



How to assess eating disorder severity in males? The DSM-5 severity index versus severity based on drive for thinness

Isabel Krug ^a, An Binh Dang^a, Isabel Sánchez ^{b,c,d}, Roser Granero ^{d,e},
Zaida Agüera ^{b,c,d,f}, Anahi Gaspar-Perez ^g, Susana Jimenez-Murcia ^{b,c,d,g},
and Fernando Fernandez-Aranda ^{b,c,d,g}



^aMelbourne School of Psychological Sciences, The University of Melbourne, Melbourne, Australia; ^bDepartment of Psychiatry, University Hospital of Bellvitge, L'Hospitalet de Llobregat, Barcelona, Spain; ^cGrupo Psiquiatría y Salud Mental-Programa Neurociencias, Instituto de Investigación Biomédica de Bellvitge (IDIBELL), L'Hospitalet de Llobregat, Barcelona, Spain; ^dCiber Fisiopatología Obesidad y Nutrición (CIBERObn), Instituto Salud Carlos III, Barcelona, Spain; ^eDepartment of Psychobiology and Methodology, Universitat Autònoma de Barcelona - UAB, Barcelona, Spain; ^fDepartment of Public Health, Mental Health and Perinatal Nursing, School of Nursing, University of Barcelona, L'Hospitalet de Llobregat, Barcelona, Spain; ^gDepartment of Clinical Sciences, School of Medicine and Health Sciences, University of Barcelona, L'Hospitalet de Llobregat, Barcelona, Spain


ABSTRACT

Using a male eating disorder (ED) sample, this study assessed the clinical utility of the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5) severity indices for males with anorexia nervosa (AN) and bulimia nervosa (BN) and compared it to an alternative transdiagnostic severity categorisation based on drive for thinness (DT). The participants included 143 males with an ED (60 [42.0%] AN and 83 [58.0%] BN) diagnosis, who were classified using these two severity classifications. The different severity categories were then compared based on ED symptoms, general psychopathology, and personality traits. Our results revealed that the DSM-5 “mild” and DT “low” severity categories were most prevalent in the AN and BN male patients. Clinically significant findings were strongest for the DT categorisation for both AN and BN. The current findings provide initial support for an alternative transdiagnostic DT severity classification for males that may be more clinically meaningful than the DSM-5 severity indices.

Clinical implications

- To assess DSM-5 and Drive for Thinness (DT) severity ratings in males with Anorexia (AN) and Bulimia (BN).
- The DSM-5 “mild” and Drive for Thinness (DT) “low” severity categories were most prevalent.
- The DT categorisation provided stronger differences in clinical measures than the DSM-5.

CONTACT Fernando Fernandez-Aranda  f.fernandez@ub.edu  Department of Psychiatry, University Hospital Bellvitge-IDIBELL and CIBERObn, L'Hospitalet de Llobregat, Feixa Llarga s/n, Barcelona 08907, Spain

 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/10640266.2023.2259682>

- DT may act as a transdiagnostic severity rating for males with AN and BN.
- Clinicians should look for the full variety of eating disorder symptoms displayed by their male patients, irrespective of their specific DSM-5 ED diagnosis.

Introduction

Previous editions of the current Diagnostic and Statistical Manual of Mental Disorders DSM-5 [(American Psychiatric Association APA, 2013), i.e., DSM-IV-TR (APA, 2003)] encompassed gender-based diagnostic criteria (i.e., amenorrhea), limiting their utility in diagnosing males with anorexia nervosa (AN). Henceforth, the DSM-5 (APA, 2013) amended these criteria and presented additional gender-neutral eating disorder (ED) severity ratings ranging from “*mild*” to “*extreme*”. The DSM-5 severity ratings are based on body mass index (BMI) for AN and weekly frequency of compensatory behaviours for bulimia nervosa (BN). A few emerging studies (e.g., Krug et al., 2021), including a recent meta-analysis on the DSM-5 severity index for EDs (Dang et al., 2022), have indicated that alternative severity classifications in females (e.g., based on drive for thinness [e.g., Krug et al., 2021] and weight shape concerns [Dang et al., 2023]) might be more clinically useful in indexing the severity of ED psychopathology than the DSM-5 severity categories for AN and BN. However, these alternative severity categorisations have not yet been directly compared to the DSM-5 severity categories in a sample of treatment-seeking male with AN and BN.

The clinical usefulness of the current DSM-5 severity categories for AN and BN

Studies undertaken on female-dominated samples have found inconsistent evidence for the clinical usefulness of the DSM-5 severity ratings for AN and BN (for a detailed review, see Dang et al., 2022). The DSM-5 AN severity index studies (94%–100% female) focusing on clinical populations have revealed only a few significant differences between the severity groups in eating psychopathology, psychiatric comorbidities, or emotional functioning (e.g., Dang et al., 2023; Gianini et al., 2017; Krug et al., 2021; Machado et al., 2017; Reas & Ro, 2017; Zayas et al., 2018). Conversely, a few female-dominated studies (e.g., Dakanalis et al., 2018; 98% females) provided support for significant differences between severity groups in ED psychopathology and ED putative maintenance features (e.g., perfectionism).

Research has also provided inconclusive findings regarding the utility of the DSM-5 severity index for BN (for a review see Dang et al., 2022). Clinical BN samples with 93%–100% female participants (e.g., Dakanalis et al., 2017; Gianini et al., 2017) and a community-based BN study (Grilo et al., 2015; 93% females) found that those in the more severe BN groups exhibited higher

ED psychopathology compared to those in the milder BN groups. However, other female studies found minimal differences across the BN severity categories in eating psychopathology (e.g., Krug et al., 2021; Nakai et al., 2017; Smith et al., 2017).

To date, Zayas et al. (2018) is the only study that examined whether the DSM-5 severity indices differed between males and females with AN ($n = 80$) and BN ($n = 43$). Regarding AN, the authors found no significant differences across the DSM-5 severity categories for both males and females, indicating that BMI may not be an optimal marker of AN severity for both males and females. Conversely, for BN, Zayas et al. (2018) revealed significant patterns of increases in ED psychopathology (e.g., dietary restraint, weight and shape concerns, drive for thinness) across the four DSM-5 BN severity groups in the female (but not in the male) sample.

Drive for thinness: an alternative transdiagnostic severity category

There has been growing interest in exploring transdiagnostic approaches to severity classification for EDs. DT, which is characterised by an extreme fear of weight gain resulting in disordered eating patterns, is argued to be a central feature of most EDs (e.g., De Young et al., 2013). Using mostly female samples, studies have shown that AN and BN patients with a lower DT exhibited milder attitudinal and behavioural ED features and lower comorbidity than patients with higher DT (e.g., Penas-Lledo et al., 2009; Ramacciotti et al., 2002).

To date, only one previous study (Krug et al., 2021) has explored the usefulness of DT as a transdiagnostic severity index for AN and BN using an all-female sample. The authors found that DT was superior to the DSM-5 severity indices in providing more clinically meaningful differences between severity groups in terms of ED and general psychopathology and to a lesser extent also personality traits. It is commonly suggested that males present with drive for muscularity, aligning with the preference for a more muscular physique (Ghaderi et al., 2022; Pope et al., 2000), but males also have desires for weight loss and reduced BMI, and therefore also DT (Kjelsås et al., 2003; Olivardia et al., 2004). Therefore, there is a need to assess DT as an alternative transdiagnostic severity indicator to the DSM-5 severity categories in males to provide further insight into ways to improve clinical diagnosis of ED severity, and subsequently inform a better treatment plan for males suffering from EDs.

The current study

Apart from Zayas et al. (2018) study, all other studies assessing the usefulness of the DSM-5 severity index for EDs have been conducted using almost all-female samples. This study aimed to fill gaps in the literature by assessing for the first time in a male ED sample: 1.) the distribution of a.) the DSM-5

severity indices for AN and BN, and b.) an alternative DT severity categorisation for these ED subtypes and 2.) the clinical validity and utility of these two distinct severity categorisation in terms of ED-related symptoms, general psychopathology, and personality traits.

Based on previous findings from a female-only study that compared the DSM-5 severity indicators to DT (Krug et al., 2021), we hypothesised that DT would offer more clinically meaningful differences between severity groups than the DSM-5 severity categories in terms of ED symptoms, general psychopathology, and personality. Assessing a range of severity indices and their clinical presentations in males is important given that EDs in males are often mis- or underdiagnosed by health-care professionals (Murray et al., 2017). This lack of knowledge in combination with the existing intensified stigma surrounding EDs and the widespread belief that EDs are still a female illness has been shown to lead to delayed assessment and intervention in males with EDs (Mitchinson & Mond, 2015).

Method

Sample

The sample comprised 143 men with an ED diagnosis [60 AN and 83 BN] presenting for treatment from 2002 to 2019 at an ED Unit in Spain. Patients were diagnosed according to the DSM-IV-TR criteria (American Psychiatric Association APA, 2000) and diagnoses were re-analysed and re-codified post hoc using DSM-5 criteria (APA, 2013). For the present analysis, from an initial sample of 221 ED male patients, 17 Purging Disorder, 26 Atypical AN and 35 Binge Eating Disorder (BED) patients were excluded due to low numbers and because the heterogeneous profile of the Purging Disorder and Atypical AN samples did not fit with any of the established DSM-5 severity indices.

Measures

Sociodemographics and clinical information

ED participants were assessed on several demographic variables (age, educational level, living arrangements, employment) and clinical information (age of onset, duration of disorder). The current height and weight—through which BMI was calculated using the formula $\text{weight (kg)}/\text{height (m)}^2$ —were measured for the ED sample at intake.

Eating Disorder Inventory-2 (EDI-2)

(Garner, 1991; Spanish version: Garner, 1998) The EDI-2 includes 91 items assessing ED symptoms, which includes 11 subscales (drive for thinness, body dissatisfaction, bulimia, ineffectiveness, perfectionism, interpersonal distrust,

interoceptive awareness, maturity fears, asceticism, impulse regulation, and social insecurity) and a total score based on the sum of the individual subscales. Items are rated on a scale from 1 (never) to 6 (always). Internal consistency for the EDI subscales was good to excellent in our sample and ranged from 0.71 (asceticism) to 0.96 (EDI-total).

Symptom Checklist-Revised (SCL-90-R)

(Derogatis, 1990; Spanish version: Derogatis, 2002) The SCL-90-R entails 90 questions and is structured in nine first-order dimensions: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. The SCL-90-R also comprises various summary indices, which include a.) a global severity index (GSI) to measure overall psychological distress; b.) a positive symptom distress index (PSDI), designed to measure the intensity of symptoms; and c.) a positive symptom total (PST), which includes self-reported symptoms. The global GSI can be used as a summary of the test. Internal consistency for the SCL-90-R scales was excellent in our sample and ranged from 0.79 (paranoid ideation) to 0.98 (GSI, PST, and PSDI).

Temperament and Character Inventory-Revised (TCI-R)

(Cloninger, 1999; Spanish version: Gutiérrez-Zotes et al., 2004) The TCI-R, which comprises 240 items, is structured on seven personality dimensions: four temperamental factors (novelty seeking, harm avoidance, reward dependence, and persistence) and three-character dimensions (self-directedness, cooperativeness, and self-transcendence). Responses are rated on a 5-point Likert scale (definitely false, mostly, or probably false, neither true nor false or about equally true and false, mostly, or probably true, definitely true). Cronbach's alpha for the TCI-R in the current study sample was good to excellent and ranged from 0.79 (reward dependence) to 0.92 (harm avoidance).

Procedure

All ED participants were first assessed during a structured face-to-face interview using the DSM-IV-TR criteria [for further information, please refer to Fernández-Aranda and Turón, (1998)]. During the interview, the clinical data used to derive the ED diagnoses were retrieved from the SCID-I (First et al., 2002) and from 2015 onwards the SCID-Clinical Version (First et al., 2015) was used. All the interviews were conducted by trained psychologists. The above-mentioned self-report questionnaires were used to collect additional psychometric data from ED patients. The Ethics Committee of our institution approved the current study and informed consent was obtained from all participants.

Categorizing eating disorder patients based on severity

DSM-5 severity index categories

For each ED subtype, we classified patients into groups based on the DSM-5 severity criteria.

As per the DSM-5 (APA, 2013), we used the following severity categories for AN which were based on BMI calculated at intake: “*mild*”: ≥ 17.0 kg/m²; “*moderate*”: 16–16.99 kg/m²; “*severe*”: 15–15.99 kg/m² and “*extreme*”: < 15 kg/m².

In terms of BN, four severity groups based on the weekly frequency of inappropriate compensatory behaviours (vomits, laxative, and diuretic use) were defined (APA, 2013) as follows: “*mild*” (1–3 episodes/week), “*moderate*” (4–7 episodes/week), “*severe*” (8–13 episodes/week), and “*extreme*” (> 14 episodes/week).

EDI-2 drive for thinness categories

We used an alternative classification system to the DSM-5 severity index based on the EDI-DT scale. The DT subscale assesses excessive concern with dieting, preoccupation with weight, and fear of weight gain. Garner and colleagues (Garner et al., 1983) recommended a cut-off score of > 14 for the EDI-DT subscale for screening purposes, which has subsequently been applied in various other studies (e.g., Krug et al., 2021; Penas-Lledo et al., 2009). Hence, the current study used this cut-off score to divide ED patients into “*low-DT*” and “*high-DT*” scoring individuals.

Statistical analysis

Stata16 for Windows was used for the statistical analysis (StataCorp, 2019). The discriminative capacity of the DSM-5 definition and the EDI-2 DT scale for grouping the ED severity levels were estimated with the partial eta-squared coefficient (η^2) in ANOVA procedures (values of 0.06, 0.10, and 0.25 were interpreted as low-poor, moderate-medium, and large-high effect size) (Levine & Hullett, 2002). Additionally, significant tests were also obtained to assess the discriminative capacity for each classification system, and Finner-correction was used to control the increase in the Type-I error due to multiple statistical analyses. This is a familywise error rate stepwise procedure which has been demonstrated to be more powerful than the classical Bonferroni correction (Finner, 1993). Given the relatively small sample size of some of the severity groups assessed (and thus, low statistical power), findings with a large- effect size OR a significant p -value were reported as relevant (Granero et al., 2020).

Results

Characteristics of the participants

Table 1 displays socio-demographic data for the overall sample ($n = 143$) and separately for AN and BN. Most participants were single (80.4%), had achieved a primary (49.0%) or secondary (36.4%) education, were classified into the mean-low (35.7%) or low (52.4%) social indexes, and were unemployed (64.3%). The mean age for the overall sample was 27.1 years old ($SD = 8.71$).

Prevalence of the eating severity groups

Figure 1 depicts the distribution of the final ED severity groups for the DSM-5 and the DT severity classification systems. The distribution of the AN severity groups was “mild”: $n = 35$; “moderate”: $n = 12$; “severe”: $n = 8$ and “extreme”: $n = 18$. For BN, the distribution was “mild”: $n = 41$; “moderate”: $n = 16$; “severe”: $n = 5$ and “extreme”: $n = 21$. Hence, the most frequent severity category for both the AN and BN samples was “mild”.

For the EDI-2 DT severity classification method, the most prevalent severity group was “low” (AN: $n = 88.3\%$; BN: $n = 71.1\%$). For both AN and BN, large differences were observed when comparing the “low” and “high” DT severity groups.

Comparison of the discriminative capacity of the two different classification systems

The estimates of the discriminative capacity of the two classification systems (DSM-5, and EDI-2 DT) for the clinical variables analysed in the study are

Table 1. Descriptive of the sample.

	Total $N = 143$		AN $n = 60$		BN $n = 83$	
	N	%	n	%	n	%
Marital status						
Single	115	80.4%	50	83.3%	65	78.3%
Married—in couple	20	14.0%	7	11.7%	13	15.7%
Divorced—separated	8	5.6%	3	5.0%	5	6.0%
Education level						
Primary/less	70	49.0%	28	46.7%	42	50.6%
Secondary	52	36.4%	21	35.0%	31	37.3%
University	21	14.7%	11	18.3%	10	12.0%
Social position						
High	1	.7%	1	1.7%	0	0.0%
Mean-high	6	4.2%	4	6.7%	2	2.4%
Mean	10	7.0%	7	11.7%	3	3.6%
Mean-low	51	35.7%	15	25.0%	36	43.4%
Low	75	52.4%	33	55.0%	42	50.6%
Employment						
Unemployed	92	64.3%	41	68.3%	51	61.4%
Student	20	14.0%	10	16.7%	10	12.0%
Employed	31	21.7%	9	15.0%	22	26.5%
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Age (years)	27.06	8.71	25.55	8.00	28.16	90.8

Note. AN: Anorexia nervosa. BN: bulimia nervosa. BED: binge eating disorder. SD: standard deviation.

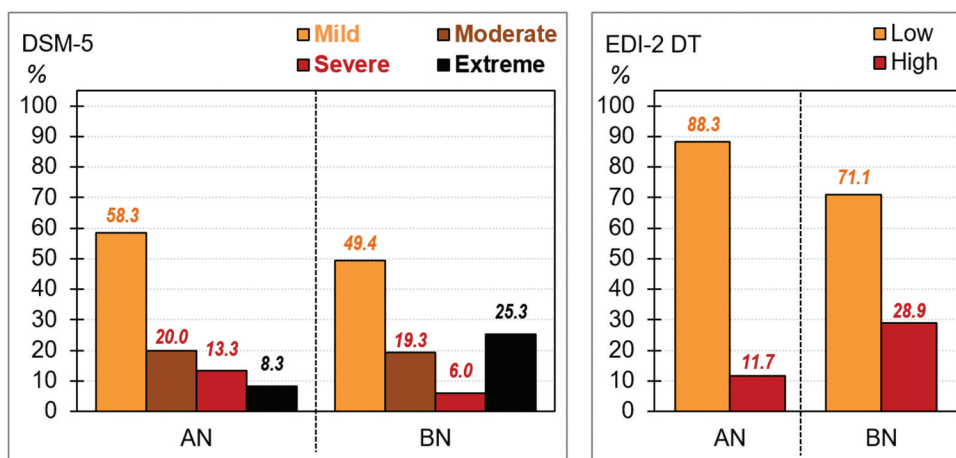


Figure 1. Distribution of the prevalence of the DSM-5 and DT severity categories.

shown in Table 2 (partial η^2 and significance level). Tables S1 and S2 (supplementary material) contain the complete results obtained from the ANOVA procedures for AN (S1) and BN (S2).

Anorexia nervosa

For AN, the *DSM-5* classification achieved discriminative capacity ($p < .005$ or η^2 into the mild/moderate to large/high range) only for current age and age of onset of the ED but not for any of the assessed personality, ED, and general psychopathology.

The *EDI-2 DT* classification obtained discriminative ability for age, ED symptom levels (most *EDI-2* subscales, except for maturity fears and perfectionism), general psychopathology (most *SCL-90 R* subscales, except for somatization, hostility, phobic anxiety, and paranoid ideation), and the personality traits of harm avoidance and self-directedness.

Bulimia nervosa

For BN patients, the *DSM-5* classification system achieved discriminative capacity for the following variables: weekly binge eating episodes, the *EDI-2* subscale body dissatisfaction, bulimia, social insecurity, and the *EDI-2* total score, the *SCL-90-R* subscales interpersonal sensitivity, anxiety, hostility, and phobic anxiety, and the *TCI-R* self-directedness subscale.

The *EDI-2 DT* severity categorisation allowed differentiation between the duration of the ED disorder, weekly binge eating episodes, ED symptom severity (all *EDI-2* scales, except for maturity fears and social insecurity), general

Table 2. Discriminative capacity for the severity groups.

	Anorexia nervosa (<i>n</i> = 60)				Bulimia nervosa (<i>n</i> = 83)			
	DSM-5		DT		DSM-5		DT	
	<i>p</i>	η^2	<i>P</i>	η^2	<i>p</i>	η^2	<i>P</i>	η^2
Age (years)	.133	.110†	.004*	.135†	.748	.015	.455	.007
Onset ED (years)	.060	.123†	.060	.060	.497	.030	.565	.004
Duration ED (yrs)	.567	.035	.056	.061	.507	.029	.022*	.063
# previous treatm.	.191	.081	.261	.022	.582	.024	.482	.006
Binge episodes	.700	.025	.712	.002	.001*	.186†	.625	.003
Purging episodes	.660	.028	.735	.002	—	—	.780	.001
BMI (kg/m ²)	—	—	.298	.019	.658	.020	.302	.013
EDI: Drive thinness	.553	.036	—	—	.088	.079	—	—
EDI: Body dissatis.	.334	.058	.001*	.356†	.041*	.099	.001*	.228†
EDI: Int.awareness	.365	.055	.001*	.391†	.238	.052	.001*	.124†
EDI: Bulimia	.326	.059	.024*	.085	.036*	.102†	.001*	.162†
EDI: Inter. Distrust	.120	.098	.014*	.010†	.284	.047	.043*	.049
EDI: Ineffectiveness	.190	.081	.001*	.342†	.060	.089	.002*	.112†
EDI: Maturity fears	.981	.003	.308	.018	.178	.060	.937	.000
EDI: Perfectionism	.084	.111†	.507	.059	.008	.089	.012*	.076
EDI: Impulse regul.	.398	.051	.036*	.074	.130	.069	.010*	.079
EDI: Asceticism	.139	.093	.001*	.439†	.073	.084	.001*	.163†
EDI: Social insecc.	.288	.064	.001*	.173†	.033*	.104†	.052	.046
EDI: Total score	.280	.066	.001*	.378†	.021*	.115†	.001*	.210†
SCL: Somatization	.832	.015	.199	.028	.666	.020	.160	.024
SCL: Obsess/comp.	.734	.022	.009*	.111†	.165	.062	.001*	.088
SCL: Int.sensitivity	.683	.026	.001*	.175†	.015*	.123†	.001*	.137†
SCL: Depressive	.377	.053	.001*	.308†	.287	.046	.001*	.086
SCL: Anxiety	.720	.023	.013*	.101†	.019*	.117†	.001*	.147†
SCL: Hostility	.615	.031	.054	.062	.040*	.099	.001*	.120†
SCL: Phobic anxiety	.860	.013	.061	.059	.034*	.103†	.024*	.062
SCL: Paranoid id.	.734	.022	.536	.007	.144	.066	.013*	.074
SCL: Psychotic	.658	.028	.002*	.148†	.326	.043	.035*	.054
SCL: PST score	.662	.028	.003*	.145†	.071	.084	.001*	.122†
SCL: GSI score	.917	.009	.021*	.088	.116	.072	.011*	.077
SCL: PSDI score	.286	.065	.001*	.247†	.266	.049	.001*	.139†
TCL: Novelty seek.	.415	.049	.090	.049	.190	.058	.976	.000
TCL: Harm avoid.	.927	.008	.001*	.182†	.122	.070	.004*	.107†
TCL: Reward-dep.	.559	.036	.091	.049	.631	.021	.473	.006
TCL: Persistence	.220	.075	.323	.017	.988	.002	.090	.035
TCL: Self-direct.	.342	.057	.010*	.110†	.033*	.104†	.002*	.112†
TCL: Cooperative.	.152	.089	.887	.000	.496	.030	.209	.019
TCL: Self-Transc.	.444	.046	.093	.048	.664	.020	.864	.000

Note. Diagnostic and Statistical Manual of Mental Disorders (DSM-5); EDI-2 DT: Eating Disorder Inventory (EDI-2) Drive for Thinness (DT) subscale; SD: standard deviation. Effect size: η^2 for Analysis of Variance (ANOVA). *Bold: significant comparison. †Effect size into the mild/moderate to the high/large range ($\eta^2 > .10$).

psychopathology (all SCL-90 R scales, except for somatization), and the personality traits of harm avoidance and self-directedness.

Discussion

This study was the first to evaluate the clinical usefulness of the DSM-5 severity indicators for AN and BN concurrently in the same study and among males. Furthermore, we assessed whether an alternative severity classification approach based on DT provided better utility than the DSM-5 severity categorisation alone. Our first main finding was related

to the frequency distribution of the two severity categorisation approaches for AN and BN, which indicated that most patients were either in the “mild” DSM-5 or the “low-DT” severity categories. A second major finding concerned the relative power of each classification system to differentiate severity. For AN and BN, the DT severity differentiation approach was more robust than the DSM-5 severity categories for ED and general psychopathology and to a lesser extent also for personality. The above findings will be discussed in more detail in the subsequent sections.

Distribution of the two severity categorisations: DSM-5 vs. DT

Regarding the *DSM-5* severity categories, most of our male AN and BN patients (>57%) were in the “mild” category. This finding is consistent with previous studies assessing AN (e.g., Dang et al., 2023; Krug et al., 2021) and BN (Krug et al., 2021) in predominantly clinical female samples. Conversely, the recent meta-analysis by Dang et al. (2022), which included both community (Grilo et al., 2015; Smink et al., 2014) and clinical ED samples (e.g., Krug et al., 2021), revealed that the severity categories for AN and BN were close to evenly distributed. While an overrepresentation of the “mild” category in general population samples is expected due to the lower severity of ED symptoms, it was surprising to find that most patients in our clinical male sample also fell into this severity group. These findings might reflect the inability of the DSM-5 to capture severity appropriately in males or might reflect the level of care provided in the different studies. For instance, in the study by Dang et al. (2023) and Gianini et al. (2017), the AN sample was from an inpatient unit, whereas Krug et al.’s (2021) and our current male AN sample comprised a mixture of inpatients and outpatients.

Concerning BN, our male patients may have engaged in steroid use, rather than other purging behaviours, as shown in previous research (e.g., Calzo et al., 2016; Griffiths et al., 2018). However, such behaviours are currently not included under the umbrella term of inappropriate compensatory behaviours for the BN severity specifier in the DSM-5.

Regarding the *DT severity indicator* distinction, for both AN and BN, most patients were classified into the “low-DT” group. This finding contradicts those of the only other previous study by Krug et al. (2021) that assessed DT as an alternative severity indicator in a female-only sample. The authors found that a significantly larger proportion of AN patients were included in the “low-DT” group, whereas a higher proportion of BN individuals were placed in the “high-DT” group.

It somehow seems paradoxical that such a high proportion (up to 88% for AN and 71% for BN) of the AN and BN groups did not present with “high-DT”. Nonetheless, our findings are in line with other female-centric

studies that found lower DT scores in female AN patients (e.g., Penas-Lledo et al., 2009). It is also worth outlining that measures such as the EDI-2 (Garner, 1991) have been developed and validated exclusively for females and, therefore, they may not appropriately capture male ED symptoms (Murray et al., 2017). This is supported by research studies that have shown that male ED patients scored lower than females on the bulimia, and body dissatisfaction EDI-2 subscales than females (e.g., Mond et al., 2014), but higher on non-ED symptoms such as perfectionism and interpersonal distrust (e.g., Joiner et al., 2000). It is possible that for male ED patients, other aspects of body dissatisfaction, such as the drive for muscularity or leanness (an interaction between DT and drive for muscularity, e.g., Lavender et al., 2017) are more important than DT. A final explanation for the “low-DT” scores in our AN and BN samples may be that our male patients minimized or even denied their DT and fat phobia symptoms (Rieger et al., 2001). Future research is needed to disentangle each possibility.

The distinctiveness of the severity categories

The DSM-5 severity classification

Our analysis of the application of the *DSM-5 severity* classification system in males identified no significant findings for ED symptoms, general psychopathology, and personality for our AN male sample. This result was expected, as it aligns with recent findings from meta-analyses (Dang et al., 2022), treatment-seeking almost-all-female studies (e.g., Dang et al., 2023; Krug et al., 2021; Machado et al., 2017), and gender-specific studies (Zayas et al., 2018) that have evaluated the usefulness of DSM-5 severity indices in predominantly female populations with AN. Since males with AN typically have higher pre-morbid BMI resulting from greater muscle mass and bone density (Nieves et al., 2005; Schorr et al., 2018), weight loss in these individuals may not necessarily lead to a low or abnormal BMI. Therefore, relying solely on BMI as a criterion to assess AN severity may result in many males with AN going undiagnosed and consequently not receiving the necessary treatment. Factors such as the rate of weight loss over a specific timeframe when diagnosing AN in males, rather than solely relying on BMI, are important.

Regarding the DSM-5 severity rating for BN, our results indicated a few variations in the levels of ED and general psychopathology within the DSM-5 BN severity groups. While such findings align with Dang et al.’s (2022) meta-analysis, they are somewhat contradicted by Zayas et al.’s (2018) study which examined the severity of female and male BN patients separately, and they did not find supporting evidence for DSM-5 BN severity rating. The observed differences may be attributed to the male participants in our study having a relatively long illness duration (average 7.2 years) and receiving little to no

prior treatment for their ED. Taken together, our findings offer no support for the DSM-5 severity rating for AN using BMI, while limited support for the DSM-5 severity ratings for BN in males.

The distinctiveness of the DT severity groups

Our analyses for the *DT* severity distinctions indicated that “*high-DT*” male patients had more severe ED and general psychopathology symptoms than the “*low-DT*” scoring patients and these effects were elevated in both AN and BN. Our findings align with the results of our previous female sample (Krug et al., 2021) which also showed the *DT* distinction to be clinically more meaningful than the DSM-5 severity indices.

Consistent with our findings, previous studies assessing the usefulness of the “*DT-low/high*” distinction found that it correctly predicted ED diagnoses (e.g., Stanford & Lemberg, 2012). Furthermore, research has revealed a positive correlation between *DT* and eating psychopathology in ED males (e.g., Gila et al., 2005; Yean et al., 2013), specifically, the frequency of binge eating and purging behaviour (e.g., Ramacciotti et al. 2002).

Limitations

A few limitations of the current study need to be acknowledged. First, our cross-sectional study design precluded examination of the predictive significance of the two severity classification approaches in terms of prognostic outcomes and treatment efficacy between ED diagnoses. Second, although we provided data on all four DSM-5 severity categories, the cell size for these different groups, especially the “severe” and “extreme” groups, was low. This may have limited our ability to detect robust group differences. Third, due to the relatively small AN male sample size, we were not able to assess differences in the severity categories for AN-Restrictive and AN-Binge Purging subtypes. Nonwithstanding these limitations, our study assessed for the first-time different severity categorizations in an exclusively male AN and BN sample.

Clinical implications

The current findings seem to indicate that the *DT* construct returns us to the realm of the psychological meaning of the symptom for AN and BN in males, whereas the DSM-5 focuses on behavioural/biomedical markers. While the current study shows that *DT* appears to be a prominent motive for many males with EDs, it should be acknowledged that clinically the experience of ED symptoms may vary significantly between male ED patients and *DT* may only be one of the various other symptoms that may correlate with degree of psychopathology.

Furthermore, acknowledging the qualitative differences observed between males and females in the presentations of EDs, future research should investigate alternative severity systems (e.g., those focusing on drive for muscularity or muscularity-oriented behaviours [Murray et al., 2017; Timko et al., 2019]) in indexing AN and BN severity in males. Such improved male-specific ED measures might help with prognostic information and support clinicians in tracking male patients' progress based on a range of ED severity indicators, and not just diagnosis alone. This could therefore lead to greater knowledge into how to enhance clinical diagnosis of ED severity in men and a better treatment plan.

Conclusions

To conclude, our data suggest that the DSM-5 severity specifiers may somewhat capture severity for males with BN, but not for AN. Our findings do, however, provide initial support for an alternative transdiagnostic DT severity category for both AN and BN male patients. DT may therefore be clinically more useful than the DSM-5 severity indices for males suffering from these ED subtypes. However, it should be concluded that clinicians should look for the full variety of ED symptoms displayed by their male patients, irrespective of their specific DSM-5 ED diagnosis.

Acknowledgments

We thank the following funding bodies

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

- Centres de Recerca de Catalunya (CERCA) Programme/Generalitat de Catalunya for institutional support - Ministerio de Economía y Competitividad (PSI2015-68701-R) and Delegación del Gobierno para el Plan Nacional sobre Drogas (20171067).
- Instituto de Salud Carlos III (ISCIII) [Fondo de Investigación (FIS) PI14/00290 and PI17/01167].
- The SLT006/17/00246 grant, funded by the Department of Health of the Generalitat de Catalunya by the call "Acció instrumental de programes de recerca orientats en l'àmbit de la recerca i la innovació en salut".
- The FEDER funds/European Regional Development Fund (ERDF); a way to build Europe. The Biomedical Research Centre in Physiopathology of Obesity and Nutrition (Centro de Investigación Biomédica en Red de Fisiopatología de la Obesidad y Nutrición: **CIBERObn**) and Centre for Mental Health Network (Centro de Investigación Biomédica en Red de Salud Mental: **CIBERSAM**) are both initiatives of ISCIII). The funders had no role in the study

design, data collection and analysis, decision to publish, or preparation of the manuscript. AGP AG is supported by a pre-doctoral Grant of Fundación Carolina and the Secretaría de Relaciones Exteriores de los Estados Unidos Mexicanos (Foreign relations secretary of the United States of Mexico).

ORCID

Isabel Krug  <http://orcid.org/0000-0002-5275-3595>

Isabel Sánchez  <http://orcid.org/0000-0001-5874-8204>

Roser Granero  <http://orcid.org/0000-0001-6308-3198>

Zaida Agüera  <http://orcid.org/0000-0003-4453-4939>

Anahi Gaspar-Perez  <http://orcid.org/0000-0002-1427-3697>

Susana Jimenez-Murcia  <http://orcid.org/0000-0002-3596-8033>

Fernando Fernandez-Aranda  <http://orcid.org/0000-0002-2968-9898>

Data availability statement

The datasets generated during and/or analysed during the current study are not publicly available due to ethical restrictions to protect the confidentiality of the participants but are available from the corresponding author on reasonable requests.

Ethics

According to the Declaration of Helsinki, the present study was approved by the Clinical Research Ethics Committee (CEIC) of Bellvitge University Hospital (Ref. PR146/14) and written and signed informed consent was obtained from all participants.

Patient consent statement

Informed consent was obtained from all individual participants included in the study.

References

- American Psychiatric Association (APA). (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). American Psychiatric Association.
- American Psychiatric Association (APA). 2013. *Diagnostic and statistical manual of mental disorders* (5th ed.) <https://doi.org/10.1176/appi.books.9780890425596>.
- Calzo, J. P., Horton, N. J., Sonnevile, K. R., Swanson, S. A., Crosby, R. D., Micali, N., Eddy, K. T., & Field, A. E. (2016). Male eating disorder symptom patterns and health correlates from 13 to 26 years of age. *Journal of the American Academy of Child & Adolescent Psychiatry*, 55(8), 693–700 e692. <https://doi.org/10.1016/j.jaac.2016.05.011>
- Cloninger, C. R. (1999). *The Temperament and character Inventory-Revised*. Center for Psychobiology of Personality, Washington University.
- Dakanalis, A., Alix Timko, C., Colmegna, F., Riva, G., & Clerici, M. (2018). Evaluation of the DSM-5 severity ratings for anorexia nervosa in a clinical sample. *Psychiatry Research*, 262, 124–128. <https://doi.org/10.1016/j.psychres.2018.02.009>

- Dakanalis, A., Clerici, M., Riva, G., & Carra, G. (2017). Testing the DSM-5 severity indicator for bulimia nervosa in a treatment-seeking sample. *Eating and Weight Disorders: EWD*, 22(1), 161–167. <https://doi.org/10.1007/s40519-016-0324-2>
- Dang, A. B., Giles, S., Fuller-Tyszkiewicz, M., Kiropoulos, L., & Krug, I. (2022). A systematic review and meta-analysis on the DSM-5 severity ratings for eating disorders. *Clinical Psychological Science*, 29(4), 325–344. <https://doi.org/10.1037/cps0000078>
- Dang, A. B., Kiropoulos, L., Castle, D. J., Jenkins, Z., Phillipou, A., Rossell, S. L., & Krug, I. (2023). Assessing severity in anorexia nervosa: Do the DSM-5 and an alternative severity rating based on overvaluation of weight and shape severity differ in psychological and biological correlates? *European Eating Disorders Review: The Journal of the Eating Disorders Association*, 31(4), 447–461. <https://doi.org/10.1002/erv.2969>
- Derogatis, L. (2002). *SCL-90-R symptom checklist 90 revised (manual)*. TEA Ediciones: Madrid.
- Derogatis, L. R. (1990). *Administration, scoring and procedures manual*. Clinical Psychometric Research.
- De Young, K. P., Lavender, J. M., Steffen, K., Wonderlich, S. A., Engel, S. G., Mitchell, J. E., Crow, S. J., Peterson, C. B., Le Grange, D., Wonderlich, J., & Crosby, R. D. (2013). Restrictive eating behaviors are a nonweight-based marker of severity in anorexia nervosa. *The International Journal of Eating Disorders*, 46(8), 849–854. <https://doi.org/10.1002/eat.22163>
- Fernández-Aranda, F., & Turón, V. (1998). *Trastornos alimentarios. Guía básica de tratamiento en anorexia y bulimia. (Eating Disorders Treatment guidelines for anorexia and bulimia)*. Barcelona.
- Finner, H. (1993). On a monotonicity problem in step-down multiple test procedures. *Journal of the American Statistical Association*, 88(423), 920–923. <https://doi.org/10.1080/01621459.1993.10476358>
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. (2002). *Structured clinical interview for DSM-IV-TR axis I disorders*. American Psychiatric Association.
- First, M., Williams, J., Karg, R., & Spitzer, R. (2015). *Structured clinical interview for DSM-5 - Research version (SCID-5 for DSM-5, research version; SCID-5-RV)*. American Psychiatric Association.
- Garner, D. M. (1991). *Eating disorder inventory (EDI-2)*. Psychological Assessment Resources Odessa.
- Garner, D., Olmstead, M., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory of anorexia nervosa and bulimia. *The International Journal of Eating Disorders*, 2, 15–34. [https://doi.org/10.1002/1098-108X\(198321\)2:2<15:AID-EAT2260020203>3.0.CO;2-6](https://doi.org/10.1002/1098-108X(198321)2:2<15:AID-EAT2260020203>3.0.CO;2-6)
- Ghaderi, A., Bulik, C., Myräl, M., & Welch, E. (2022). Anonymous online survey on disordered eating, drive for muscularity, sexual orientation, and satisfaction with life in young Swedish males. *Archives of Sexual Behavior*, 51(7), 3457–3465. <https://doi.org/10.1007/s10508-022-02383-8>
- Gianini, L., Roberto, C. A., Attia, E., Walsh, B. T., Thomas, J. J., Eddy, K. T., Grilo, C. M., Weigel, T., & Sysko, R. (2017). Mild, moderate, meaningful? Examining the psychological and functioning correlates of DSM-5 eating disorder severity specifiers. *The International Journal of Eating Disorders*, 50(8), 906–916. <https://doi.org/10.1002/eat.22728>
- Gila, A., Castro, J., Cesena, J., & Toro, J. (2005). Anorexia nervosa in male adolescents: Body image, eating attitudes and psychological traits. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine*, 36(3), 221–226. <https://doi.org/10.1016/j.jadohealth.2004.02.039>
- Granero, R., Treasure, J., Claes, L., Favaro, A., Jimenez-Murcia, S., Karwautz, A., Le Grange, D., Tchanturia, K., & Fernandez-Aranda, F. (2020). Null hypothesis significance tests, a misleading approach to scientific knowledge: Some implications for eating disorders

- research. *European Eating Disorders Review: The Journal of the Eating Disorders Association*, 28(5), 483–491. <https://doi.org/10.1002/erv.2782>
- Griffiths, S., Murray, S. B., Krug, I., & McLean, S. A. (2018). The contribution of social media to body dissatisfaction, eating disorder symptoms, and anabolic steroid use among sexual minority men. *Cyberpsychology, Behavior and Social Networking*, 21(3), 149–156. <https://doi.org/10.1089/cyber.2017.0375>
- Grilo, C. M., Ivezaj, V., & White, M. A. (2015). Evaluation of the DSM-5 severity indicator for bulimia nervosa. *Behaviour Research and Therapy*, 67, 41–44. <https://doi.org/10.1016/j.brat.2015.02.002>
- Gutiérrez-Zotes, J. A., Bayón, C., Montserrat, C., Valero, J., Labad, A., & Cloninger, C. R. (2004). Temperament and character inventory-Revised (TCI-R). Standardization and normative data in a general population sample. *Actas Esp de Psiquiatr*, 32(1), 8–15.
- Joiner, T. E., Jr., Katz, J., & Heatherton, T. F. (2000). Personality features differentiate late adolescent females and males with chronic bulimic symptoms. *The International Journal of Eating Disorders*, 27(2), 191–197. [https://doi.org/10.1002/\(SICI\)1098-108X\(200003\)27:2<191:AID-EAT7>3.0.CO;2-S](https://doi.org/10.1002/(SICI)1098-108X(200003)27:2<191:AID-EAT7>3.0.CO;2-S)
- Kjelsås, E., Augestad, L. B., & Flanders, D. (2003). Screening of males with eating disorders. *Eating and Weight Disorders: EWD*, 8(4), 304–310. <https://doi.org/10.1007/BF03325030>
- Krug, I., Dang, A., Granero, R., Aguera, Z., Sanchez, I., Riesco, N., Jimenez-Murcia, S., Menchon, J. M., & Fernandez-Aranda, F. (2021). Drive for thinness provides an alternative, more meaningful, severity indicator than the DSM-5 severity indices for eating disorders. *European Eating Disorders Review: The Journal of the Eating Disorders Association*, 29(3), 482–498. <https://doi.org/10.1002/erv.2776>
- Lavender, J. M., Brown, T. A., & Murray, S. B. (2017). Men, muscles, and eating disorders: An overview of traditional and muscularity-oriented disordered eating. *Current Psychiatry Reports*, 19(6), 32. <https://doi.org/10.1007/s11920-017-0787-5>
- Levine, T. R., & Hullett, C. R. (2002). Eta squared, partial eta squared, and misreporting of effect size in communication research. *Human Communication Research*, 28(4), 612–625. <https://doi.org/10.1111/j.1468-2958.2002.tb00828.x>
- Machado, P. P., Grilo, C. M., & Crosby, R. D. (2017). Evaluation of the DSM-5 severity indicator for anorexia nervosa. *European Eating Disorders Review: The Journal of the Eating Disorders Association*, 25(3), 221–223. <https://doi.org/10.1002/erv.2508>
- Mitchison, D., & Mond, J. (2015). Epidemiology of eating disorders, eating disordered behaviour, and body image disturbance in males: A narrative review. *Journal of Eating Disorders*, 3, 20. <https://doi.org/10.1186/s40337-015-0058-y>
- Mond, J., Hall, A., Bentley, C., Harrison, C., Gratwick-Sarll, K., & Lewis, V. (2014). Eating-disordered behavior in adolescent boys: Eating disorder examination questionnaire norms. *The International Journal of Eating Disorders*, 47(4), 335–341. <https://doi.org/10.1002/eat.22237>
- Murray, S. B., Nagata, J. M., Griffiths, S., Calzo, J. P., Brown, T. A., Mitchison, D., Blashill, A. J., & Mond, J. M. (2017). The enigma of male eating disorders: A critical review and synthesis. *Clinical Psychology Review*, 57, 1–11. <https://doi.org/10.1016/j.cpr.2017.08.001>
- Nakai, Y., Nin, K., Noma, S., Teramukai, S., Fujikawa, K., & Wonderlich, S. A. (2017). The impact of DSM-5 on the diagnosis and severity indicator of eating disorders in a treatment-seeking sample. *The International Journal of Eating Disorders*, 50(11), 1247–1254. <https://doi.org/10.1002/eat.22777>
- Nieves, J. W., Formica, C., Ruffing, J., Zion, M., Garrett, P., Lindsay, R., & Cosman, F. (2005). Males have larger skeletal size and bone mass than females, despite comparable body size. *Journal of Bone and Mineral Research: The Official Journal of the American Society for Bone and Mineral Research*, 20(3), 529–535. <https://doi.org/10.1359/JBMR.041005>

- Olivardia, R., Pope, H. G., Jr., Borowiecki, J. J., III, & Cohane, G. H. (2004). Biceps and body image: The relationship between muscularity and self-esteem, depression, and eating disorder symptoms. *Psychology of Men & Masculinity*, 5(2), 112–120. <https://doi.org/10.1037/1524-9220.5.2.112>
- Penas-Lledo, E., Fernandez-Aranda, F., Jimenez-Murcia, S., Granero, R., Penelo, E., Soto, A., Gunnard, K., & Menchon, J. M. (2009). Subtyping eating disordered patients along drive for thinness and depression. *Behaviour Research and Therapy*, 47(6), 513–519. <https://doi.org/10.1016/j.brat.2009.03.003>
- Pope, H. G., Jr., Gruber, A. J., Mangweth, B., Bureau, B., deCol, C., Jouvent, R., & Hudson, J. I. (2000). Body image perception among men in three countries. *The American Journal of Psychiatry*, 157(8), 1297–1301. <https://doi.org/10.1176/appi.ajp.157.8.1297>
- Ramacciotti, C. E., Dell'osso, L., Paoli, R. A., Ciapparelli, A., Coli, E., Kaplan, A. S., & Garfinkel, P. E. (2002). Characteristics of eating disorder patients without a drive for thinness. *The International Journal of Eating Disorders*, 32(2), 206–212. <https://doi.org/10.1002/eat.10067>
- Reas, D. L., & Ro, O. (2017). Investigating the DSM-5 severity specifiers based on thinness for adults with anorexia nervosa. *The International Journal of Eating Disorders*, 50(8), 990–994. <https://doi.org/10.1002/eat.22729>
- Rieger, E., Touyz, S. W., Swain, T., & Beumont, P. J. (2001). Cross-cultural research on anorexia nervosa: Assumptions regarding the role of body weight. *The International Journal of Eating Disorders*, 29(2), 205–215. [https://doi.org/10.1002/1098-108X\(200103\)29:2<205:AID-EAT1010>3.0.CO;2-1](https://doi.org/10.1002/1098-108X(200103)29:2<205:AID-EAT1010>3.0.CO;2-1)
- Schorr, M., Dichtel, L. E., Gerweck, A. V., Valera, R. D., Torriani, M., Miller, K. K., & Bredella, M. A. (2018). Sex differences in body composition and association with cardio-metabolic risk. *Biology of Sex Differences*, 9(1), 1–10. <https://doi.org/10.1186/s13293-018-0189-3>
- Smink, F. R., van Hoeken, D., Oldehinkel, A. J., & Hoek, H. W. (2014). Prevalence and severity of DSM-5 eating disorders in a community cohort of adolescents. *The International Journal of Eating Disorders*, 47(6), 610–619. <https://doi.org/10.1002/eat.22316>
- Smith, K. E., Ellison, J. M., Crosby, R. D., Engel, S. G., Mitchell, J. E., Crow, S. J., Peterson, C. B., Le Grange, D., & Wonderlich, S. A. (2017). The validity of DSM-5 severity specifiers for anorexia nervosa, bulimia nervosa, and binge-eating disorder. *The International Journal of Eating Disorders*, 50(9), 1109–1113. <https://doi.org/10.1002/eat.22739>
- Stanford, S. C., & Lemberg, R. (2012). A clinical comparison of men and women on the eating disorder inventory-3 (EDI-3) and the eating disorder assessment for men (EDAM). *Eating Disorders*, 20(5), 379–394. <https://doi.org/10.1080/10640266.2012.715516>
- StataCorp. (2019). *Stata statistical software: Release 16*. StataCorp LLC.
- Timko, C., DeFilipp, L., & Dakanalis, A. (2019). Sex differences in adolescent anorexia and bulimia nervosa: Beyond the signs and symptoms. *Current Psychiatry Reports*, 21(1), 1. <https://doi.org/10.1007/s11920-019-0988-1>
- Yean, C., Benau, E. M., Dakanalis, A., Hormes, J. M., Perone, J., & Timko, C. A. (2013). The relationship of sex and sexual orientation to self-esteem, body shape satisfaction, and eating disorder symptomatology. *Frontiers in Psychology*, 4, 887. <https://doi.org/10.3389/fpsyg.2013.00887>
- Zayas, L. V., Wang, S. B., Coniglio, K., Becker, K., Murray, H. B., Klosterman, E., Kay, B., Bean, P., Weltzin, T., Franko, D. L., Eddy, K. T., & Thomas, J. J. (2018). Gender differences in eating disorder psychopathology across DSM-5 severity categories of anorexia nervosa and bulimia nervosa. *The International Journal of Eating Disorders*, 51(9), 1098–1102. <https://doi.org/10.1002/eat.22941>