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Abstract

While social avoidance and distress (SAD), a key aspect of social phobia related to behavioral inhibition, is high in different eating disorders (EDs), novelty seeking (NS) is mainly linked to bulimic disorders. Since heterogeneity in NS levels (low/high) exists in social phobia and in about 55% of ED with a highly disturbed personality, we examined ED types based on SAD and NS and their relationships to eating and comorbid features.

Scores of 825 ED women on SAD and NS were submitted to cluster analysis. Five clinically differentiated ED clusters emerged: two without SAD (45%) and three with high SAD and low (13%), mid (34%), high NS (8%) levels. High vs. low SAD groups showed greater eating and social impairment, ineffectiveness, ascetism, suicide attempts, and lower education. Among SAD clusters, “SAD–low NS” had the lowest rate of binge eating, vomit, substance use, stealing and compulsive buying, whereas “SAD–high NS” presented the opposite pattern. However, no differences across SAD clusters were found with regard to ED diagnostic category distribution or history of treatment. Findings show that SAD-ED types present heterogeneity of NS and greater severity.

1. Introduction

Among anxiety disorders, social phobia frequently overlaps with eating disorders (EDs). Social phobia appears to be the second most common comorbid diagnosis (about 20%) (Kaye, Bulik, Thornton, Barbarich, & Masters, 2004) and the most common comorbid life- time diagnosis (55–59%) (Godart, Flament, Lecrubier, & Jeammet, 2000). These data, together with evidence regarding social phobia’s earlier onset than ED in most cases, as well as of the absence of significant differences in the prevalence of social phobia across ED diagnostic categories (DSM; American Psychiatric Association (APA), 2000) (Godart et al., 2000; Kaye et al., 2004), led researchers to suggest that social anxiety might be a vulnerability factor for development of any ED (Kaye, 2008; Schwalberg, Barlow, Alger, & Howard, 1992). However, little is known about how social anxiety as a dimensional trait may link to ED symptoms and related features.

Research has identified three personality subtypes in adult patients with eating disorders: high functioning (42–45%), over-controlled and under-controlled. The latter two are characterized by greater comorbidity, poorer social functioning and outcome (Thompson-Brenner & Westen, 2005; Westen & Harnden-Fischer, 2001). Furthermore, the under-controlled personality type shows high comorbidity of disorders characterized by high social avoidance and distress (Heimberg, Hope, Rapee, & Bruch, 1988). For example, this type has shown higher rates of all anxiety and cluster C personality disorders than the high functioning type. Furthermore, it has even presented higher rates of dependent personality, panic and post-traumatic stress disorder than the over-controlled (Thompson-Brenner & Westen, 2005). Considering both that social anxiety is high and common in all ED types (Kaye et al., 2004) and the high degree of heterogeneity that characterizes ED diagnostic types (Peñas-Lledó et al., 2009), it is likely that both the over- and under-controlled personality prototypes may exist in ED with high social anxiety as has been shown in patients with social phobia (Kashdan, Elhai, & Breen, 2008; Kashdan & Hofmann, 2008; Kashdan, McKnight, Richey, & Hoffman, 2009). These prototypes are also likely to present specific relationships to eating and comorbid symptoms, which are characterized by higher psychiatric severity and poorer functioning.

Social anxiety is defined as the strong fear and distress accompanied by avoidance of social situations in which a person might be exposed to negative evaluation by others. Research suggests that social avoidance and distress (SAD) exists on a continuum referred to as the social anxiety spectrum that ranges from the absence of social fear to intense and functionally impairing levels that may include social phobia diagnostic criteria (DSM; APA, 2000) (McNeil, 2001). This is consistent with recent epidemiological studies

showing that, increasingly, social fears are associated with severe manifestations of the disorder (i.e., psychiatric comorbidity, suicide attempts, lower levels of social function and education) (McNeil, 2001; Ruscio et al., 2008).

In addition, it is well established that an important feature and risk factor of social anxiety and other anxiety disorders is the temperamental trait of harm avoidance (Hayward, Killen, Kraemer, & Taylor, 1998; Kaye et al., 2004; Turner, Beidel, & Wolff, 1996). Harm avoidance has been also associated with vulnerability to ED (Klump et al., 2004), as well as with vulnerability to ED and other comorbid anxiety disorders (Kaye et al., 2004). Individuals with SAD consider that since they are socially inadequate, others will judge them negatively. Thus, they generally use behavioral inhibition and avoidance to suppress negative emotions whenever they cope with social threat cues such as rejection, punishment and novel stimuli. However, despite the fact that behavioral inhibition and avoidance may be effective in suppressing expression of emotions, it may impair regulation of the negative experience associated with them, thereby increasing feelings of worthlessness and inducing impulsive reactions (Gross & John, 2003; Vohs, Baumeister, & Ciarocco, 2005).

In relation to this, novelty seeking (NS), a qualitatively opposed temperamental trait to harm avoidance, has been found to characterize a percent of socially anxious individuals in independent cluster analytic studies (Kashdan et al., 2008, 2009; Kashdan & Hofmann, 2008). Such studies have shown this group of socially anxious individuals with high NS vs. the group with low NS to be characterized by greater use of impulsive behaviors such as substance abuse and greater social impairment. However, these impulsive socially anxious individuals were not found to be more likely to seek treatment for social phobia than other socially anxious individuals (Kashdan et al., 2009). Considering the high lifetime prevalence of social phobia among ED patients (Kaye et al., 2004) and that NS is a shared risk factor with anxiety and bulimic disorder (BN), an eating disorder mostly characterized by the presence of recurrent binge eating and compensatory behaviors (Wade, Bulik, Prescott, & Kendler, 2004), a subset of ED women may be expected to present high scores on SAD and NS. Further support for this expectation comes from studies of ED patients in which NS explained the confluence of BN and lifetime impulse control disorders (Fernández-Aranda et al., 2006, 2008).

On the basis of the research described above, we expected to identify at least three clinically relevant groups of ED patients based on SAD and NS: one with low SAD levels, and the other two with high SAD levels in conjunction with low or high NS, respectively. We expected the latter to present the largest number of women with impulsive problems, including bulimic behaviors. Therefore, the aim of the present study was threefold: first, to find clinically relevant and specific eating disorder clusters based on the dimensions of SAD and NS; secondly, to examine their specific relationships to eating and comorbid symptoms; and finally, to explore the distribution of ED DSM diagnoses across the empirical clusters.

2. Methods

2.1. Participants

The final sample included 825 case reports from female patients consecutively admitted to the Eating Disorders Unit at the Department of Psychiatry in the University Hospital of Bellvitge, who met DSM-IV criteria for an ED (APA, 2000) as determined by a

SCID-I (First, Spitzer, Gibbon, & Williams, 1997). The SCID-I was carried out by experienced psychologists who were trained in the administration of this instrument, although formal inter-rater reliability was not computed for this study. Of these, 100 (12.1%) were anorexia nervosa-restrictive (AN-R), 80 (9.7%) anorexia nervosa-binge eating/purging (AN-BP), 350 (42.4%) BN-purging (BN-P), 43 (5.2%) BN-non-purging (BN-NP), 252 (30.6%) eating disorders not otherwise specified (EDNOS) including 122 (14.8%) EDNOS-AN, 87 (10.5%) EDNOS-BN, 41 (5.0%) binge eating disorder and 9 (0.2%) night-time eating syndrome. The EDNOS diagnosis was given if the individual did not meet the minimal criteria for AN/BN (in the case of subthreshold AN: no amenorrhea, or could not meet the minimal BMI of 17.5; in the case of subthreshold BN: although meeting all criteria for BN, they could not, however, meet the frequency criteria). The mean age of the participants was 26.3 years ($SD = 7.3$). Mean age of onset of the eating disorder was 19.3 years ($SD = 6.5$) and mean duration was 7.0 years ($SD = 5.96$). The Ethics Committee of our Institution approved this study and informed consent was obtained from all participants.

2.2. Measures

2.2.1. Social avoidance distress scale (SAD; Watson & Friend, 1969)

The SAD is a 28-item true–false scale, which was designed to measure the degree of distress, discomfort, anxiety, and avoidance of social situations. Higher scores indicate greater social avoidance and distress. The Spanish version of the present scale has shown good psychometric properties (Bobes et al., 1999).

2.2.2. Temperament and character inventory-revised version (TCI-R; Cloninger, 1999)

The TCI-R is a 240-item, five-point Likert scale 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). Both the Spanish version of the original questionnaire and the revised version (Gutiérrez-Zotes et al., 2004) have shown good psychometric properties.

2.2.3. Weekly binge eating, vomiting and laxative use frequencies Throughout duration of the study, patients kept a food diary

(Fernández-Aranda & Turón, 1998), which also recorded episodes of binge eating and purging. Patients were trained by the therapists in diary-keeping in a session prior to starting treatment.

2.2.4. Bulimic investigatory test Edinburgh (BITE; Henderson & Freeman, 1987)

This questionnaire contains 33 items that measure the presence and severity of bulimic symptoms. There are two subscales: the symptomatology scale (30 items), which determines the seriousness of the symptoms, and the severity scale (3 items) that offers a severity index (i.e., the higher the scores, the greater the severity). The Spanish translation of this questionnaire has shown good psychometric properties (Rivas, Bersabé, & Jiménez, 2004).

2.2.5. Eating disorders inventory-2 (EDI-2; Garner, 1991)

The EDI-2 is a 91-item multidimensional self-report questionnaire, which assesses characteristics related to AN, and BN disorders, and is subdivided into 11 different subscales: drive for thinness (DT), bulimia, body dissatisfaction, ineffectiveness, perfectionism, interoceptive awareness, interpersonal distrust, maturity fears, social insecurity, impulsivity and ascetism. The Spanish version of the EDI-2 has shown good psychometric properties (Garner, 1998).

2.2.6. Symptom checklist revised (SCL-90-R; Derogatis, 1983)

The SCL-90-R is a widely used questionnaire used for the measurement of self-reported overall psychological distress and psychopathology. It is comprised of 90 items, each rated on a five-point scale of distress. The global severity index (GSI), a widely used overall measure of distress, was used for the present study. The Spanish version of the SCL-90-R has shown good psychometric properties (González de Rivera, 2001).

2.2.7. Lifetime impulse control disorders

Evaluation of lifetime alcohol and substance use, stealing behavior, pathological gambling, compulsive buying, kleptomania and suicidal behaviors were assessed using the structured clinical interview for DSM-IV axis I disorders (SCID-I) (First et al., 1997). Suicidal attempts, defined as self-destructive acts with some degree of intent to end one's life, were assessed by structured clinical face-to-face interviews, on the basis of a lifetime time frame.

2.3. Statistical analysis

For the present subtyping scheme, the global scores on the SAD and the TCI-R subscale of novelty seeking (NS) were submitted to cluster analysis. Analyses were carried out with SPSS 15.0.1 for Windows. Different cluster analyses were carried out specifying a three to six group solution based on scores in the SAD and the TCI-R NS scales. The two step-cluster procedure, which creates empirical groups based on a nearness criterion into a hierarchical agglomerative clustering (Fraley & Raftery, 1998; Theodoridis &

Koutroumbas, 1999), was used. In this study, the distance measure was a likelihood function and the normal density for continuous variables was selected due to the metrical scale of income variables. According to our hypothesis, the best cluster solution was selected from among the results obtained by the system. The comparison of different groupings was based on clinical criteria with the aim of obtaining the best final classification with a clear theoretical interpretation and to avoid superposition patterns.

Next, analysis of variance (ANOVA) for quantitative measures and chi-square tests for qualitative measures were carried out to compare the empirically derived subclusters on clinical phenotypes (the two income variables of cluster analysis, sociodemographic data, frequency of bulimic behaviors, eating-related pathology, comorbid psychopathology, personality characteristics and impulse control problems). Effect size and association measures were based on eta-squared in ANOVA procedures (for quantitative criteria) and Nagelkerke's R^2 in logistic regressions (for binary criteria). Due to multiple comparisons, type-I error inflation was controlled through Finner's adjustment (Finner, 1993), obtained with SPSS macros (Domènech, 2008). This method is a modified (stepwise) Bonferroni method that uses a sequential step-down procedure to adjust the p-values to control the familywise error rate (FWER) while retaining better power than Bonferroni's method. In step-down methods p-values are examined in order, from smallest to largest. Once a p-value is found that is large according to a criterion based on alpha and the p-value's position in the list, that p-value and all larger p-values are accepted. Bonferroni's correction constitutes a traditional and popular procedure to control the change of making type-I errors in the scenario of multiple comparisons. But it has a very relevant cost: an important reduction in statistical power. Many simulations demonstrate that when the number of tests increases, the power for each individual comparison becomes too low, and consequently unacceptable. Finner's correction constitutes a sensible and powerful alternative, and it is included in the approaches based on the control of the false discovery rate. It aims at controlling the "proportion" of significant results that are in fact type-I errors. The specific algorithm, which can be revised in Brown and Russell (1997), consists of keeping the proportion of false discoveries relative to all significant results at a specific low level.

While Finner's adjustment was applied to the overall 42 omnibus tests analyzed at once, post hoc comparisons were performed for those measures that showed statistically significant differences. In this case, the global alpha value for the whole set of contrasts was established at 0.05.

3. Results

3.1. Cluster analysis: subtypes along social avoidance and distress (SAD) and novelty seeking (NS)

Results obtained for the 5-factor solution in cluster analyses are shown in Table 1. About half of the total population ($N = 464$) was distributed into three groups presenting higher mean scores on SAD without significant differences between them (greater than 20) than the other two (mean scores lower than 7.5). The present cluster analysis yielded three groups of ED patients with high SAD levels that were clearly differentiated by their mean NS levels: "SAD-low NS" (13.3%), "SAD-mid NS" (34.5%) and "SAD-high NS" (8.4%). The mean NS scores obtained for the "SAD-low NS", "SAD-mid NS" and "SAD-high NS" clusters corresponded to percentile 37, 52 and 70, respectively, in the norm population for the TCI-R psychometric study in Spain (Gutiérrez-Zotes et al., 2004), which were regarded as low, medium, and very high in the community sample.

3.2. Subtype comparisons

Table 1 shows all relevant clinical variables that presented significant effects from this subtyping scheme based on SAD and NS. Regarding the omnibus tests, overall results remained unchanged when Finner's correction was applied with respect to initial results without correction for potential type-I error. Significant differences between empirical subtypes are summarized in the following sections.

3.2.1. Sociodemographic variables

ED women with "SAD-low NS" were older than those with "higher mid NS" but there were no significant differences between the remaining groups. Age of ED onset was younger for those with higher NS levels ("SAD-high NS" and "higher mid NS" than in the "lower mid NS" cluster). SAD clusters also had less than a university-level education. In addition, "SAD-high NS" showed greater unemployment than the two clusters without SAD risk.

3.2.2. Eating-related psychopathology

Overall, the three SAD clusters had greater eating psychopathology (EDI-total) than the other two. In particular, they presented greater scores on the EDI scales of interoceptive awareness, impulsivity, ineffectiveness and ascetism without significant differences between them. In addition, they also presented greater interpersonal distrust and social insecurity than the other two, with the “SAD–low NS” cluster having even greater scores on these scales than the other “SAD” clusters.

With regard to bulimic behaviors, significant differences appeared among the “SAD–low NS”, which had similar scores to the “lower mid NS” cluster, and the other two SAD clusters with mid and high NS levels that were similar to “higher mid NS”. BITE– severity score and the percents of women who engaged in binge eating and vomiting behaviors were lower in the former than in the latter. In particular, the “SAD–high NS” cluster presented the highest number of women who engaged in vomiting and the greatest severity of this behavior. Finally, the number of women who engaged in laxative use was greater in the “SAD–mid NS” and “SAD–high NS” than in the non-SAD clusters. These results suggest that engaging in binge eating or vomiting behaviors seems in general better explained by NS than by SAD severity, whereas the confluence of SAD and NS appeared to increase the probability of laxative use.

Other clinical variables such as current and minimum lifetime body mass index (BMI), premorbid obesity, perceived need and desire to receive present treatment and number of previous treatments (not shown in Table 1) were analyzed but presented no significant differences. However, there were differences in maximum lifetime BMI and duration of ED that were greater in the “SAD–mid NS” than in the “higher mid NS” and in the “lower mid NS” clusters, respectively.

3.2.3. General psychopathology

The three SAD clusters had greater scores than the other two on the GSI (SCL-90-R), with the “SAD–high NS” cluster presenting the greatest level of psychopathology among all groups. The three SAD groups also reported greater social impairment than the other two.

3.2.4. Impulse control disorders

The “SAD–high NS” cluster showed the greatest number of women who engaged in different impulsive behaviors such as alcohol and substance abuse, compulsive buying, stealing behavior and pathological gambling in comparison to the other clusters. By contrast, the “SAD–low NS” cluster showed the lowest number of women who engaged in drug abuse. The SAD–low NS cluster, together with the lower mid NS also presented the lowest rates of stealing behavior and compulsive buying. However, both “SAD–high NS” and “SAD–low NS” had greater numbers of ED women who attempted suicide than the non-SAD clusters.

3.2.5. Personality traits

The three SAD clusters presented lower scores on reward dependence than the rest, corresponding to low scores (around percentile 40 in the Spanish psychometric study of the TCI-R; Gutiérrez-Zotes et al., 2004). In addition, they also scored greater than the rest on harm avoidance, the “SAD–low NS” having the highest score of all and the lowest with regard to self-directedness. Finally, the “SAD–high NS” together with SAD–mid NS” had lower scores than the rest on cooperativeness.

3.3. Distribution of DSM-eating diagnostic types across subtypes

No differences were found for representation of diagnostic types across the SAD–NS empirical clusters as shown in Table 1. The only significant difference emerged for the “lower mid NS” type characterized by presenting the lowest levels of psychopathology, with the greatest number of women with AN-R and the lowest with BN-P.

4. Discussion

In the light of previous research showing (a) high and similar lifetime prevalence rates for social phobia across ED types in about 55% of adult women, (b) heterogeneity within socially anxious individuals with regard to levels of behavioral disinhibition, and (c) severe personality types characterized by high/low inhibition in about 55% of ED women, the present study had three aims: first, to identify clinically relevant

clusters based on these dimensions; secondly, to examine their specific relations to eating and related features; and finally, to explore the distribution of ED DSM diagnoses across the empirical clusters.

4.1. Cluster analyses

Present results derived by cluster analyses fit with expectations. Firstly, from the total, more than half of the ED women (55%) presented low social function or high levels of SAD, a key aspect for the diagnosis of social phobia (DSM; APA, 2000), at baseline assessment. This result is coherent with evidence showing that social phobia is the most common lifetime comorbid anxiety disorder in ED with rates close to the presently found 55% (Godart et al., 2000; Kaye et al., 2004). Additionally, this result appears in agreement with the identified percent of adult ED women (55–58%) with an over- or under-controlled personality style characterized by high psychiatric comorbidity and poor functioning and outcome (Thompson-Brenner & Westen, 2005; Westen & Harnden-Fischer, 2001). Secondly, these SAD-ED women were distributed into three differentiated groups that had NS levels ranging from very low (13%) to very high (8%) with a larger group in between with mid NS levels (34%). Present results are also coherent with research in social phobia individuals since they confirm heterogeneity within ED women with high levels of social anxiety, including a small group with very high NS levels too (Kashdan et

al., 2008, 2009). Although present or lifetime prevalence rates of social phobia were not determined in the present study, high levels of the dimension SAD are of relevance since severity of social phobia is proportional to a number of social fears (Ruscio et al., 2008).

4.2. Subtype comparisons

Present clusters showed specific relationships to eating and comorbid symptoms. Overall, as shown in previous studies, SAD vs. non-SAD clusters showed lower university education, greater psychopathology (McNeil, 2001; Ruscio et al., 2008), in particular, higher eating, ego-dysfunction (interoceptive awareness, impulsivity, ineffectiveness and ascetism), personality (harm avoidance and lower reward dependence and self-directedness) and related psychopathology including suicide attempts and social impairment.

Furthermore, in support of prior findings in social phobia patients, there were also differences between SAD clusters (Kashdan et al., 2009). ED “SAD–low NS” had the lowest rate not only of binge eating and vomiting but also of other impulsive behaviors such as substance use, stealing behavior and compulsive buying. The low rate of these behaviors was found in association with certain ego-function and personality features in “SAD–low NS” type that presented the greatest levels of social insecurity, interpersonal distrust, harm avoidance and cooperativeness. On the contrary, the “SAD–high NS” presented the greatest rate of vomit, alcohol and substance use, stealing behavior, pathological gambling and compulsive buying and the lowest levels of TCI-R- self-directedness. Some relevant differences are discussed in more detail in the following sections.

4.2.1. Sociodemographic variables

As found in other associated disorders (namely impulse control disorders) (Jiménez-Murcia et al., 2010), age of ED onset was younger in those clusters with higher NS levels, “SAD–high NS” and “higher mid NS,” than in the “lower mid NS” cluster. In the light of this finding, one could speculate that the subset of ED women with the highest NS levels may have later developed SAD due to the negative social consequences of engaging in impulsive behaviors. However, despite the fact that NS is conceptualized as a lifelong trait, the cross-sectional design does not permit us to draw inferences about risk factors. Thus, future longitudinal studies addressing the temporal pattern and directionality of these relationships may be able to test whether those ED patients with impulse control problems may be at a greater risk of developing SAD subsequent to ED instead of before as commonly reported (Fernández-Aranda et al., 2008; Godart et al., 2000; Kaye et al., 2004).

4.2.2. Eating pathology

The three SAD clusters had greater scores on EDI-total (overall eating pathology) than the other. However, NS levels clearly explained differences in bulimic pathology between these groups. “SAD–low NS” and “lower mid NS” types had lower BITE severity, and percent of women reporting binge eating and vomiting than types with mid to very high NS levels, the other two SAD and the “higher mid NS” types. Of all the

clusters, the “SAD–high NS” was the most impaired with regard to the use of vomiting. As in previous research, two personality variables were clearly associated with vomiting severity because this type presented the highest levels of NS and the lowest of self-directedness (Reba et al., 2005; Wade, Treloar, & Martin, 2008). Also in keeping with previous research (Tozzi et al., 2006), laxative use was greater in women with a confluence of higher anxiety and impulsivity than in those with lower anxiety.

4.2.3. EDI-ego-function and TCI-personality variables

SAD vs. non-SAD showed higher levels of TCI-harm avoidance (related to EDI-interpersonal distrust and social insecurity, which were also higher) and lower reward dependence (related to EDI-ascetism), self-directedness (related to EDI-ineffectiveness and impulsivity) and cooperativeness scores. These results were similar to those previously found in eating disorders in both the ill and recovered state vs. control women (Klump et al., 2004), suggesting that these traits may be present in most people with eating disorders, and are even higher if they have high social anxiety.

Greater ascetism and lower reward dependence characterized all ED-SAD vs. non-SAD clusters, despite being traits commonly associated with the restricting-type anorexia nervosa (DSM-IV; APA, 2000). These findings are consistent with studies showing that socially anxious individuals and individuals who use emotion suppression and inhibition present diminished positive and rewarding psychological experiences (Gross & John, 2003; Kashdan, 2007). The reduced hedonic capacity observed in ED with SAD seems to be trait-related and might be partly explained by the correlation between alterations in striatal dopamine function in response to rewarding stimuli and harm avoidance in these patients (Wagner et al., 2007, 2010).

Higher impulsivity in conjunction with other related features such as poor interoceptive awareness and ineffectiveness in SAD vs. non-SAD clusters suggested difficulties in maintaining self-control. This may be a consequence of self-imposed effortful control, which is known to favor depletion of executive resources (Vohs et al., 2005).

4.2.4. Lifetime impulse control disorders

The “SAD–high NS” cluster had the greatest rate of impulse control disorders, which is compatible with other studies based on a different approach (Fernández-Aranda et al., 2006, 2008), and as discussed above, may reflect social anxiety as a consequence of serious life impairments due to externalising behaviors. In this regard, all SAD clusters may be more vulnerable to impulsivity, as shown by scores on EDI-impulsivity, but may differ with regard to the impulsive behavior used. Indirect support for this fact comes from the differences that emerged between SAD clusters in stealing, buying and substance use with the exception of suicidal behavior. Thus, future research should explore the sort of impulsive behaviors that present “low and high NS–SAD” clusters, which may have important implications for treatment.

4.2.5. History of treatments

Despite the “SAD–high NS” being more impaired than “SAD–low NS,” no differences were found with regard to number of past treatments or the reported need to receive treatment at present. This result is coherent with recent research in social phobia patients (Kashdan et al., 2009). The same occurred when comparing the SAD groups vs. the non-SAD groups. Despite being more impaired than the latter, the former presented no differences in number of past treatments or perceived need for treatment.

4.3. Distribution of ED diagnoses across subtypes

No differences were found for ED diagnostic category distribution including EDNOS across SAD types as has been shown in previous studies examining social phobia in ED (Godart et al., 2000; Kaye et al., 2004). Thus, it would appear relevant to examine the similarity of dimensional variables such as SAD, harm avoidance and novelty seeking for cross-diagnostic research to advance.

Further research is needed to address the temporal relation between ED, SAD and NS and to overcome limitations inherent in the design of this study including reliance on self-report measures to explore social anxiety, a case report retrospective design, a cross-

sectional assessment and a convenience sampling. Nevertheless, its major strengths are: (a) the relatively large clinical sample of eating disorder patients, (b) data from a Spanish sample, (c) some novel findings,

and (d) the study's potential to identify under-recognized subtypes of eating disorders.

5. Conclusions

The current study provides preliminary data on ED empirical clusters based on social anxiety and novelty seeking. Results appear to be largely consistent with previous cluster analytic or epidemiological studies on social phobia and ED, demonstrating that social anxiety in ED is high at assessment in a population seeking treatment, increases psychopathology and social dysfunction, and involves heterogeneity in bulimic and other impulsive behaviors. It also shows that despite greater severity in the clusters of socially anxious ED women, particularly in the very high impulsive subset, this seems to present no differences with regard to previous number of treatments or perceived need to receive treatment. Finally, it also shows that these "SAD" clusters had no differences in the distribution of ED diagnostic types. These findings may shed light on ED phenomenology, etiology and treatment at cognitive, emotional, behavioral, interpersonal and biological levels. For example, for treatment benefits when exploring SAD in ED, it is also essential to look at NS levels, in order to focus on the motivation behind engaging in internalizing–externalizing impulsive behaviors. It is important to favor those impulsive behaviors that may be functional, because they lead to positive experiences in order to ultimately prevent reinforcing avoidance. Therefore, present results can be useful in future examinations of behavioral and neurobiological processes associated with SAD in ED, and response to particular treatments.

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Table 1

5 cluster solution	(1) SAD-low NS (N = 110)	(2) Lower mid NS (N = 156)	(3) SAD-mid NS (N = 285)	(4) Higher mid NS (N = 205)	(5) SAD-high NS (N = 69)	p-Value ^a	Effect size ^b	Comparison between clusters: contrasts ^c
Social anxiety (SAD)	21.89 (3.95)	6.53 (3.92)	20.89 (4.09)	7.24 (4.27)	20.09 (3.92)	<0.001	0.75	(2-4) < (1-3-5)
TCI-R: total novelty seeking	78.11 (7.58)	91.26 (8.72)	100.81 (6.93)	115.95 (9.43)	127.33 (9.24)	<0.001	0.75	1 < 2 < 3 < 4 < 5
Sociodemographic								
Age	27.91 (8.00)	26.49 (8.04)	26.59 (7.40)	25.07 (6.38)	25.39 (6.02)	0.014	0.02	1 > 4
Age ED onset	20.55 (7.55)	20.87 (7.18)	19.14 (6.34)	18.16 (5.56)	17.76 (4.89)	<0.001	0.03	2 > 4,5
Education (university)	10.2%	25.2%	11.0%	19.6%	11.6%	0.004	0.04	(1-3-5) < (2-4)
Unemployment	30.6%	23.4%	31.2%	21.4%	37.9%	0.029	0.02	2,4 < 5; 3 > 4
Eating-related pathology								
Rate binge eating	54.5%	51.4%	72.3%	69.7%	70.3%	<0.001	0.05	(1-2) < (3-4-5)
Frequency binge eating	4.46 (6.84)	3.42 (6.28)	5.55 (7.11)	4.72 (6.22)	5.28 (9.87)	0.059	0.01	
Rate vomit	46.0%	45.2%	63.0%	59.3%	73.8%	<0.001	0.04	(1-2) < (3-4) < 5
Frequency vomit	3.44 (6.38)	3.76 (7.25)	6.18 (8.63)	4.86 (7.26)	9.11 (12.72)	<0.001	0.04	1,2,4 < 5
Rate laxatives	29.3%	22.1%	31.8%	20.1%	41.0%	0.005	0.03	(2-4) < (3-5)
Frequency laxatives	3.65 (9.49)	3.71 (11.59)	5.14 (14.95)	2.70 (20.56)	9.00 (28.06)	0.115	0.01	
BITE: symptoms	18.84 (7.75)	15.80 (8.58)	21.49 (6.79)	20.40 (6.91)	21.78 (5.87)	<0.001	0.08	2 < 1,3,4,5; 1 < 3
BITE: severity	9.75 (6.91)	7.69 (6.75)	12.58 (7.39)	10.58 (6.98)	13.93 (8.16)	<0.001	0.07	1 < 3,5; 2 < 3,4,5; 4 < 5
EDI-II: bulimia	6.95 (6.04)	5.21 (5.54)	7.64 (5.71)	7.07 (5.71)	7.72 (5.32)	<0.001	0.02	2 < 3
EDI-II: drive for thinness	13.57 (6.27)	10.37 (6.87)	14.28 (5.71)	13.13 (6.01)	14.33 (5.56)	<0.001	0.05	2 < (1-3-4-5)
EDI-II: body dissatisfaction	18.15 (7.61)	12.53 (8.04)	18.35 (7.42)	15.19 (7.86)	18.14 (7.63)	<0.001	0.08	1 > 2,4; 2 < 3,4,5; 3 > 4
EDI-II: interoceptive awareness	14.69 (5.96)	6.74 (5.52)	12.82 (6.28)	10.15 (6.15)	14.03 (5.56)	0.001	0.17	(2-4) < (1-3-5)
EDI-II: interpersonal distrust	9.79 (4.44)	3.54 (3.34)	7.54 (4.23)	3.35 (3.27)	6.72 (4.07)	<0.001	0.27	(2-4) < (3-5) < 1
EDI-II: ineffectiveness	15.51 (6.12)	6.89 (5.42)	13.17 (6.63)	8.54 (6.63)	13.12 (6.04)	<0.001	0.19	(2-4) < (1-3-5)
EDI-II: maturity fears	10.41 (6.27)	5.97 (5.06)	8.46 (5.44)	7.36 (5.67)	10.17 (5.97)	<0.001	0.06	1 > 2,4; 2 < 3,5; 4 < 5
EDI-II: perfectionism	6.55 (4.43)	4.99 (4.05)	5.65 (4.28)	4.89 (4.45)	5.70 (4.85)	0.015	0.02	1 > 4
EDI-II: impulsivity	8.08 (5.69)	3.58 (4.32)	8.35 (6.07)	5.69 (5.08)	10.23 (5.58)	<0.001	0.13	(2-4) < (1-3-5)
EDI-II: ascetism	8.69 (4.62)	5.06 (3.97)	7.98 (4.05)	5.94 (3.70)	7.81 (4.48)	<0.001	0.10	(2-4) < (1-3-5)
EDI-II: social insecurity	12.12 (4.29)	4.57 (3.59)	10.28 (4.55)	5.33 (3.80)	9.97 (4.07)	<0.001	0.33	(2-4) < (3-5) < 1
EDI-II: total score	124.77 (35.93)	69.32 (37.17)	114.58 (39.14)	86.42 (38.83)	117.96 (33.93)	<0.001	0.22	2 < 4 < (1-3-5)
General psychopathology								
SCL-90-R: GSI	2.04 (0.68)	1.25 (0.68)	2.04 (0.70)	1.50 (0.71)	2.32 (0.63)	<0.001	0.21	(2-4) < (1-3) < 5
Degree of social impairment (0-8)	5.73 (2.44)	4.14 (2.61)	5.26 (2.36)	4.24 (2.53)	5.35 (2.38)	<0.001	0.06	(2-4) < (1-3-5)
Lifetime impulse control disorders								
Alcohol misuse	7.1%	4.8%	13.1%	11.3%	38.7%	<0.001	0.10	(1-3-4) < 5; 2 < 3,4,5
Drugs misuse	8.1%	14.5%	17.8%	20.4%	45.2%	<0.001	0.07	1 < (3-4) < 5; 2 < 5
Stealing behavior	4.0%	6.8%	13.5%	18.7%	27.9%	<0.001	0.07	(1-2) < (3-4) < 5
Pathological gambling	1.0%	0.7%	0.8%	2.1%	8.1%	0.002	0.09	2,3,4 < 5
Suicide attempts	30.3%	12.3%	26.2%	19.5%	35.5%	<0.001	0.04	2 < 1,3,5; 4 < 1,5
Kleptomania	2.0%	0.7%	3.5%	2.7%	6.5%	0.193	0.04	
Compulsive buying	7.2%	9.7%	18.7%	22.4%	45.8%	<0.001	0.09	(1-2) < (3-4) < 5
Personality								
TCI-R: total harm avoidance	134.61 (15.88)	108.76 (17.90)	123.93 (15.76)	104.29 (16.86)	123.25 (16.32)	<0.001	0.30	(2-4) < (3-5) < 1
TCI-R: total reward dependence	96.69 (16.67)	108.97 (14.16)	98.22 (14.50)	110.00 (14.23)	100.38 (14.95)	<0.001	0.13	(1-3-5) < (2-4)
TCI-R: total persistence	106.80 (24.07)	116.16 (17.76)	107.59 (20.89)	112.71 (19.99)	108.07 (20.93)	<0.001	0.03	2 > 1,3
TCI-R: total self-directedness	111.19 (19.17)	132.94 (22.89)	110.54 (18.43)	119.75 (18.57)	100.10 (15.19)	<0.001	0.20	5 < (1-3) < 4 < 2
TCI-R: total cooperativeness	137.45 (19.59)	142.91 (14.70)	130.06 (16.98)	137.87 (16.54)	124.74 (21.91)	<0.001	0.10	(3-5) < (1-2-4)
TCI-R: total self-transcendence	62.05 (14.25)	63.94 (14.55)	66.87 (15.99)	68.34 (15.28)	69.20 (16.00)	0.001	0.02	1 < 4
ED subtypes								
Anorexia restrictive (AN-R)	15.5%	23.1%	8.1%	10.7%	2.9%	<0.001	0.06	2 > 3,4,5
Anorexia bulimic-purgative (AN-BP)	10.0%	10.3%	11.9%	5.9%	10.1%			
Bulimia purgative (BN-P)	33.6%	32.7%	48.1%	44.4%	49.3%			2 < 3,4,5
Bulimia non-purgative (BN-NP)	5.5%	3.8%	4.9%	7.3%	2.9%			
EDNOS	35.5%	30.1%	27.0%	31.7%	34.8%			