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BRIEF REPORT

Gender differences in eating disorder psychopathology across *DSM-5* severity categories of anorexia nervosa and bulimia nervosa

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Abstract

Objective: This study examined whether patterns of eating-disorder (ED) psychopathology differed by gender across *DSM-5* severity specifiers in anorexia nervosa (AN) and bulimia nervosa (BN).

Method: We tested whether ED psychopathology differed across *DSM*-5 severity specifiers among 532 adults (76% female) in a residential treatment center with AN or BN. We hypothesized that severity of ED psychopathology would increase in tandem with increasing severity classifications for both males and females with AN and BN.

Results: Among females with BN, *DSM-5* severity categories were significantly associated with increasing ED psychopathology, including Eating Disorder Examination-Questionnaire dietary restraint, eating concern, shape concern, and weight concern; and Eating Disorder Inventory drive for thinness and bulimia. ED psychopathology did not differ across *DSM-5* severity levels for males with BN. For both males and females with AN, there were no differences in ED psychopathology across severity levels.

Discussion: Results demonstrate that *DSM-5* severity specifiers may function differently for males versus females with BN. Taken together, data suggest *DSM-5* severity specifiers may not adequately capture severity, as intended, for males with BN and all with AN. Future research should evaluate additional clinical validators of *DSM-5* severity categories (e.g., chronicity, treatment non-response), and consider alternate classification schemes.

KEYWORDS

anorexia nervosa, bulimia nervosa, *DSM-5* severity, gender differences

1 | INTRODUCTION

Recent epidemiological studies suggest the incidence and prevalence of eating disorders (EDs) in males are increasing (Sweeting et al. 2015). Up to 25% of individuals with anorexia nervosa (AN) and

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bulimia nervosa (BN) in community samples are males (Hudson, Hiripi, Pope, & Kessler, 2007). However, males are systematically underrepresented in ED research and clinical practice (Murray et al., 2017). For example, previous editions of the *DSM* included gender-based diagnostic criteria (i.e., amenorrhea), limiting their utility in diagnosing males with EDs. Recognizing possible gender bias, *DSM-5* (American Psychiatric Association, 2013) removed these criteria, and introduced ostensibly gender-neutral severity ratings ranging from mild to extreme. For AN, ratings are based on BMI: mild (≥17.0), moderate (16.0–16.99), severe (15.0–15.99), and extreme (<15.0). For BN, ratings are based on weekly frequency of compensatory behaviors: mild (1–3 episodes), moderate (4–7 episodes), severe (8–13 episodes), and extreme (14+ episodes).

Recent studies have found mixed support for the utility of these ratings in predominantly female samples. Among patients with AN (96% female), there were no differences in ED psychopathology across severity groups (Machado et al., 2017). These findings were replicated among inpatients with AN (94% female), such that severity of ED psychopathology, depression, and physical and emotional functioning did not differ across severity groups (Gianini et al., 2017). However, Dakanalis et al. (2018) found significant increases in ED psychopathology across AN severity groups (96% female). The literature on BN severity specifiers is slightly more consistent. In a community sample of individuals with BN (93% female), severity of ED psychopathology increased alongside severity rating of BN (Grilo, Ivezaj, & White, 2015). This was replicated in several treatment-seeking samples (93% female, Dakanalis, Clerici, Riva, & Carra, 2017; 99% female, Gianini et al., 2017; 95% female, Jenkins, Luck, Cardy, & Stanford, 2016). However, as previous studies included almost entirely female samples, whether *DSM-5* severity specifiers function equivalently for males, such that patterns of increasing ED psychopathology by diagnostic severity are similar across males and females, is unknown.

As a potential complication, many widely used measures of ED psychopathology were initially developed and validated for females (Murray et al., 2017). Driven in part by lower scores on gender-based items (e.g., dissatisfaction with size of thighs), normative scores for males on these measures are lower than those for females (Mond et al., 2014). Males score lower than females even in clinical settings, highlighting that these measures may not capture some aspects of ED psychopathology relevant for males (Murray et al., 2017). For instance, males may be vulnerable to using steroids as part of their ED, which are not captured by traditional measures (Calzo et al., 2016).

However, one confound in this literature is that studies to date have only examined group-level averages in ED psychopathology in samples with ostensibly wide ranges of severity. Although this is helpful in comparing whether measures capture the same levels of ED psychopathology for males and females on average, comparing aggregate scores limits our ability to determine whether males with more severe EDs score higher than those with less severe EDs. It is possible that males score lower than females on average, but that males with more severe EDs still score higher on measures of ED psychopathology than male with less severe EDs. Indeed, males with diagnosed EDs score significantly higher (M = 3.48; Dahlgren, Stedal, & Ro, 2017) than males without EDs (M = 1.09; Lavender, De Young, & Anderson, 2010) on the Eating Disorders Examination Questionnaire (EDE-Q), indicating these measures do capture increases in ED severity among males. Therefore, these measures may also provide useful information to facilitate the first empirical examination of *DSM-5* severity specifiers among males with EDs.

The present study aimed to examine whether males and females with AN and BN demonstrate increasing scores on ED psychopathology measures across *DSM-5* severity levels. As *DSM-5* severity specifiers are meant to apply to both genders, we hypothesized that both males and females with AN and BN would display increasing severity of ED psychopathology across *DSM-5* severity levels.

2 | METHOD

2.1 | Participants

Participants were patients consecutively admitted to an ED residential treatment facility (i.e., unlocked live-in treatment facility appropriate for patients who are very psychologically ill but medically stable) between 2005 and 2014 with primary diagnoses of AN or BN (N = 532, M_{age} = 22.89 years, 76.9% female, 91.2% White). Because diagnoses were made on *DSM-IV* clinical criteria following an unstructured interview with a clinician, we retrospectively applied *DSM-5* research criteria. Individuals not meeting *DSM-5* criteria (i.e., clinical diagnosis of AN with measured BMI > 18.5 kg/m^2, clinical diagnosis of BN without compensatory behaviors at least once per week per EDE-Q) were excluded from the analytic sample. All participants provided informed consent and completed questionnaires prior to admission. The hospital Institutional Review Board approved this study.

2.2 | Measures

2.2.1 | Demographics

Demographic information (gender, age, race/ethnicity) was collected during the in-person intake assessment to residential treatment.

2.2.2 | Eating disorder examination-questionnaire (EDE-Q)

The EDE-Q (Fairburn & Beglin, 2008) includes 28 items assessing ED behaviors and cognitions over the past 28 days. The EDE-Q includes four subscales (restraint, eating concern, shape concern, weight concern) Items are rated on a 7-point Likert scale from 0 (no days) to 6 (every day).

2.2.3 | Eating disorder inventory (EDI-3)

The EDI-3 (Garner, 2004) includes 91 items assessing eating pathology, rated on a 6-point Likert scale. The EDI-3 has 12 subscales, but the current study used only the ED risk composite subscales: EDI-Body Dissatisfaction (EDI-BD), EDI-Bulimia (EDI-B), and EDI-Drive for Thinness (EDI-DFT) subscales.

2.3 | Data analytic plan

We conducted two multivariate ANOVAs (MANOVAs) to test our hypothesis that males with AN and females with AN would display similarly increasing patterns of severity on EDE-Q and EDI-3 subscales when stratifying across *DSM-5* AN severity levels. Similarly, we conducted two MANOVAs to test our hypothesis that males with BN and females with BN would display similarly increasing patterns of severity on these measures when stratifying across *DSM-5* BN severity levels. All MANOVAs used linear contrast weights to test our hypothesis of monotonic increasing severity by *DSM-5* severity specifiers within each diagnosis.

3 | RESULTS

3.1 | Overall severity categories

We report demographic and clinical characteristics in Table 1. The most common diagnosis was AN for both males (65.0%) and females (67.2%). Based on *DSM-5* AN severity criteria, we classified 136 (38.3%) participants as mild, 90 (25.4%) as moderate, 75 (21.1%) as severe, and 54 (15.2%) as extreme. Based on *DSM-5* BN severity criteria, we classified 33 (17.2%) participants as mild, 61 (34.3%) as moderate, 37 (18.7%) as severe, and 46 (29.9%) as extreme.

3.2 | Severity categories for AN

Table 2 displays EDE-Q and EDI-3 means[1] at admission for males and females with AN across severity levels. These measures of ED psychopathology did not differ significantly across *DSM-5* severity levels for either males or females with AN.

3.3 | Severity categories for BN

Table 2 displays EDE-Q and EDI-3 means at admission for males and females with BN across severity levels. Within males, there were no significant differences across *DSM-5* severity categories on ED psychopathology. However, the MANOVA for females was significant (Pillai's trace: $F[21, 369] = 2.09$, $p = .004$), with differences on EDE-Q restraint ($p = .02$), eating ($p = .002$), shape ($p = .03$), and weight concern ($p = .02$), and EDI-3 bulimia ($p < .001$) and drive for thinness ($p = .049$). Linear contrast weights demonstrated a significant linear trend for EDI-3 bulimia, with scores increasing across groups from mild to extreme. There was also a linear trend for EDI-3 drive for thinness, and EDE-Q eating, shape, and weight concern, with higher scores in the moderate than mild category, and higher scores in the extreme than severe category. Finally, there was a linear trend for EDE-Q restraint, with higher scores in the extreme than severe category.

[1]Demonstrating adequate variability to detect group differences, there was a wide range of scores on the EDI-BD (0–40), EDI-B (0–32), and EDI-DFT (0–28), and all EDE-Q subscales (0–6).

TABLE 1 Demographics and clinical characteristics of males and females with anorexia nervosa and bulimia nervosa seeking treatment at a residential treatment center

	Males (n = 123)	Females (n = 409)	Total (N = 532)
Mean age (*SD*)	22.41 (8.99)	23.03 (9.34)	22.89 (9.26)
DSM-5 diagnosis and severity			
AN, *n* (%)	80 (65.0)	275 (67.2)	355 (66.7)
Mild, *n* (%)	34 (42.5)	102 (37.1)	136 (38.3)
Moderate, *n* (%)	24 (30)	66 (24)	90 (25.4)
Severe, *n* (%)	12 (15)	63 (22.9)	75 (21.1)
Extreme, *n* (%)	10 (12.5)	44 (16)	54 (15.2)
BN, *n* (%)	43 (35.0)	134 (32.8)	177 (33.3)
Mild, *n* (%)	10 (23.3)	23 (15)	33 (17.2)
Moderate, *n* (%)	15 (34.9)	46 (28.6)	61 (34.3)
Severe, *n* (%)	12 (27.9)	25 (22.6)	37 (18.7)
Extreme, *n* (%)	6 (14.0)	40 (33.8)	46 (29.9)
Compensatory behaviors			
Self-induced vomiting, *M* (*SD*)	56.49 (98.31)	44.77 (45.27)	47.62 (62.29)
Laxative use, *M* (*SD*)	1.33 (3.52)	3.65 (13.19)	3.08 (11.64)
Diuretic use, *M* (*SD*)	0.54 (3.44)	0.98 (3.71)	0.88 (3.64)
Excessive exercise, *M* (*SD*)	3.56 (7.93)	4.32 (7.94)	4.14 (7.92)
Fasting, *M* (*SD*)	2.14 (2.07)	2.33 (1.97)	2.28 (1.99)
Race			
White, *n* (%)	113 (92.6)	378 (92.6)	491 (92.6)
Hispanic, *n* (%)	2 (1.6)	2 (0.5)	4 (0.8)
African American, *n* (%)	2 (1.6)	2 (0.5)	4 (0.8)
Asian, *n* (%)	1 (0.8)	4 (0.9)	5 (0.9)
Native American, *n* (%)	1 (0.8)	0 (0)	1 (0.1)
Other, *n* (%)	3 (2.6)	22 (5.5)	25 (4.8)

Note. AN = anorexia nervosa; BN = bulimia nervosa. Compensatory behaviors are for participants with BN over the past 4 weeks. Severity criteria for include: mild: BMI ≥ 17 kg/m^2; moderate: BMI = 16–16.99 kg/m^2; severe: BMI = 15–15.99 kg/m^2; extreme: BMI < 15 kg/m^2. Severity criteria for BN include: mild: 1–3 weekly episodes of purging; moderate: 4–7 weekly episodes; severe: 8–13 weekly episodes; extreme: >14 weekly episodes.

4 | DISCUSSION

This study is the first to examine whether males and females with AN and BN demonstrated similarly increasing patterns of severity in ED psychopathology across *DSM-5* severity categories. For AN, there were no differences in ED psychopathology severity levels for males or females. However, males and females with BN demonstrated different patterns of ED psychopathology scores across severity levels. Among females with BN, we found significant patterns of increasing dietary restraint, eating, weight, and shape concern, bulimia, and drive for thinness, that corresponded with increases in severity from mild to extreme. This extends previous research showing differences in ED psychopathology between BN severity groups in predominantly female samples of non-clinical community (Grilo, et al., 2015) and

TABLE 2 Differences in eating disorder psychopathology across anorexia nervosa and bulimia nervosa *DSM-5* severity groups

	Males				Females			
	Mild	Moderate	Severe	Extreme	Mild	Moderate	Severe	Extreme
Anorexia nervosa	**(*n* = 34)**	**(*n* = 24)**	**(*n* = 12)**	**(*n* = 10)**	**(*n* = 102)**	**(*n* = 66)**	**(*n* = 63)**	**(*n* = 44)**
EDE restraint	2.86 (2.06)	2.47 (1.91)	3.40 (1.96)	2.76 (2.40)	4.23 (1.64)	3.92 (1.70)	3.60 (1.63)	3.57 (1.83)
EDE EC	2.28 (1.60)	2.49 (1.79)	2.67 (1.75)	2.20 (1.77)	3.67 (1.47)	3.33 (1.27)	3.28 (1.46)	3.01 (1.40)
EDE SC	3.32 (1.85)	3.28 (2.25)	3.44 (1.76)	3.05 (1.91)	4.75 (1.40)	4.66 (1.33)	4.31 (1.71)	4.07 (1.69)
EDE WC	2.65 (1.80)	2.74 (2.19)	3.05 (1.97)	2.44 (1.65)	4.23 (1.54)	4.02 (1.56)	3.67 (1.66)	3.57 (1.86)
EDI BD	18.15 (11.07)	17.38 (10.23)	17.67 (9.86)	13.60 (9.37)	28.20 (10.16)	27.02 (9.51)	24.32 (11.57)	23.18 (10.75)
EDI bulimia	4.82 (4.97)	3.96 (5.61)	2.67 (5.71)	5.00 (7.11)	7.39 (7.94)	6.42 (7.27)	5.38 (7.31)	3.50 (4.97)
EDI DFT	14.00 (9.47)	12.00 (10.25)	14.41 (8.40)	13.10 (8.80)	20.90 (7.48)	20.35 (6.67)	18.49 (7.79)	17.11 (8.29)
Bulimia nervosa	**Mild (*n* = 10)**	**Moderate (*n* = 15)**	**Severe (*n* = 12)**	**Extreme (*n* = 6)**	**Mild (*n* = 23)**	**Moderate (*n* = 46)**	**Severe (*n* = 25)**	**Extreme (*n* = 40)**
EDE restraint	3.00 (1.59)	3.19 (1.92)	3.45 (1.79)	2.87 (1.73)	3.51 (1.58)[a]	4.08 (1.40)[a]	3.70 (1.53)[a]	4.57 (1.25)[b]
EDE EC	2.98 (1.89)	3.04 (1.65)	4.20 (1.20)	2.87 (1.91)	3.60 (1.25)[a]	4.20 (1.12)[b]	3.95 (1.10)[b]	4.69 (0.91)[c]
EDE SC	4.25 (2.07)	4.38 (1.65)	4.85 (0.89)	3.92 (2.02)	4.63 (1.57)[a]	5.29 (0.90)[b]	5.03 (1.15)[b]	5.41 (0.73)[c]
EDE WC	3.90 (2.05)	3.41 (1.91)	3.90 (1.63)	3.40 (1.96)	4.14 (1.60)[a]	4.82 (1.18)[b]	4.56 (1.27)[b]	5.15 (0.97)[c]
EDI BD	20.80 (15.29)	25.27 (11.99)	25.00 (8.58)	21.17 (11.89)	28.65 (10.79)[a]	31.33 (9.11)[a]	27.96 (10.47)[a]	31.44 (7.28)[a]
EDI bulimia	14.00 (10.34)	20.47 (5.80)	20.75 (4.90)	17.33 (5.05)	13.87 (7.12)[a]	18.62 (7.38)[b]	22.13 (6.67)[c]	22.64 (6.77)[d]
EDI DFT	16.80 (9.74)	17.27 (7.07)	19.50 (6.27)	16.00 (7.63)	19.83 (7.38)[a]	22.73 (5.77)[b]	21.79 (5.90)[b]	23.82 (3.19)[c]

Note. Values are means and standard deviations. EDE EC = EDE eating concern; SC = shape concern; WC = weight concern, EDI BD = EDI body dissatisfaction; DFT = drive for thinness. Groups in the top portion correspond to AN severity criteria (mild: BMI ≥ 17 kg/m^2; moderate: BMI = 16–16.99 kg/m^2; severe: BMI = 15–15.99 kg/m^2; extreme: BMI < 15 kg/m^2); groups in the bottom portion correspond to BN severity criteria (mild: 1–3 weekly episodes of purging; moderate: 4–7 weekly episodes; severe: 8–13 weekly episodes; extreme: >14 weekly episodes). For females with BN, means with different superscripts in each row indicate significant differences between severity levels ($p < .05$).

treatment-seeking (Gianini et al., 2017) individuals by demonstrating gender differences in a treatment-seeking clinical sample. Contrary to our expectations, severity categories did not correspond to differences in ED psychopathology among males with BN, as our study is the first to demonstrate.

Taken together, these results may provide further support for the limited clinical utility of *DSM-5* severity specifiers for AN (Gianini et al., 2017; Machado et al., 2017). Moreover, we found evidence for potentially differential functioning of these specifiers for males and females with BN. Whereas BN severity specifiers showed some utility in associations with ED psychopathology in females, these associations did not emerge among males. Future research should seek to replicate and confirm these findings and examine whether severity classification based on nonpurging compensation shows the same pattern of results.

The current study has several strengths, including the use of a large, treatment-seeking sample of patients with AN and BN. We also specifically examined *DSM-5* severity specifiers for males, a group that has been underrepresented in ED research. Future work should seek to replicate these findings in non-treatment-seeking community samples, as the generalizability of our results to non-treatment-seeking or community samples, or patients in different levels of care (e.g., inpatient, day treatment, outpatient), is unknown. As with previous studies (e.g., Nakai et al. 2017), cell size was also small for participants with extreme AN or BN, particularly for males, and this may have limited our ability to detect all but the most robust group differences. Moreover, although excellent agreement has been shown between self-report and interview versions of EDE subscale scores among individuals with AN and BN, future studies should confirm that similar results are obtained with thorough clinical assessments with patients and others (e.g., parents). Another potential limitation is the use of measures that may not accurately assess ED psychopathology in males. This highlights the need to develop, validate, and utilize psychometrically sound ED psychopathology measures in males and females that accurately capture symptom and severity levels. Forbush et al. (2013) developed the Eating Pathology Symptoms Inventory (EPSI), a self-report measure with questions particularly relevant for males (e.g., "I thought my muscles were too small"), and other symptoms that may correspond to ED severity (e.g., extreme exercise). Future research using the EPSI could provide additional information about the *DSM-5* severity specifiers in males and females. If, for example, males and females also demonstrate different patterns of ED psychopathology on the EPSI across *DSM-5* severity categories, this would bolster our findings that these specifiers function differently by gender.

This study adds to a growing literature on the validity and clinical utility of *DSM-5* severity specifiers and provides preliminary evidence for the differential function of these specifiers for males versus females with BN. ED psychopathology in AN did not correspond to *DSM-5* severity categories for males or females, suggesting BMI may not be the optimal marker of severity for AN, at least for specific ED attitudes. These results emphasize the importance of considering alternate classification schemes (e.g., overvaluation of shape/weight, BMI *Z*-scores) that have shown more robust associations with psychopathology (Gianini et al., 2017) and medical impairment (Kandemir, et al., 2016) among individuals with EDs. Although *DSM-5* severity specifiers have strong face validity, future studies should also consider alternate validators for severity categories, including longitudinal chronicity, psychiatric comorbidity, and medical morbidity or complications. Continued research examining whether males and females classified using various models show robust differences across

multiple severity indicators would provide important information on how to most effectively define severity of EDs, and the prognostic and clinical utility of such classification models.

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