noting that our sample was only composed of treatment-seeking patients and therefore the low prevalence of SUD in the GD group, when compared with other findings (Konklolÿ Thege, Hodgins, & Wild, 2016), could be due to this factor, and therefore any interpretations made when comparing this group should be made with caution. This SUD + GD had a very small sample size ($n = 11$) and therefore the authors suggest that, because this subgroup is considerably underpowered, any interpretations regarding differences with this subgroup be made with great prudence. Third, in the SUD + BN and SUD + GD groups, it was not possible to establish which of the two diagnoses was primary and which was secondary. Finally, the lack of a control group prevents us from exploring the extent of variability between clinical groups.

CONCLUSIONS

In sum, categorically classifying mental disorders can be effective because of their low complexity, which facilitates the design and implementation of standardized treatment protocols for all patients who meet the diagnostic criteria for a specific condition. However, dimensional methods allow researchers and clinicians to explore possible similarities across disorders (Helzer, Bucholz, et al., 2006). Such

information is needed to improve the effectiveness of treatment interventions, especially in more complex cases featuring comorbidity and unspecific symptoms (Fernández-Aranda et al., 2012; Kaye, White, & Lewis, 2016).

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