

Unveiling Severity Indicators for Anorexia and Bulimia Nervosa Treatment Success: DSM–5 Versus ICD–11 Versus Drive for Thinness

An Dang¹  | Roser Granero^{2,3} | Isabel Sanchez^{2,4} | Laura Gálvez Solé⁵ | Jessica Jimenez-del Toro⁵ | Magda Rosinska⁶ | Susana Jimenez-Murcia^{4,6,7,8,9} | Isabel Krug¹  | Fernandez-Aranda Fernando^{4,6,7,8}

¹Melbourne School of Psychological Sciences, The University of Melbourne, Melbourne, Australia | ²Ciber Fisiopatología Obesidad y Nutrición (CIBERObn), Instituto Salud Carlos III, Barcelona, Spain | ³Department of Psychobiology and Methodology, Universitat Autònoma de Barcelona—UAB, Barcelona, Spain | ⁴Department of Psychiatry, University Hospital of Bellvitge-IDIBELL and CIBERObn, Barcelona, Spain | ⁵Clinical Psychology Department, University Hospital of Bellvitge, Barcelona, Spain | ⁶Psychoneurobiology of Eating and Addictive Behaviors Group, Neurosciences Program, Bellvitge Biomedical Research Institute (IDIBELL), Barcelona, Spain | ⁷CIBER Fisiopatología Obesidad y Nutrición (CIBERObn), Instituto de Salud Carlos III, Barcelona, Spain | ⁸Department of Clinical Sciences, School of Medicine and Health Sciences, University of Barcelona, Barcelona, Spain | ⁹Psychological Services, University of Barcelona, Barcelona, Spain

Correspondence: An Dang (dangb1@student.unimelb.edu.au)

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ABSTRACT

Objective: This study aimed to compare treatment outcomes associated with three severity indicators—DSM–5 for anorexia nervosa (AN) and bulimia nervosa (BN), ICD–11 for AN, and drive for thinness (DT) for AN and BN—within a treatment-seeking population.

Method: A total of 628 female participants diagnosed with either AN ($n = 266$; mean age = 26.71) or BN ($n = 362$; mean age = 29.49) were recruited from an ED unit. Upon admission, participants were classified based on DSM–5 (AN and BN) and ICD–11 severity categories. They underwent CBT-E comprehensive manualised programs, according to ED subtype, and were categorised into ‘full remission’, ‘partial remission’, ‘non-remission’ or ‘drop-out’ based on DSM–5 diagnostic criteria at discharge.

Results: Significant associations were found only for ICD–11 AN severity groups ($p = 0.03$, Cramer’s $V = 0.18$), with ‘dangerously low BMI’ associated with poorer outcomes than ‘significantly low BMI’. No other significant relationships were found with DSM–5 or DT severity groups.

Conclusion: This study reveals the limitation of using a single severity indicator and emphasises the necessity of a comprehensive assessment to capture the complexities of AN and BN. Future research should also evaluate the validity of these severity measures across various factors, including biological correlates and psychopathology.

Summary

- Treatment outcomes were significantly associated with severity based on the ICD-11 index for AN, but not with severity based on the DSM-5 and DT severity groups for both AN and BN.
- This study underscores the limitation of relying on a single severity indicator to comprehensively capture the multifaceted nature of AN and BN.
- It is important to explore alternative tailored severity indicators to capture the complexities of EDs in assessment and treatment.

1 | Introduction

Both anorexia nervosa (AN) and bulimia nervosa (BN) are diagnosed using the DSM-5 (American Psychiatric Association [APA] 2013) and its text revised version (DSM-5-TR; APA 2022) or the ICD-11 (World Health Organization [WHO] 2019). While both systems use a severity indicator for AN based on body mass index (BMI), only the DSM-5 proposes a severity indicator for BN based on the weekly frequency of purging behaviours. These severity ratings aim to index the level of general and eating disorder (ED) psychopathology that is experienced by individuals with AN and BN, and thus, if valid, should serve as a crucial tool for tailoring treatment decisions, including duration, frequency and type of treatments (Regier, Kuhl, and Kupfer 2013). Although lower BMI and more frequent engagement in inappropriate compensatory behaviours predict poor long-term outcomes and higher mortality rates in AN and BN, few studies have directly examined the relationship between severity ratings and treatment outcomes (e.g., Dalle Grave et al. 2018). Some studies propose evaluating severity based on cognitive factors like drive for thinness (DT)—a common feature in both AN and BN, characterised by fear of weight gain and striving for an unhealthily low body weight—rather than solely relying on the DSM-5 severity index (Krug et al. 2021). However, no study to date has assessed DT as an alternative severity in indexing treatment outcomes for AN and BN. Therefore, this study aims to examine the relationship between treatment outcomes and three different severity indicators based on DSM-5 (for AN and BN), ICD-11 (for AN), DT (for AN and BN) using a treatment-seeking population.

2 | Severity Ratings

2.1 | DSM-5 Anorexia Nervosa Severity Rating

The DSM-5 AN severity index categorises AN into four levels based on BMI: mild ($\geq 17.0 \text{ kg/m}^2$), moderate ($16\text{--}16.99 \text{ kg/m}^2$), severe ($15\text{--}15.99 \text{ kg/m}^2$) and extreme ($< 15 \text{ kg/m}^2$). Several studies have examined the relationship between these categories and general and ED psychopathology (e.g., Krug et al. 2021), physiological correlates (e.g., potassium; Dang et al. 2023), psychiatric comorbidity (e.g., generalised anxiety disorders Dang, Kiropoulos, Anderluh, et al. 2024; Dang, Kiropoulos, Castle, et al. 2024), and as well as cognitive impairment (Mora-Maltas et al. 2023). However, little to no support was found for

the DSM-5 AN severity rating in indexing the abovementioned variables. Dang et al. (2022) conducted a meta-analysis of 19 studies, including five assessing the DSM-5 AN severity indicator in indexing baseline ED psychopathology (e.g., Dakanalis et al. 2018), and found no significant differences across the severity groups.

Regarding BMI and treatment outcomes, various studies (e.g., Keel and Brown 2010; Vall and Wade 2015; Wild et al. 2016) have consistently shown that a lower baseline BMI is associated with poorer outcomes, including lower BMI at discharge, lower quality of life, higher psychiatric comorbidity, higher risk of relapse, higher ED symptoms, but also more dysfunctional personality traits and higher emotional dysregulation (Fernandez-Aranda et al. 2021; Miranda-Olivos et al. 2023; Mallorqui-Bague et al. 2023). Only two studies (Dalle Grave et al. 2018; Smink et al. 2014) have assessed the relationship between the DSM-5 AN severity groups and treatment outcomes with limited support.

Smink et al. (2014) found no association between the four DSM-5 AN severity groups and the proportion of clinically recovered cases in a Dutch cohort study spanning pre-adolescence to young adulthood ($N = 2230$). Similarly, Dalle Grave et al. (2018), using a sample of 128 participants with AN undergoing Enhanced Cognitive Behavioural Therapy for ED ([CBT-E]; Fairburn 2008), found no significant differences between the DSM-5 AN severity groups in weight recovery and good outcomes across baseline, 6- and 12-month follow-ups. While Dalle Grave et al.'s study has several strengths, including longitudinal follow-up, the sample size of 128 individuals may have limited the power to detect significant differences. Therefore, replication with a larger sample with AN is needed.

2.2 | ICD-11 Severity Rating for AN Based on BMI

Recognising the importance of severe underweight as a predictor of poor prognosis and mortality, the ICD-11 introduced a severity qualifier, 'dangerously low body weight', with a cut-off of $\text{BMI} < 14.0 \text{ kg/m}^2$ (Button, Chadalavada, and Palmer 2010; Rosling et al. 2011). This adjustment aims to enhance diagnostic accuracy and considers the role of severely underweight status in predicting AN prognosis and treatment intensity (Uher and Rutter 2012). Despite this, only two studies (Engelhardt et al. 2021; Dang, Kiropoulos, Anderluh, et al. 2024; Dang, Kiropoulos, Castle, et al. 2024) have explored the clinical utility of the ICD-11 severity rating for AN. Engelhardt et al. (2021) studied 469 children and adolescents with AN and found that those meeting the 'dangerously low BMI' criteria had longer treatment durations and lower BMIs at discharge compared to those in the 'significantly low BMI' group. However, these differences were not substantial enough to assist in daily clinical practice for risk assessment or treatment stratification. Another study by Dang et al. ($N = 312$) did not support the clinical usefulness of the AN ICD-11 severity ratings in differentiating severity groups based on psychiatric comorbidity. Furthermore, the rationale behind the ICD-11's binary severity classification remains unclear, and no study has explored the relationship between the AN ICD-11 severity groups and treatment outcomes in treatment-seeking adults with AN.

2.3 | DSM-5 Bulimia Nervosa Severity Rating

For BN, the DSM-5 employed the weekly frequency of inappropriate compensatory behaviours to index severity, which classifies individuals into mild (1–3 episodes/week), moderate (4–7 episodes/week), severe (8–13 episodes/week) and extreme (14 or more episodes/week). Regarding the DSM-5 BN severity rating, Dang et al.'s (2022) meta-analysis, included seven BN studies and found that individuals with milder BN severity exhibited significantly lower levels of baseline dietary restraint, eating and concerns related to weight/shape compared to those in the more severe BN groups, with small to large effect sizes. This supports the notion that the DSM-5 BN severity index serves as an indicator of ED psychopathology at baseline among those with BN.

However, the ability of the DSM-5 BN severity index to predict treatment outcomes remains less explored, with only two studies examining its relationship in adults (Dakanalis et al. 2017; $N = 281$) and adolescents (Gorrell et al. 2019; $N = 110$). Dakanalis et al. found a significant difference in post-treatment abstinence rates from inappropriate compensatory behaviours across the four DSM-5 BN severity groups, with notably higher abstinence rates in the milder groups. In contrast, Gorrell et al. focused on both behavioural (e.g., abstinence from compensatory behaviours) and attitudinal outcomes (e.g., ED global score measured using the Eating Disorder Examination-Questionnaire [EDE-Q; Fairburn and Beglin 1994]) at post-treatment, 6- and 12-month follow-up. They found no associations between the DSM-5 BN severity groups and the tested outcomes. However, additional analyses revealed a significant linear trend in EDE-Q global scores across the DSM-5 BN severity groups at the end of treatment and follow-up, following the expected linear pattern. Based on these findings, the authors concluded that the DSM-5 BN severity indicators may be more informative in predicting attitudinal rather than behavioural treatment outcomes.

2.4 | Drive for Thinness Severity Rating for AN and BN

Researchers have explored alternative classifications amidst uncertainty about the clinical utility of current ICD-11 and DSM-5 severity ratings for AN and BN, focusing on cognitive factors such as DT (e.g., Dang, Kiropoulos, Anderluh, et al. 2024; Dang, Kiropoulos, Castle, et al. 2024; Krug et al. 2021). DT—an intense fear of weight gain leading to disordered eating patterns—has been proposed as a central feature of EDs (Chernyak and Lowe 2010; Peñas-Lledó et al. 2015). Studies indicate that individuals with AN and BN who have lower DT tend to exhibit less severe attitudes and behaviours related to EDs and have lower comorbidity compared to those with high DT scores (Abbate-Daga et al. 2007; Peñas-Lledó et al. 2009; Ramacciotti et al. 2002; Vervaet, Van Heeringen, and Audenaert 2004).

Krug et al. (2021) compared DT with DSM-5 AN and BN severity ratings and found that the DT alternative severity rating was superior for indexing general and ED psychopathology in

treatment-seeking populations. Mora-Maltas et al. (2023) later compared cognitive flexibility among 161 individuals with AN across severity groups based on DSM-5, DT and illness duration. They found more deficits in cognitive flexibility in those in the long illness duration (> 12 years) compared to those in the short duration illness (< 12 years) group, but no statistical differences between DT and DSM-5 AN severity groups.

No study has yet examined the relationship between DT severity groups and treatment outcomes in AN and BN. Nevertheless, elevated DT has been linked to poorer recovery rates in AN (Prost-Lehmann et al. 2018) and BN (Keski-Rahkonen et al. 2013), as well as a higher likelihood of treatment dropout in both disorders (Schnicker, Hiller, and Legenbauer 2013). These findings suggest that elevated DT may lead to the belief that further weight gain is intolerable, potentially causing premature treatment termination and poor outcomes. Despite efforts to explore DT as a severity indicator, no study has directly examined the relationship between DT severity categories and treatment outcomes.

2.5 | The Current Study

Despite DSM-5 AN and BN severity ratings being introduced over a decade ago, few studies have directly assessed their ability to predict treatment outcomes (e.g., Dalle Grave et al. 2018). These studies offer conflicting findings, target diverse demographic groups and use various proxies to assess the predictive validity of these severity categories on treatment outcomes (e.g., behavioural vs. attitudinal changes). No study has yet investigated whether both the ICD-11 AN severity rating and the DT alternative severity rating for AN and BN can reliably predict treatment outcomes in adults with these disorders.

CBT-E, a current evidence-based treatment for AN, aims to reduce restrictive dietary patterns and facilitate weight gain, and for BN, it aims to disrupt dieting cycles, binge eating episodes, and compensatory behaviours, ultimately aiming for symptom abstinence in both disorders. In treating AN and BN, behavioural symptoms like binge eating and purging typically diminish before attitudinal symptoms such as overvaluation of weight and shape. Addressing both behavioural and attitudinal features is crucial for signalling recovery in both disorders, constituting a key treatment goal (Dalle Grave et al. 2013; Fernández-Aranda et al. 2021; Wonderlich et al. 2014). This study, therefore, used attitudinal and behavioural changes as treatment outcome proxies.

Improving the ability to predict treatment responses is crucial for guiding interventions for individuals with EDs. This study aimed to investigate the relationship between severity classifications (DSM-5, ICD-11 and DT) at baseline and treatment outcomes for AN and BN. We assessed (1) the distribution of severity rating groups and (2) the relationship between treatment outcomes across these severity indicators in a sample seeking treatment for AN and BN. Based on previous literature, we hypothesised that the DT alternative severity rating would be a more effective measure for assessing treatment outcomes compared to DSM-5 and ICD-11 severity ratings.

3 | Method

3.1 | Participants

Our study included 628 female participants diagnosed with either AN ($n = 266$) or BN ($n = 362$) who received treatment at a specialised Spanish adult ED unit from 1998 to 2018. Ethics approval for this study was obtained from the Research Ethics Committee of the institution where the study was conducted. Written and signed informed consent was obtained from all participants. AN and BN diagnoses were established during intake assessments through one-to-one semi-structured interviews conducted by clinical psychologists and psychiatrists using DSM-IV-TR criteria. The average assessment time was 45 min. Although data were collected from 1998 to 2018, significant efforts ensured accuracy and consistency, such as having the same trained clinicians throughout the study for diagnostic outcomes. Diagnoses were re-analysed and recoded based on DSM-5 criteria, which broadened the criteria by eliminating specific weight thresholds for both disorders and removing the amenorrhoea requirement for AN, resulting in a more inclusive classification (Dang, Kiropoulos, Anderluh, et al. 2024; Dang, Kiropoulos, Castle, et al. 2024).

Among participants diagnosed with AN (AN-restrict = 162; AN-binge/purge = 104), the average age was 26.71 years ($SD = 9.41$). The mean age of illness onset was 19.82 years ($SD = 7.75$) with a mean illness duration (calculated from self-reported AN symptom onset to the diagnostic assessment in the current study) of 6.84 years ($SD = 7.03$), and a mean BMI of 15.96 kg/m² ($SD = 1.89$).

For those diagnosed with BN, the average age was 29.49 years ($SD = 9.35$), the mean age of illness onset was 19.11 years ($SD = 7.36$), with a mean BN duration of 10.54 years ($SD = 8.46$), and a mean BMI of 25.01 kg/m² ($SD = 6.68$).

4 | Measure

4.1 | Clinical and Demographic Information

Height was assessed barefoot using a stadiometer, and BMI was computed with a Tanita BC-420MA scale (Tanita Corporation, Tokyo, Japan). Demographics, education, occupation and ED-related clinical data were gathered via a standardised face-to-face interview.

4.2 | Measure

4.2.1 | Severity Groups

Upon admission, individuals were classified based on DSM-5 (AN and BN) and ICD-11 (AN) severity ratings, using BMI for AN and clinical interviews for BN.

The DT severity groups for both AN and BN were derived from the DT subscale of the Eating Disorder Inventory (EDI-2;

Garner 1991; Spanish version; Garner 1998). The EDI-2 comprises 91 items designed to evaluate cognitive and behavioural traits associated with ED, including DT. The DT sub-scale assesses excessive concern with dieting, preoccupation with weight, and fear of weight gain. Respondents rate each question (e.g., 'I'm preoccupied with the desire to be thin' or 'I think about dieting') on a six-point scale, ranging from 'always' to 'never', with scores from 0 to 3. The total score for the DT subscale was determined by adding the scores of all seven DT items. A cut-off score of 14, recommended by Garner et al. (1984), was used to categorise individuals into low and high DT severity groups, as applied in prior studies (Krug et al. 2021; Penas-Lledo et al. 2009). The internal consistency of the EDI DT subscale in our sample was $\alpha = 0.85$. Please refer to Garner (1991) for specific seven items of the DT subscale.

4.2.2 | Treatment

For AN, participants received a day hospital treatment that addressed both psychological and nutritional-dietary aspects based on the CBT-E programme (Fairburn 2008) that has been shown to be effective (Agüera et al. 2015; for more details, see Fernández-Aranda et al. 1998). Participants attended the hospital 5 days a week (Monday to Friday) from 9 AM to 3 PM, where breakfast and lunch were consumed and monitored.

For BN, participants attended 16-weekly manualised 90-min group therapy sessions that were conducted by experienced psychologists. This programme is published in Spanish (Fernández-Aranda et al. 1998) and has been shown to be effective in addressing ED psychopathology (Agüera et al. 2015).

Both treatments included problem-solving, cognitive restructuring, emotion regulation, self-esteem, body image enhancement and relapse prevention training, as well as psychoeducation, monitoring and normalisation of eating patterns. All treatments were conducted by experienced psychologists.

4.2.3 | Treatment Outcome

Upon discharge, patients were reevaluated and categorised into four groups: 'full remission', 'partial remission', 'non-remission' and 'drop-out'. Full remission was defined according to DSM-5 criteria as the complete absence of symptoms meeting DSM-5 criteria for either AN or BN for at least four consecutive weeks. Partial remission is defined by the DSM-5 as a significant improvement in symptoms with residual symptoms such as fear of gaining weight or disturbances in self-perception of weight and shape. Non-remission indicated poor outcomes. Voluntary treatment discontinuation (i.e., not attending treatment for three consecutive sessions) was classified as 'dropout'. These categories were determined by senior clinical staff through consensus judgement, considering various treatment outcome factors such as nutritional patterns, frequency of binge episodes, compensatory behaviours (e.g., vomiting, laxative use), weight restoration, attitude changes towards weight and shape and ED-related cognitions. These

definitions of treatment outcomes were based on established treatment outcomes in the DSM-5 and have been previously employed in other studies (e.g., Fernández-Aranda et al. 2021; Mairhofer et al. 2021; Steward et al. 2016). Objective assessments, such as weight status and frequency of binge/purge episodes per week, were obtained from food diaries and weight monitoring records.

4.3 | Procedure

4.3.1 | Statistical Analyses

Analyses were conducted using analysis of variance (ANOVA) and the linear-by-linear chi-square tests for continuous and ordinal variables respectively (Agresti 2012). As recommended by Sharpe (2015), post-hoc residual analyses were conducted to explore the relative contribution of cells to the chi square analyses by inspecting the standardised residuals to identify those that exceeded ± 1.96 .

To evaluate a significant association in treatment outcomes (dropout, non-remission, partial remission, full remission) among the four DSM-5 severity groups for AN and BN, a chi-square analysis was conducted on the two four-level factors (DSM-5 severity groups and treatment outcomes). Subsequently, post-hoc chi-square analyses were conducted to investigate pairwise comparisons of severity groups (e.g., DSM-5 mild vs. DSM-5 moderate) on treatment outcomes. If significant differences were identified, standardised residuals would be calculated. To account for multiple comparisons, Holmes corrections were applied.

As our goal in comparing multiple severity groups was to find these severity groups associated with different treatment outcomes, a significant chi-square test gives a false alarm, if none of the post-hoc tests are significant (Tian et al. 2018). Hence, in line with Chen et al.'s recommendations, we based our findings on the results of the post-hoc pairwise comparisons.

5 | Results

5.1 | Demographic and Baseline ED Psychopathology

The results from Table 1 indicate that the DSM-5 AN severity groups were only significantly different in terms of education status ($p = 0.014$) and age ($p = 0.012$). Specifically, we found that individuals in the DSM-5 moderate group were more likely to have a primary school level of education compared to those in the DSM-5 extremely severe groups. Additionally, those in the DSM-5 extremely severe group were significantly older than the individuals in the remaining three severity groups. Further information can be found in Supporting Information S1.

The ICD-11 severity groups differed significantly in age ($p = 0.047$) and duration of illness ($p = 0.007$). Participants in the 'dangerously low BMI' group were older and had a longer illness duration compared to those in the 'significantly low BMI' group.

No significant differences in any demographic variables were found across the four DSM-5 BN and the two DT AN severity groups. The high DT BN severity group was found to be more likely to be married compared to the low DT group ($p = 0.006$).

Although not the focus of the paper, significant differences in baseline general and ED psychopathology across the DSM-5 AN and BN, and the DT AN and BN severity groups were found (see Krug et al. 2021). In contrast, the ICD-11 AN severity groups were not significantly different in general and ED psychopathology—these analyses are presented in Supporting Information S2.

5.2 | Frequency of Each Severity Group

The frequency distribution of each severity group per the DSM-5, ICD-11 and DT severity classification is displayed in Figure 1. There was a somewhat equal distribution in the DSM-5 severity groups for AN (mild = 33.1%, moderate = 27.4%, severe = 16.5% and extreme = 22.9%) and BN (mild = 28.6%, moderate = 21.2%,

TABLE 1 | Discriminative capacity for the severity groups at baseline: Total sample.

	Anorexia nervosa ($n = 266$)						BN ($n = 362$)			
	DSM-5		EDI-2 DT		ICD-11		DSM-5		EDI-DT	
	<i>p</i>	ES	<i>p</i>	ES	<i>p</i>	ES	<i>p</i>	ES	<i>p</i>	ES
Marital status	0.424	0.106	0.639	0.058	0.729	0.049	0.052	0.133^a	0.006^b	0.168^a
Education	0.014^b	0.174^a	0.420	0.081	0.202	0.110	0.311	0.101^a	0.797	0.035
Employment	0.234	0.127	0.101	0.101	0.422	0.049	0.952	0.031	0.143	0.077
Age (years-old)	0.012^b	0.041	0.827	0.000	0.047^b	0.015	0.629	0.005	0.506	0.001
Onset (years-old)	0.105	0.023	0.101	0.010	0.997	0.000	0.910	0.002	0.846	0.000
Duration (years)	0.299	0.014	0.078	0.012	0.007^b	0.027	0.874	0.002	0.466	0.001

Abbreviations: BN, bulimia nervosa; EDI-2 DT, EDI-2 drive for thinness.

^aBold: Effect size within a high/large range ($\eta^2 > 0.10$ or $V > 0.15$).

^bBold: Significant comparison.

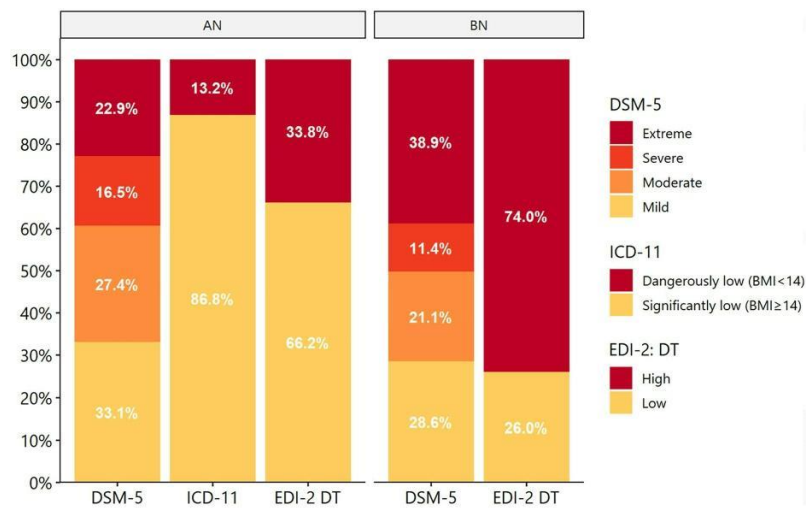


FIGURE 1 | Prevalence of the severity groups in the study. AN, anorexia nervosa; BN, bulimia nervosa; EDI-2 DT, EDI-2 drive for thinness.

severe = 11.4% and extreme = 38.9%). However, 86.8% of participants with AN were categorised into the ‘significantly low’ ICD-11 severity group. Regarding the DT severity groups, while most participants with AN (66.2%) were categorised into the low DT group, only 26% of those with BN were categorised into the low DT group.

5.3 | Treatment

Results from the chi-square test of independence (Table 2) revealed a significant association between DSM-5 AN severity groups and treatment outcome ($\chi^2(9, n = 266) = 19.35, p = 0.02$, Cramer’s $V = 0.16$). However, subsequent post-hoc pairwise comparisons of severity groups (e.g., DSM-5 mild vs. DSM-5 moderate) using Holmes correction did not uncover significant differences among the DSM-5 severity groups in treatment outcomes (Table 2). Hence, in line with Chen et al.’s recommendations, we based our findings on the results of the post-hoc pairwise comparisons.

Regarding the ICD-11 AN severity groups, it was found that there was a significant relationship between the two ICD-11 AN severity groups and treatment outcome ($\chi^2(3, n = 270) = 8.89, p = 0.03$, Cramer’s $V = 0.18$, with those in the ‘significantly low weight’ group having a lower likelihood to drop out from treatment than those in the ‘dangerously low weight’ group ($SR = -1.98$). Additionally, those in the ‘significantly low weight’ group were more likely to achieve full remission than those in the ‘dangerously low weight’ group ($SR = 2.94$).

Finally, we did not find any association between treatment outcomes and the remaining tested severity indicators: DSM-5 BN $\chi^2(9, n = 350) = 16.28, p = 0.06$; DT AN $\chi^2(3, n = 266) = 0.22, p = 0.97$ and DT BN $\chi^2(3, n = 362) = 1.30, p = 0.73$. Per Tian et al.’s (2018) recommendation, subsequent

post-hoc pairwise comparisons of DSM-5 BN severity groups (e.g., DSM-5 mild vs. DSM-5 moderate) were conducted. With Holmes correction, no significant associations in treatment outcomes between the DSM-5 BN, DT AN and DT BN severity groups were identified.

6 | Discussion

This study examined how pre-treatment severity classifications (DSM-5, ICD-11 and DT) predicted treatment outcomes in adults with AN and BN undergoing CBT-E. Most individuals with AN fell into milder severity groups, while those with BN were mostly in severe categories. Significant associations were found only for ICD-11 AN severity groups, with the ‘dangerously low BMI’ group showing poorer outcomes than the ‘significantly low BMI’ group. No other significant relationships were found between treatment outcomes for AN and BN and the DSM-5 and DT severity groups.

6.1 | Frequency Distribution of DSM-5, ICD-11 and DT Severity Groups

6.1.1 | Anorexia Nervosa

Our findings revealed that most individuals diagnosed with AN fell into less severe categories across the three classification systems: DSM-5 AN (mild and moderate severity groups, 60.5%), ICD-11 AN (‘significantly low weight’, 86.8%) and low DT AN group (66.2%). Similar distributions have been noted in prior studies for both DSM-5 and ICD-11 severity ratings (Dang et al. 2023; Dakanalis et al. 2018; Smith et al. 2017).

Similarly, 66.2% of our participants were classified into the low DT AN severity group, aligning with previous research showing

TABLE 2 | Discriminative capacity for the severity groups at baseline on the therapy outcome.

Anorexia nervosa: DSM-5 severity																					
	Mild/ G1		Moderate/ G2		Severe/ G3		Extreme/ G4		p	G1-G2		G1-G3		G1-G4		G2-G3		G2-G4		G3-G4	
	(n = 88)		(n = 73)		(n = 44)		(n = 61)			C-V		C-V		C-V		C-V		C-V		C-V	
	n	%	n	%	n	%	n	%		n	%	n	%	n	%	n	%	n	%	n	%
Dropout	30	34.1	28	38.4	19	43.2	27	44.3	0.022^a	0.156^b	0.200 ^b	0.229 ^b	0.268 ^b	0.250 ^b	0.257 ^b						0.037
Non-rem.	7	8.0	13	17.8	7	15.9	11	18.0													
Partial-rem.	16	18.2	6	8.2	10	22.7	13	21.3													
Full-rem.	35	39.8	26	35.6	8	18.2	10	16.4													

Bulimia nervosa: DSM-5 severity																					
	Mild/G1		Moderate/ G2		Severe/ G3		Extreme/ G4		p	G1-G2		G1-G3		G1-G4		G2-G3		G2-G4		G3-G4	
	(n = 100)		(n = 74)		(n = 40)		(n = 136)			C-V		C-V		C-V		C-V		C-V		C-V	
	N		n	%	n	%	n	%		n	%	n	%	n	%	n	%	n	%	n	%
Dropout	41	41.0	42	56.8	21	52.5	70	51.5	0.061	0.125 ^b	0.160 ^b	0.164 ^b	0.200 ^b	0.175 ^b	0.160 ^b						0.175 ^b
Non-rem.	9	9.0	4	5.4	5	12.5	20	14.7													
Partial-rem.	23	23.0	14	18.9	4	10.0	29	21.3													
Full-rem.	27	27.0	14	18.9	10	25.0	17	12.5													

Anorexia nervosa: EDI-2 DT severity										Bulimia nervosa: EDI-2 DT severity										Anorexia nervosa: ICD-11 severity												
Low (n = 176)					High (n = 90)					p	Low (n = 94)					High (n = 268)					p	Signif. low (n = 231)					p	Danger. low (n = 35)				
n	%	n	%	n	%	n	%	n	%		n	%	n	%	n	%	n	%	n	%		n	%	n	%	n		%	n	%		
Dropout	70	39.8	34	37.8	0.974	0.029	50	53.2	129	48.1	0.729	0.060	85	36.8	19	54.3	0.031^a	0.183^b														
Non-rem.	24	13.6	14	15.6			10	10.6	31	11.6			32	13.9	6	17.1																
Partial-rem.	30	17.0	15	16.7			19	20.2	52	19.4			38	16.5	7	20.0																
Full-rem.	52	29.5	27	30.0			15	16.0	56	20.9			76	32.9	3	8.6																

Note: G1: DSM-5 Mild group; G2: DSM-5 Moderate group; G3: DSM-5 Severe group; G4: DSM-5 Extreme Severe group.

^aBold: Significant comparison.

^bBold: Effect size into the mild/moderate to the high/large range ($V > 0.15$).

lower DT scores in AN samples (Abbate-Daga et al. 2007; Penas-Lledo et al. 2009; Ramacciotti et al. 2002). The prevalence of individuals with low DT may be influenced by ego-syntonic functioning, resulting in the underreporting of cognitive factors and fat phobia symptoms (Rieger et al. 2001). Overall, our study found little evidence to support the effectiveness of the tested severity ratings for AN in identifying individuals at the severe or extreme end of AN severity within a treatment-seeking sample.

6.1.2 | Bulimia Nervosa

As regards to BN, using both the DSM-5 criteria and the alternative DT severity ratings, we observed that a significant proportion of our participants fell into the extreme severe DSM-5 BN (38.9%) and high DT BN (74%) severity groups. This distribution of individuals at the severe end of the BN spectrum appears notably elevated in our study compared to findings synthesised by Dang et al.'s (2022) meta-analysis. Dang et al. noted a more balanced distribution across DSM-5 severity groups. The higher prevalence of individuals in the more severe BN spectrum in our study could potentially be indicative of the intense nature, including a longer duration of illness, of BN experienced by individuals seeking treatment at a tertiary ED treatment unit.

6.2 | Treatment Outcomes and Severity Groups

6.2.1 | DSM-5 Severity Rating for Anorexia Nervosa

Besides age and education status, no significant differences in any tested sociodemographic variables were found. It is worth noting that individuals in the extreme severe DSM-5 AN severity group were significantly older than those in the milder DSM-5 AN severity groups. The reasons for these differences are unclear, but older age may reflect the chronicity of the illness (Fernández-Aranda et al. 2021), which might indicate a higher severity of the disorder as defined by BMI.

While we found a significant association between the DSM-5 AN severity groups and treatment outcomes overall using the chi-square test, subsequent pairwise post-hoc analyses did not reveal significant differences across the groups. This aligns with existing literature on the predictive validity of the DSM-5 AN severity rating (Dalle Grave et al. 2018; Smink et al. 2014). Our study suggests that the DSM-5 severity groups based on BMI may not be clinically useful in predicting treatment outcomes for individuals undergoing CBT-E. This raises questions about the validity of the current arbitrary BMI cut-off for determining AN DSM-5 severity groups, especially given the established link between low BMI and poor long-term outcomes (Button, Chadalavada, and Palmer 2010; Lowe, Miller-Kovach, and Pheasant 2001). Therefore, future research should explore alternative BMI cut-off scores that may offer better predictive accuracy in AN treatment outcomes.

6.2.2 | ICD-11 Severity Rating for Anorexia Nervosa

In terms of the ICD-11 AN severity rating, we found that the individuals in the 'significantly low group' were less likely to drop out from treatment and achieve full remission than those with a 'dangerously low weight'. These findings are consistent with previous studies that have found that having a BMI < 14.0 kg/m² significantly correlated with having a poorer prognosis (Button, Chadalavada, and Palmer 2010; Engelhardt et al. 2021; Rosling et al. 2011). As such, the current study provides supporting evidence for BMI as an indicator of CBT-E treatment outcomes in AN, which is in line with previous research (Engelhardt et al. 2021).

It is worth to note that the debate centres once more on selecting a cut-off score that can effectively distinguish all pertinent AN-clinical variables. While the ICD-11 proposed a severity rating that is indicative of treatment outcomes, it fell short in capturing differences in the baseline level of ED psychopathology (Supporting Information S2). Yet, for practical implementation in daily clinical practice for risk assessment or treatment stratification, an effective severity indicator must encompass a diverse range of clinical indicators, including baseline general and ED psychopathology.

While both the DSM-5 and ICD-11 severity ratings for AN are based on BMI, our findings revealed a significant relationship between the ICD-11 and treatment outcomes, but not for the DSM-5 AN severity groups. This discrepancy may be attributed to the different number of severity groups within each rating system. Specifically, the presence of only two severity groups in the ICD-11 system may enhance the ability to detect significant findings compared to the four severity groups in the DSM-5 AN classification. Furthermore, both systems recognise a BMI below 14 kg/m² as indicating extremely severe AN, but they differ in how changes in BMI affect severity categorisation. A one-point change in BMI can shift individuals from DSM-5 moderate to DSM-5 severe categories, whereas the 'significantly low BMI' category in ICD-11 (the less severe of the two ICD-11 severity groups) encompasses all individuals with BMI greater than 14 kg/m², potentially leading to more detectable significant differences. Regardless of the different pattern in results between the DSM-5 and ICD-11 severity ratings for AN, this study refrains from supporting the integration of these two severity ratings into clinical practice.

6.2.3 | Bulimia Nervosa

While previous research supports the effectiveness of DSM-5 BN severity ratings in assessing baseline ED psychopathology (e.g., Dang et al. 2022), our study found no significant differences among these groups regarding treatment outcomes. This contrasts with prior findings that linked DSM-5 BN severity ratings to abstinence from compensatory behaviours in adults with BN and a decrease in ED-related attitudinal outcomes in adolescents with BN (Dakanalis et al. 2017; Gorrell et al. 2019).

One potential explanation for this discrepancy could be our study's stricter criteria for defining good treatment outcomes, which incorporate both attitudinal and behavioural aspects. This differs from previous studies that focused solely on behavioural outcomes or considered attitudinal and behavioural aspects separately. Overall, our study did not support the use of DSM-5 BN severity ratings to predict treatment outcomes in adults with BN. This aligns with the assumption in the current DSM-5 BN severity rating that different purging behaviours are interchangeable, although studies suggest that the type and number of purging behaviours are associated with different psychopathologies and treatment responses (Bruce and Steiger 2013; Gianini et al. 2017).

6.3 | Drive for Thinness as an Alternative Severity Rating for Anorexia and Bulimia Nervosa

Prior research has supported using DT as a severity indicator for AN and BN to assess baseline ED and general psychopathology (Krug et al. 2021). However, our study found no significant associations between DT severity groups and treatment outcomes in individuals with AN and BN. This contrasts with previous findings suggesting that higher DT is linked to poorer treatment outcomes in both AN and BN (Prost-Lehmann et al. 2018; Keski-Rahkonen et al. 2013; Schnicker, Hiller, and Legenbauer 2013).

The differences in our findings regarding DT severity groups and treatment outcomes compared to previous studies may be due to different study designs. Previous studies based their AN treatment outcome criteria on participants' weight and scores on the Eating Attitudes Scale-26 (Garner, Olmstead, and Polivy 1983; Prost-Lehmann et al. 2018) or participants' treatment dropout status (Schnicker, Hiller, and Legenbauer 2013), while our focus was on the absence of DSM-5 AN criteria symptoms (both attitudinal and behavioural). For BN, Keski-Rahkonen et al. (2013) conducted a cohort study involving participants with varying treatment histories, types, and durations, while Schnicker, Hiller, and Legenbauer (2013) exclusively examined BN participants who either completed or dropped out of CBT-E treatment, without directly considering BN behavioural and attitudinal symptoms as in our study.

Another possible explanation for the discrepancies between our results and earlier studies may be that previous research examined the relationship between DT and treatment outcome on a continuous scale, whereas we used the cut-off score proposed by Garner et al. (1984) to delineate the two distinct groups. This method might reduce statistical power compared to using continuous variables. Nevertheless, our study is the first to investigate the relationship between an alternative severity indicator, DT and treatment outcome.

6.4 | Implications

This study is the first to directly compare the efficacy of current severity ratings for AN and BN in predicting CBT-E treatment outcomes among adults seeking treatment. The potential to use

baseline clinical information to predict outcomes can inform clinicians, patients and families about the expected treatment duration and types. While the results support the ICD-11 AN severity rating to some extent, their inability to capture other clinical information highlights the ongoing need for comprehensive clinical assessments. Considering additional indicators such as overvaluation of weight/shape or perfectionism (key features in EDs per Fairburn, Cooper, and Shafran 2003) could offer deeper insights into these disorders' complex psychopathological aspects. This approach, encompassing the various dimensions of AN and BN, can yield a more focused and comprehensive understanding, leading to more effective clinical decisions and treatment strategies.

6.5 | Strength and Limitations

This study has strengths worth noting. Firstly, it includes participants from both inpatient and outpatient clinics at a reputable ED unit in Spain, enhancing the generalisability of our findings across these settings. Secondly, participants received interventions from trained clinical psychologists following consistent CBT-E treatment procedures.

Conversely, there are also several limitations to the current study that need to be discussed. First, the demographic composition of our sample comprises females who are predominately white, raising concerns about the generalisability of our findings to diverse ethnicities, age groups and genders. Therefore, future research investigating the clinical utility of the DSM-5, ICD-11 and alternative ED severity ratings in a more diverse sample with different social and demographic backgrounds is needed.

Second, this study examines the relationship between DSM-5, ICD-11 and DT severity groups and treatment outcomes. While treatment outcome is a crucial aspect that these severity ratings are expected to index, other relevant domains—such as disordered eating, cognitive impairments, level of disability and quality of life—are also important for assessing their validity but were not examined in this study. Therefore, future research should include more comprehensive studies that explore a broader range of domains.

Third, recognising the complexity of eating disorders, a rigid, one-size-fits-all structured interview approach may miss important aspects of the disorder, hence semi-structured interviews were conducted by senior clinicians to establish ED diagnosis. It is recognised that semi-structured interviews can be susceptible to bias, and incorporating a second rater in future studies could help minimise this potential bias.

Fourth, our exploration of the relationship between the three assessed severity ratings based on DSM-5, ICD-11 and DT and CBT-E treatment outcomes was conducted cross-sectionally, restricting our ability to track changes in symptomatology over time. Furthermore, the evaluation of treatment outcomes, in the current study, relied on combining changes in attitudinal, behavioural and physical symptoms into a categorical variable, impeding our ability to observe changes in each of these specific

aspects over time. As such, future research should be conducted longitudinally and measure the changes of each aspect of ED symptomatology separately rather than looking at as altogether.

Lastly, the study only assessed purging behaviours specified in the DSM-5 for individuals with BN, excluding other compensatory behaviours like insulin misuse or diet pill use, which could introduce confounding factors. Additionally, the study lacked statistical power to explore how distinct compensatory patterns impact treatment outcomes within different DSM-5 BN severity categories. For example, individuals with laxative abuse have been found to have higher baseline general and eating disorder psychopathology compared to those who engage in other purging behaviours (Tozzi et al. 2006), suggesting that individuals with laxative abuse may respond differently to treatment compared to those engaging in excessive exercise, even if they fall within the same DSM-5 BN severity group. Future research should include a wider range of compensatory behaviours and investigate whether specific patterns moderate the relationship between DSM-5 BN severity groups and treatment outcomes.

6.6 | Conclusion

In conclusion, our study aimed to assess the predictive validity of DSM-5, ICD-11 and DT severity ratings that are currently proposed for AN and BN within an all-female treatment-seeking patient group. Interestingly, only the ICD-11 AN severity groups exhibited a significant association with treatment outcomes. Specifically, the higher BMI group classified as 'significantly low' demonstrated more favourable outcomes compared to the lower BMI group labelled as 'dangerously low'. Our current findings underscore the limitation of relying on a single severity indicator to comprehensively capture the multifaceted nature of AN and BN. Consequently, there is a compelling need to redirect attention towards exploring and developing severity indicators tailored for specific purposes, reflecting the nuanced complexities inherent in the assessment and treatment of ED.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.