

## RESEARCH ARTICLE

# Loss of Control over Eating: A Description of the Eating Disorder/Obesity Spectrum in Women

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## Abstract

**Goals:** This study aimed to analyse the association, commonalities and differences between obesity and eating disorders (ED).

**Method:** A total of 150 female patients [50 obese with bulimia nervosa (OB + BN), 50 obese with binge eating disorders (OB + BED), 50 obese without eating disorders (OB)] and 50 female healthy-eating/weight control (CG) volunteers participated in this study.

**Assessment:** All participants were assessed by the Eating Disorders Inventory-2 (EDI-2), the Symptom Checklist-Revised (SCL-90-R) and the Temperament and Character Inventory-Revised.

**Results:** In general, all the groups differed significantly and showed linear trends (OB + BN > OB + BED > OB > CG) on general and eating psychopathology (SCL-90-R and EDI-2). Regarding personality traits, statistically significant differences across all four groups were found on Harm Avoidance and Self-Directedness. Whereas some symptoms were shared in extreme weight conditions, others were specifically related to ED.

**Conclusions:** The presence of binge and purge symptomatology in obese patients is clinically relevant. These findings help to understand the relationship between Obesity and ED. Copyright © 2013 John Wiley & Sons, Ltd and Eating Disorders Association.

## Keywords

obesity; eating disorders; binge eating; abnormal eating behaviour; classification

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## Introduction

People with low control of eating, who often have a weight above normal, are now classified within the eating disorder (ED) spectrum. Obesity is a specific risk factor for both binge eating disorder (BED) and bulimia nervosa (BN; de Zwaan, 2001; Fairburn, Welch, Doll, Davies, & O'Connor, 1997), and individuals with obesity often

also have an ED (Müller et al., 2012; Villarejo et al., 2012). There are common risk factors for obesity and ED (mainly bulimic-type), such as impulsivity (Rosval et al., 2006), reward sensitivity (Davis et al., 2008), lower Self-directedness (Fassino et al., 2002a; Sullivan, Cloninger, Przybeck, & Klein, 2007), unhealthy weight control behaviours and psychiatric comorbidities (namely, depression and impulse control disorders; Erermis et al., 2004; Fernandez-Aranda

et al., 2007; Schmidt, Körber, de Zwaan, & Müller, 2012), and some shared biological and genetic factors (Bulik, Sullivan, & Kendler, 2003; Jacquemont et al., 2011; Root et al., 2011).

Previous studies have focused on the neurobiological and behavioural similarities between loss of control over eating and substance abuse-dependence, using the term 'food addiction' to describe this pattern of over eating (Fortuna, 2012; Smith & Robbins, 2012). In animal models, an addictive process has been suggested with an imbalance of opioids and dopamine release that is associated with a loss of control over eating (Davis & Carter, 2009). Avena et al. (2008) found that under certain circumstances (e.g. food deprived and intermittent access to a sugar solution), rats could become sugar dependent, showing neurochemical changes in the brain similar to drug addiction (Avena, Rada, & Hoebel, 2008). Various other combinations of genetic and environmental experiences produce overeating in animals (Avena, Long, & Hoebel, 2005; Boggiano et al., 2005; Rada, Avena, & Hoebel, 2005). Likewise, recently, there has been a growing interest in the study of the phenomenon of 'food addiction' in ED patients (Gearhardt et al., 2011) and obese subjects (Davis et al., 2011; Davis et al., 2013; Pedram et al., 2013). Research on humans suggests that food cues can trigger similar networks to those activated by substance abuse (Frank & Rollin, 2011; Gearhardt et al., 2011; Van den Eynde & Treasure, 2009; Volkow et al., 2013).

Indeed, a novel and controversial hypothesis is that obesity and ED should be considered to be part of a broad eating and weight spectrum of disorders (Haines & Neumark-Sztainer, 2006; Neumark-Sztainer et al., 2007). Further work to examine to what extent there are shared intermediate phenotypes across these disorders is warranted especially as this may have implications for treatment (Wilson, 2010).

Most of the previously reported studies found significantly higher levels of eating symptomatology and general psychopathology in obese patients with binge eating than those without binge eating (Arias-Horcajadas et al., 2006; Fandiño et al., 2010), but significantly lower values in BED patients when they were compared with BN patients (Núñez-Navarro et al., 2011; Agüera et al., 2013 *in press BMC Psychiatry*). With this, we hypothesized that obese patients (OB), obese patients with BED (OB + BED) and obese patients with BN (OB + BN) will lie on a continuum of clinical severity (regarding general psychopathology as well as eating symptomatology) with OB + BN and OB at the most and least severe ends, respectively, with OB + BED representing an intermediate group. On the other hand, regarding personality traits, a few studies that have been reported suggest that there are no differences between obesity and ED (Davis, et al., 2008). ED patients shared a personality profile characterized by high Harm Avoidance and low Self-directedness, which some authors consider as the basic personality profile of the 'ED spectrum' (Fassino, Amianto, Gramaglia, Facchini & Abbate Daga, 2004; Fassino et al., 2002a). Regarding obesity, Sullivan et al. (2007) also found lower Self-directedness in obese versus lean persons. On the basis of the existing literature, our second hypothesis is that all three groups will share some personality traits (mainly high Harm avoidance and low Self-directedness) in comparison with normal-weight control subjects.

## Aims of the study

The aim of the present study is to analyse and compare the phenotypic characteristics of obese patients with and without comorbid ED in order to better understand their differences and similarities.

## Method

### Participants

The participants were 150 female patients (50 OB + BN, 50 OB + BED and 50 OB without ED) and 50 normal weight controls (CG). Eating disorder diagnosis (BED and BN) was made according to Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (APA, 2000) criteria, using a Semi-Structured Clinical Interview (First, Gibbon, Spitzer, & Williams, 1996), conducted by experienced psychologists and psychiatrists. The ED participants were recruited from the Eating disorder Unit at the University Hospital of Bellvitge, whereas the obese patients without ED were seeking for bariatric surgery at our Hospital.

Exclusion criteria for the clinical sample were to be men, patients who underwent bariatric surgery, a body mass index (BMI) below 30 kg/m<sup>2</sup>, psychotic disorder and incomplete questionnaires. Additionally, there were 50 female healthy controls, recruited from individuals visiting the hospital for routine blood tests. The exclusion criteria for the healthy-eating control group were to be men, being younger than 18 years, a lifetime history of ED and BMI below 18.5 kg/m<sup>2</sup> or higher than 25 kg/m<sup>2</sup>. We obtained written informed consent from all participants, and the study was approved by the Ethics Committee of our hospital. Entry into the study was between 2005 and 2009.

### Assessment

We used a comprehensive battery of validated assessment measures including the Spanish validation of the following questionnaires: the Eating Disorders Inventory-2 (EDI-2; Garner, 1998), the Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 2002) and the Temperament and Character Inventory-Revised (TCI-R; Gutiérrez-Zotes et al., 2004).

### Eating Disorders Inventory 2

This is a reliable and valid 91-item multidimensional self-report questionnaire that assesses different cognitive and behavioural characteristics, which are typical for ED. The EDI-2 retains the 64 items (grouped into eight scales: Drive for Thinness, Bulimia, Body Dissatisfaction, Ineffectiveness, Perfectionism, Interpersonal Distrust, Interoceptive Awareness and Maturity Fears) of the EDI and adds 27 new items into three provisional scales: Asceticism, Impulse Regulation and Social Insecurity. All of these scales are answered on a 6-point Likert scale and provide standardized subscale scores. This instrument was validated in a Spanish population (Garner, 1998) with a mean internal consistency of 0.63 (coefficient alpha).

### Symptom Checklist-90-Revised

In order to evaluate a broad range of psychological problems and symptoms of psychopathology, the SCL-90-R was employed. This test contains 90 items and helps to measure nine primary symptom dimensions, which are Somatization, Obsession-Compulsion,

Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation and Psychoticism. In addition, it includes three global indices, which are a global severity index, designed to measure overall psychological distress; a positive symptom distress index, designed to measure the intensity of symptoms; and a positive symptom total, which reports self-reported symptoms. The global severity index can be used as a summary of the test. This scale has been validated in a Spanish population (Derogatis, 2002), obtaining a mean internal consistency of 0.75 (coefficient alpha).

### Temperament and Character Inventory-Revised

The TCI-R (Cloninger, 1999) is a 240-item, 5-point Likert scale, reliable and valid questionnaire that measures seven dimensions of personality: four temperament (Harm Avoidance, Novelty Seeking, Reward Dependence and Persistence) and three character dimensions (Self-Directedness, Cooperativeness and Self-Transcendence). The performance of the Spanish version of the original questionnaire (Gutiérrez et al., 2001) and the revised version (Gutiérrez-Zotes et al., 2004) have been documented. The scales in the latter showed an internal consistency (coefficient alpha) of 0.87.

### Procedures

Specialized clinical psychologists and psychiatrists performed a semi-structured face-to-face diagnostic interview with the clinical group. The questionnaires and anthropometric measurements were completed during a second session. Additional demographic information including age, education, occupation, marital status, weight history and other relevant clinical variables regarding ED was obtained by face-to-face interview (Fernandez-Aranda & Turon, 1998).

### Statistical analysis

Analyses were carried out with SPSS 120 for Windows (IBM Corporation, Armonk, NY, USA). Using analysis of variance adjusted by age for quantitative measures: BMI, weekly bingeing and vomiting episodes, and EDI-2, SCL-90-R and TCI-R scores. Type-I error inflation was controlled through Finner's adjustment (Domènech,

2008), a sequential procedure to adjust the *p*-values to control the FamilyWise Error Rate (Brown & Russell, 1997). As Finner's adjustment was applied to the overall omnibus tests for EDI-2, SCL-90-R and TCI-R scores, *post hoc* comparisons were performed for those measures that showed statistically significant differences at the .05 level. Finally, a radar chart was used to represent graphically the linearity of the measures and how the four groups performed across the different domains (eating and general psychopathology and personality traits). The data were converted to *z* scores, to allow us to have similar measures for all the variables used.

## Results

### Clinical and sociodemographic variables and eating symptomatology

Regarding sociodemographic characteristics of the clinical sample, most participants from all obese groups were married (OB: 64.0%, OB + BED: 53.1%, OB + BN: 54%) and employed (OB: 77.3%, OB + BED: 73.5%, OB + BN: 66%). Regarding education, 43.8% of the OB, 54.2% of the OB + BED and 44.9% of the OB + BN group had completed secondary education.

Table 1 details the clinical information of the three subgroups clinical OB, OB + BN and OB + BED. As would be expected from the diagnostic criteria used, there were group differences in frequency bingeing ( $p < .001$ ) and vomiting ( $p < .001$ ). OB patients showed higher current ( $p < .001$ ), minimum ( $p < .001$ ) and maximum ( $p < .001$ ) BMI, followed by OB + BED and OB + BN patients.

As shown in Table 2, all four groups differed significantly ( $p < .001$ ) in all SCL-90-R scores. OB + BN patients showed the highest scores, followed by OB + BED and OB patients and finally CG participants. SCL-90-R scores differed statistically across all four groups ( $p < .001$ ).

As shown in Table 3, all three obese groups presented significant differences with higher Drive for Thinness, Body dissatisfaction and Asceticism than the CG in these subscales of EDI-2 ( $p < .001$ ). OB patients did not differ from CG regarding EDI-2 Interoceptive Awareness, Bulimia and Ineffectiveness. Both groups showed lower scores in these subscales in relation to OB + BED and OB + BN patients ( $p < .001$ ).

**Table 1** Clinical features of the obese groups (with and without ED)

	OB (1)		OB + BED (2)		OB + BN (3)		ANOVA		<i>Post hoc</i> : mean difference ( $\phi$ ) and <i>p</i>					
	(n = 50)		(n = 50)		(n = 50)		Factor: group		1 vs 2		1 vs 3		2 vs 3	
	Mean	SD	Mean	SD	Mean	SD	F	<i>p</i>	$\phi$	<i>p</i>	$\phi$	<i>p</i>	$\phi$	<i>p</i>
Age	37.63	9.06	34.24	9.66	33.16	9.49	3.04	.051	3.39	.225	4.47	.058	1.08	.999
BMI (kg/m <sup>2</sup> )	44.66	5.16	37.02	4.30	35.21	4.39	58.63	<.001	7.64	<.001	9.45	<.001	1.81	.159
BMI maximum (kg/m <sup>2</sup> )	48.18	6.05	38.52	5.39	37.84	7.17	42.10	<.001	9.65	<.001	10.34	<.001	0.69	.999
BMI minimum (kg/m <sup>2</sup> )	27.55	6.10	23.88	4.02	23.40	3.85	10.69	<.001	3.67	.001	4.15	<.001	0.48	.999
BMI ideal (kg/m <sup>2</sup> )	25.57	2.89	24.73	2.68	24.05	2.77	3.11	.048	0.84	.485	1.51	.044	0.68	.841
Binge episodes (weekly)	0.0	0.0	7.4	5.0	9.3	6.7	51.15	<.001	—	—	—	—	-1.88	.166
Vomiting episodes (weekly)	0.0	0.0	0.0	0.0	7.7	7.9	26.94	<.001	—	—	—	—	—	—

OB, obese group; OB + BED, obese group with binge eating disorders; OB + BN, obese group with bulimia nervosa; BMI, body mass index.

*Post hoc* Bonferroni's comparisons.

**Table 2** General psychopathology, measured by means of SCL-90-R, among the groups

	CG		OB		OB + BED		OB + BN		ANOVA adjusted by age		
	(n = 50)		(n = 50)		(n = 50)		(n = 50)		F (df)	p*	Contrasts (comparison between the 4 groups)
	Mean	SD	Mean	SD	Mean	SD	Mean	SD			
SCL-Somatization	.57	.44	1.15	.86	1.85	.84	2.36	.86	48.92 (3, 192)	<.001	CG < OB < OB + BED < OB + BN
SCL-Obsession-compulsion	.60	.48	.95	.68	1.87	1.03	2.22	.75	48.00 (3, 192)	<.001	CG < OB < OB + BED < OB + BN
SCL- Interpersonal	.58	.56	1.02	.86	1.90	1.00	2.33	.89	44.38 (3, 192)	<.001	CG < OB < OB + BED < OB + BN
SCL-Depressive	.63	.51	1.06	.85	2.23	.93	2.68	.74	73.96 (3, 192)	<.001	CG < OB < OB + BED < OB + BN
SCL-Anxiety	.51	.46	.71	.65	1.53	.86	2.18	.88	55.04 (3, 192)	<.001	(CG = OB) < OB + BED < OB + BN
SCL-Hostility	.41	.46	.60	.70	1.39	1.04	1.88	1.06	34.91 (3, 192)	<.001	CG < OB < OB + BED < OB + BN
SCL-Phobic anxiety	.19	.35	.38	.49	.84	.91	1.53	1.03	32.18 (3, 192)	<.001	(CG = OB) < OB + BED < OB + BN
SCL-Paranoid ideation	.49	.46	.76	.71	1.32	1.01	1.69	.92	22.90 (3, 192)	<.001	CG < OB < OB + BED < OB + BN
SCL-Psychoticism	.26	.37	.47	.49	1.17	.82	1.64	.77	50.00 (3, 192)	<.001	CG < OB < OB + BED < OB + BN
SCL-GSI	0.49	0.36	0.84	0.61	1.69	0.78	2.16	0.69	72.67 (3, 191)	<.001	CG < OB < OB + BED < OB + BN
SCL-PST	29.33	17.71	42.26	20.45	59.34	20.92	72.32	14.31	50.73 (3, 191)	<.001	CG < OB < OB + BED < OB + BN
SCL-PSDI	1.39	0.33	1.66	0.49	2.43	0.53	2.63	0.50	77.69 (3, 191)	<.001	CG < OB < OB + BED < OB + BN

SD, standard deviation; OB, obese group; OB + BED, obese group with binge eating disorders; OB + BN, obese group with bulimia nervosa; CG, control group; SCL, Symptom Checklist 90-Revised; GSI, global severity index; PST, positive symptom total; PSDI, positive symptom distress index.

\*ANOVA adjusted by age, (omnibus test).

**Table 3** Eating symptomatology, measured by means of EDI-2, among the groups

EDI-Subscales	CG		OB		OB + BED		OB + BN		ANOVA adjusted by age (and by SCL-GSI)		
	(n = 50)		(n = 50)		(n = 50)		(n = 50)		F (df)	p*	Contrasts (comparison between the 4 groups)
	Mean	SD	Mean	SD	Mean	SD	Mean	SD			
EDI-Drive for Thinness	1.26	3.10	10.96	5.08	11.92	5.05	14.22	4.64	32.29 (3, 190)	<.001	CG < (OB = OB + BED = OB + BN)
EDI-Body Dissatisfaction	2.60	4.04	18.32	7.43	21.72	5.32	23.18	4.62	76.27 (3, 190)	<.001	CG < OB, OB + BED, OB + BN; OB < OB + BN
EDI-Interoceptive	1.36	2.44	3.58	3.95	9.58	6.06	13.66	5.93	9.77 (3, 190)	<.001	(CG = OB) < OB + BED < OB + BN
EDI-Bulimia	0.20	0.73	1.42	2.43	9.40	4.29	11.62	4.26	49.14 (3, 190)	<.001	(CG = OB) < OB + BED < OB + BN
EDI-Interpersonal Distress	1.76	2.69	3.82	4.27	4.72	4.04	6.20	4.75	0.59 (3, 190)	.691	
EDI-Ineffectiveness	1.56	3.02	4.58	4.35	10.72	6.85	13.62	6.27	6.07 (3, 190)	.001	(CG = OB) < (OB + BED = OB + BN)
EDI-Maturity Fears	3.78	3.16	6.02	4.91	6.92	4.99	9.64	5.62	1.27 (3, 190)	.398	
EDI-Perfectionism	3.60	3.06	3.43	3.40	4.78	4.61	6.14	4.84	0.20 (3, 188)	.897	
EDI-Impulsivity	1.06	1.99	2.44	3.63	6.00	4.73	8.10	5.65	0.76 (3, 190)	.625	
EDI-Ascetic	1.72	1.84	4.66	3.47	6.26	3.31	8.26	3.23	6.56 (3, 190)	.001	CG < (OB = OB + BED = OB + BN)
EDI-Social Insecurity	2.38	3.36	3.62	3.70	6.78	4.51	9.02	4.30	0.43 (3, 190)	.759	
EDI-2: total	21.3	19.3	63.0	29.7	98.8	34.8	123.6	32.9	24.83 (3, 188)	<.001	CG < OB < OB + BED < OB + BN

SD, standard deviation; EDI, Eating Disorders Inventory; OB, obese group; OB + BED, obese group with binge eating disorders; OB + BN, obese group with bulimia nervosa; CG, control group; Bold, significant results (.05 level).

\*ANOVA adjusted by age (omnibus test); corrected for multiple comparison (Finner's correction).

**Personality traits**

Regarding TCI-R scores (Table 4), statistically significant differences across all four groups were found in Harm Avoidance ( $p < .001$ ) and Self-Directedness ( $p < .001$ ). OB + BN patients showed the highest Harm Avoidance and the lowest Self-Directedness, followed by OB + BED, OB and CG subjects in their respective direction. OB + BN and OB + BED patients showed lower Cooperativeness ( $p < .001$ ) and Persistence ( $p = .004$ ) than OB and CG subjects (Table 4).

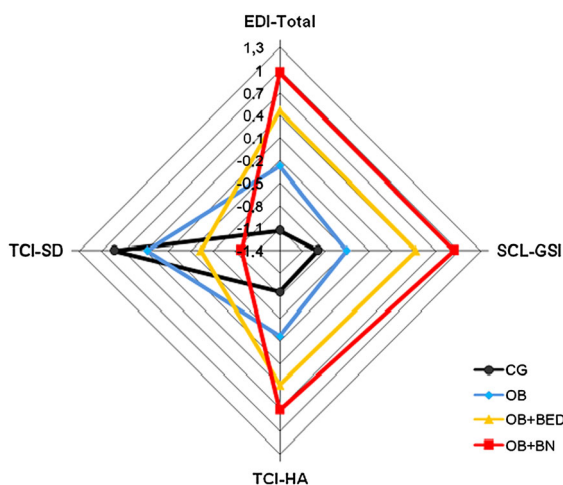
In addition, for all the variables of EDI-2, TCI-R and SCL-90-R that showed statistically significant differences among groups through analysis of variance procedures, a significant linear trend was observed when performing polynomial contrast ( $p < .001$ ). Accordingly, as shown in Figure 1, a radar chart represents graphically this linearity and how the four groups performed across the four domains: two psychopathological (eating and general psychopathology, measured by means of total scores of EDI-2 and SCL-90-R) and two personality traits (Self-directedness and Harm Avoidance).

**Table 4** Temperament and character traits among the groups

	CG		OB		OB + BED		OB + BN		ANOVA adjusted by age		
	(n = 50)		(n = 50)		(n = 50)		(n = 50)		F (df)	p*	Contrasts (comparison between the 4 groups)
Observed means and SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD			
TCR-Novelty Seeking	100.5	13.5	94.3	13.6	101.3	17.3	102.7	16.5	2.33 (3, 193)	.227	
TCR-Harm Avoidance	94.0	13.5	105.8	16.3	118.8	17.5	125.6	17.1	35.73 (3, 193)	<.001	CG < OB < OB + BED < OB + BN
TCR-Reward Dependence	109.9	14.6	110.9	15.9	105.6	15.0	105.0	18.4	1.65 (3, 194)	.359	
TCR-Persistence	116.8	17.6	110.3	18.4	101.7	21.4	103.2	19.6	5.54 (3, 193)	.004	(CG = OB) > (OB + BED = OB + BN)
TCR-Self-directedness	152.7	16.4	140.6	22.1	120.9	23.1	105.9	20.7	48.69 (3, 193)	<.001	CG > OB > OB + BED > OB + BN
TCR-Cooperativeness	145.6	14.6	143.8	14.7	133.4	18.7	130.5	20.9	9.58 (3, 194)	<.001	(CG = OB) > (OB + BED = OB + BN)
TCR-Self-transcendence	62.6	15.1	64.1	14.3	61.9	15.7	65.8	16.5	0.65 (3, 194)	.585	

SD, standard deviation; OB, obese group; OB + BED, obese group with binge eating disorders; OB + BN, obese group with bulimia nervosa; CG, control group; TCR, Temperament and Character Inventory-Revised; Bold, significant results (.05 level).

\*ANOVA adjusted by age (omnibus test); corrected for multiple comparison (Finner's correction).



**Figure 1.** Radar chart showing the performance of the Obese (OB), Obese with Binge eating disorder (OB + BED), obese with bulimia nervosa (OB + BN) and healthy-eating/weight control groups (CG) for eating psychopathology (EDI-2-Total), total scores on general psychopathology (SCL-90R-GSI), Harm Avoidance temperament traits (TCI-R-HA) and Self-directedness character traits (TCI-R-SD)

## Discussion

We examined the personality traits and the clinical and psychopathological characterization (measured by self-reported questionnaires) of obese patients with and without a comorbid ED (namely, BED or BN) and compared them with a normal-weight control group. Our first hypothesis was confirmed, in that the severity of specific and general eating symptomatology and psychopathology (measured by total EDI-2 and SCL-90-R) lay on a continuum with OB + BN and OB at the most and least severe, respectively. Our second hypothesis, regarding personality traits, was partially supported by the present findings. Our results suggest that some personality traits are specific to ED (namely, low Persistence and low Cooperativeness), whereas other personality traits are shared by all the obese groups (namely, high Harm Avoidance and low Self-directedness).

## General psychopathology

Our results showed a continuum regarding psychopathological severity in obese groups, with OB + BN as the more severe, followed by the OB + BED group and the OB group to show the least severity in general psychopathology. These findings are in line with other studies that found higher psychopathology in obese patients with binge eating than those without binge eating (Arias-Horcajadas et al., 2006; Fandiño et al., 2010; Fichter, Quadflieg and Brandl, 1993). Also, our results are in agreement with previous studies that found more severity in BN patients in comparison with BED patients (Núñez-Navarro et al., 2011) and even poorer prognosis (Agüera et al., 2013). These findings suggest a positive association between higher eating symptomatology and higher general psychopathology, in accordance with previous studies (Fichter et al., 1993). However, in contrast to our findings, another study (Carpenter, Hasin, Allison, & Faith, 2000) indicated higher psychopathology in obese people, such as depression, stress, anxiety and suicide ideation, but that may be because obesity and obesity with ED have not been differentiated (Fabricatore & Wadden, 2004; Telch & Agras, 1994).

## Eating disorder symptomatology

Drive for Thinness and body dissatisfaction were increased in all the obese groups, but this was not simply related to weight, as cases with OB + BN (with the lowest weight of all three groups) had a more negative body attitude than the other groups in this study. As already noted by some authors, the greater body dissatisfaction would be associated with the presence of ED and not to the degree of obesity (Arias-Horcajadas et al., 2006). On the other hand, people with simple obesity did not share the traits of ineffectiveness, poor interoceptive awareness and bulimic symptomatology, measured by EDI-2, seen in obese people with ED (Barry, Grilo, & Masheb, 2003; Fassino, Leombruni, Piero, Abbate-Daga, & Giacomo Rovera, 2003; Fassino et al., 2004). These variables, more specifically related to ED, were found to be similar among OB patients and CG.

## Personality traits

Our second hypothesis, relating to shared personality traits, was partially supported. High Harm avoidance and low Self-directedness

(Fassino et al., 2002a, 2002b; Sullivan et al., 2007) were present in obese and ED patients, and this may be particularly linked to the obese BED group (Fassino et al., 2002b). Differences between ED subgroups in personality traits have also been reported (Hoffman et al., 2012). However, surprisingly and inconsistent with previous research, significant differences between the groups were not found regarding Novelty Seeking. Although this finding contradicts other studies that have identified higher Novelty Seeking in both individuals with BN (Fassino et al., 2002a) and BED (Fassino et al., 2002b) than controls, it is also possible that the impulsivity captured by the TCI-R Novelty Seeking subscale may be characteristic of only an impulsive subgroup of BN and BED cases (e.g. those who presented other comorbid disorders; Fernandez-Aranda et al., 2006).

In accordance with previous studies, some dysfunctional personality traits (mainly high Harm avoidance and low Self-directedness) were positively related to general psychopathology, in obese individuals, mainly those who had an ED. In this sense, previous studies have reported an association between some personality traits (i.e. high Harm avoidance and low Self-directedness), and anxious and depressive symptoms (Brown, Svrakic, Przybeck, and Cloninger, 1992), as well as the higher presence of these symptoms in obese patients who had an ED, than in obese without ED (Arias-Horcajadas et al., 2006; Fandiño et al., 2010; Fassino et al., 2003). In this line, another study (Dalle Grave et al., 2007) pointed out that the improvement of psychopathology (specifically depressive symptomatology) was related to changes in harm avoidance and self-directedness.

The profile of personality traits is independent of weight but is related to ED behaviours in a complex manner. This suggests that it may be helpful to have a multidimensional assessment process in order to formulate a treatment plan, rather than following a broad transdiagnostic treatment plan. For example in addictive problems, it has been found useful to match the intervention to personality traits (Conrod, Castellanos, & Mackie, 2008; Conrod, Castellanos-Ryan, & Strang, 2010).

This study, which has concurrently taken into account the dimensions of weight and ED symptomatology, general psychopathology and personality traits, has implications for nosology and clinical care. For example, people with obesity complicated by ED have poorer therapy outcome and higher drop-out rates (Bulik, Sullivan, Joyce, Carter, & McIntosh, 1998; Fernandez-Aranda et al., 2009; Hsu et al., 1998).

## Limitations

The present study must be assessed in the context of several limitations. First, the three obese groups consisted of patients seeking treatment for obesity or ED, so the present results may not be extrapolated to obese people from the general population. Specifically, a subsample of the patients was in the waiting list for bariatric surgery. It is known that such patients are very likely to show socio-relational and psychological problems and this could limit the generalizability of our results. Second, we did not assess other eating and non-eating-related clinical indices, such as personality disorders, impulsive behaviours, unhealthy dieting behaviours, related syndromes (e.g. prader willi), and metabolic or endocrinological parameters. Furthermore, future studies should control for pharmacotherapy, as the lack of these data is a limiting factor of the present study. Finally, it would have been useful to have a sample of men. However, the number of men with ED diagnoses (mainly BN and BED) was too small for meaningful comparisons.

## Conclusions

In the present study, we found a number of clinical and personality differences between obese patients with and without a comorbid ED, and normal-weight healthy controls. Given these differences (namely, greater psychopathology, more severity in eating symptomatology and higher body dissatisfaction in ED patients than in obese patients without a comorbid ED), the presence of binge and/or purge symptomatology in obese patients must be taken into account in clinical practice. Therefore, it would be useful to apply a treatment aimed to motivation and adherence to treatment, especially in those patients with low Persistence, low Cooperativeness and high Inefficacy (i.e. obese patients with comorbid BED or BN).

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