Three Studies on the Factorial Distinctiveness of Binge Eating and Bulimic Symptoms Among Nonclinical Men and Women

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Abstract: **Objective:** *According to DSM-IV's proposed nosology, binge eating disorder is separable from bulimia nervosa. The basis for separation rests with compensatory behaviors (e.g., induced vomiting)—people with bulimia nervosa engage in compensatory behaviors, whereas those with binge eating disorder do not. We addressed the validity of this nosology.* **Methods:** *In three studies on 2,015 young men and women, we used factor-analytic techniques to assess whether bulimic and binge eating symptoms are separable in men and women.* **Results and Discussion:** *Results of the three studies converged: Although binge eating symptoms may be distinct from bulimic symptoms among young men, the two syndromes are factorially inseparable among young women. Nosologic and sociocultural implications are noted. © 2000 by John Wiley & Sons, Inc.* Int J Eat Disord 27: 198–205, 2000.

Key words: *binge eating disorder; bulimia nervosa; factorially inseparable*

INTRODUCTION

According to the 4th ed. of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association [APA], 1994), binge eating disorder, which appears in DSM's appendix as a diagnosis needing further study, is a similar but distinct syndrome in comparison to bulimia nervosa. The area of overlap involves binge eating; indeed, within the definitions of binge eating disorder and bulimia nervosa, the DSM criteria for a "binge" are virtually identical. What differentiates the syndromes is the presence of compensatory behaviors, such as purging, laxative and diuretic abuse, and excessive exercise. Compensatory behaviors characterize bulimia nervosa, but not binge eating disorder. Binge episodes, then, can exist independently, comprising their own delimited syndrome or they can coexist with compensatory behaviors, and thus comprise the syndrome of bulimia nervosa.

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To the extent that this nosology is valid (i.e., that a binge syndrome exists distinct from bulimia nervosa), a distinct binge factor should exist in factor analyses of eating disorder symptoms. This binge factor should be correlated with but distinct from a separate purge factor. The purpose of this study is to factor analytically test whether this is in fact the case among samples of nonclinical men and women.

Unlike most eating pathology (e.g., bulimia nervosa, anorexia nervosa), which is more common among women, binge eating disorder is approximately equally prevalent among men and women (APA, 1994). Among women, then, both bulimia nervosa and binge eating disorder are relatively common; among men, by contrast, bulimia nervosa is fairly uncommon and binge eating disorder relatively common. Taken together with the overlap in criteria between binge eating disorder and bulimia nervosa, the relatively high prevalence of both syndromes in women raises a question as to whether they are actually distinct. The same question applies to men; however, the differential prevalence of the syndromes among men is suggestive, although not definitive, of the syndromes' distinctness.

In three studies, we explored this question among large groups of young men and women. Using factor-analytic techniques, we determined whether the factorial structure of eating disordered symptoms differed by gender. If binge eating disorder and bulimia nervosa are distinct syndromes for both men and women, separate (if highly correlated) factors should emerge for each gender, one reflecting the specific aspect of bulimia nervosa (i.e., purge behaviors) and one reflecting the common element of both syndromes (i.e., binge behaviors).

However, if the two are distinct only for men, we would expect that (1) in a one-factor analysis, a purge indicator would load highly on the general binge-purge factor for women but not for men; (2) in a one-factor analysis, the general factor will display a higher eigenvalue for women than for men, indicating that the general binge-purge factor is more cohesive for women than for men; and (3) in multifactor analyses, a purge indicator would comprise its own factor for men but not for women. Such findings would suggest that for women, bulimia nervosa and binge eating disorder are not separable, whereas for men, they are.

STUDY 1

Participants and Procedure

Researchers affiliated with Radcliffe College distributed surveys to a randomly selected sample of 800 women and 400 men who were students at Harvard University (Zuckerman, Colby, Ware, & Lazerson, 1986). The focus of the present study was on the 562 women and 234 men who both agreed to participate and had complete data on the Eating Disorders Inventory (EDI). The participants were predominantly Caucasian (79%); approximately 9% were Asian; 6% were African-American; 4% were Hispanic; and 2% were classified as other. The mean age of the sample was 20.06 years (SD = 1.6).

The questionnaire completed by this sample included items about demographic background; height and weight; concerns about dieting, eating patterns, and body weight and shape; and eating disorder symptomatology. Of particular interest for the present study, participants completed the Bulimia subscale of the EDI.

EDI Bulimia Subscale

The EDI (Garner, Olmsted, & Polivy, 1983) is a frequently used 64-item self-report measure of eating-related attitudes and traits. It yields eight subscales: Drive for Thinness,

Bulimia, Body Dissatisfaction, Ineffectiveness, Perfectionism, Interpersonal Distrust, Interoceptive Awareness, and Maturity Fears. The subscales have shown adequate internal consistency coefficients and have been well validated (Garner et al., 1983).

The present study focused on the Bulimia subscale, in keeping with the study's interest on the structure of binge and purge symptoms in men and women. Within EDI subscales, selected items were excluded by the researchers who designed the questionnaire packet in order to reduce demands on participants. Only redundant items were selected for exclusion. Six of the seven original items of the Bulimia subscale, which assesses binging and purging (e.g., "I stuff myself with food," "I have the thought of trying to vomit to lose weight"), were included (excluded item: "I eat or drink in secrecy"). Participants were asked to rate items on a 1 to 6 scale (1 = never; 2 = rarely; 3 = sometimes; 4 = frequently; 5 = usually; 6 = always).

Data-Analytic Strategy

The EDI items were factor analyzed using principal axis factoring (PAF). In analyses containing more than one factor, an oblique rotation procedure was used, in keeping with the assumption that factors reflecting aspects of binge and purge symptoms would be correlated.

With regard to criteria for extraction of factors, we first extracted one factor, to assess our expectation that a purge indicator would load more highly on this factor for women than for men. In subsequent analyses, we extracted as many factors as needed to detect a purge factor, should it exist, as long as such was defensible in light of standard extraction criteria, including the scree test (Cattell, 1966), and the interpretability of resulting factor structures (Gorsuch, 1983). These multifactor analyses were conducted to evaluate our expectation that a purge indicator would comprise its own factor for men but not for women.

Results and Discussion

One-Factor Analysis

Table 1 displays the factor loadings for the PAF extracting one factor, separately for women and men. Consistent with our expectation, the purge item was not as strong an indicator of this general factor among men as it was among women (loadings = .64 vs. .43 in women and men, respectively).

Also consistent with expectation, the general factor among women possessed a higher

Table 1. Rotated factor loadings from one-factor principal axis factor analysis of items from the EDI Bulimia subscale, among men and women, study 1

Item	Women	Men
1. Eat when upset	.62	.53
2. Stuff self with food	.70	.48
3. Eating binges/could not stop	.80	.83
4. Think about binging	.84	.86
5. Eat moderately/stuff self when others are gone	.71	.62
6. Thought of trying to vomit	.64	.43
Eigenvalue	3.60	2.99

Note: EDI = Eating Disorders Inventory. For women, $N = 562$; for men, $N = 234$.

eigenvalue than among men (eigenvalues = 3.60 vs. 2.99 in women and men, respectively). Relatedly, as a general rule, women's item loadings were either higher than or comparable to (not lower than) those for men. The multifactor analysis, described next, will determine which, if any, of these items comprise a second interpretable factor; our expectation was that the purge item would do so among men but not women.

Multifactor Analysis

Table 2 displays the Oblimin-rotated factor loadings and eigenvalues for an analysis extracting two factors. Consistent with expectation, the second factor represents a very clear purge factor among men but not among women.

Among women, the second factor was difficult to interpret, in that one of the several binge items comprised this factor. It is important to note that this same pattern of findings emerged when we conducted three-, four-, and five-factor analyses. It is also important to emphasize that we view the purge factor among men as defensible, despite its relatively low eigenvalue, on the basis of the criterion of interpretability (Gorsuch, 1983).

Consistent with the possibility that bulimic and binge eating symptoms may be discernible among men but not women, factor-analytic results indicated an inclusive binge-purge factor among women, whereas separate factors for binge and purge symptoms were detected among men. It appears, then, that the separate categorization of bulimia nervosa and binge eating disorder among women is in question. However, because this was a novel result obtained using nonideal measures (especially of purging, assessed by one item), we deemed replication especially important.

STUDY 2

Participants and Procedure

Participants (N = 925) were seniors in high school who would be attending a selective Northeastern college in Fall 1996. In May 1996, all incoming freshmen (N = 1029) received confidential surveys on health and eating behavior. Only 34 students (3%) refused to participate. An additional 70 students had missing data on EDI Bulimia scale items, and were excluded; therefore, 90% of surveyed students were included in the present study. The sample included 472 women and 453 men; mean age was 17.6 (range = 16–26, SD =

Table 2. Rotated factor loadings from two-factor principal axis factor analysis of items from the EDI Bulimia subscale, using oblique rotation, among men and women, study 1

	Women		Men	
Item	Factor 1	Factor 2	Factor 1	Factor 2
1. Eat when upset	.03	.94	.61	.11
2. Stuff self with food	.54	.21	.48	−.01
3. Eating binges/could not stop	.85	−.04	.73	.17
4. Think about binging	.90	−.06	.90	−.03
5. Eat moderately/stuff self when others are gone	.60	.15	.53	.17
6. Thought of trying to vomit	.69	−.05	.03	.91
Eigenvalues	3.60	0.71	2.99	0.94

Note: EDI = Eating Disorders Inventory. For women, N = 562; for men, N = 234.

.71). Racial composition of the sample was as follows: 79% Caucasian, 10% Asian, 4% African-American, 4% Hispanic, and 3% American Indian.

The questionnaire completed by this sample was virtually identical to that described in Study 1, including the same six items of the EDI Bulimia subscale.

Data-Analytic Strategy

As in Study 1, we used PAF. We extracted one factor, to assess our expectation that a purge indicator would load highly on this factor for women but not for men. Next, we extracted as many factors as needed to detect a purge factor, should it exist, as long as such was defensible in light of standard extraction criteria. The multifactor analyses were conducted to evaluate our expectation that a purge indicator would comprise its own factor for men but not for women.

Results and Discussion

One-Factor Analysis

Table 3 displays the factor loadings for the PAF extracting one factor, separately for women and men. Consistent with our expectation and with the findings of Study 1, the purge item was not as strong an indicator of this general factor among men as it was among women (loadings = .65 vs. .35, in women and men, respectively). As in Study 1, eigenvalues and item loadings were higher among women than among men.

Multifactor Analysis

In a two-factor analysis among both men and women, the second factor was not interpretable. Accordingly, because there was a trivial difference between the eigenvalues for the second through the fifth factors, we examined three-, four-, and five-factor analyses separately among men and women.

Table 4 displays the Oblimin-rotated factor loadings and eigenvalues for an analysis extracting three factors. Results for the four- and five-factor analyses were highly similar to the three-factor analysis, and will thus not be discussed further. As shown in Table 4, consistent with expectation, a purge factor emerged among men but not among women. Specifically, among women, the purge item loaded onto the first factor, together with binge items. By contrast, among men, the purge item comprised its own factor (Factor 3 in Table 4) and did not load highly onto other factors. As in Study 1, we view the purge

Table 3. Rotated factor loadings from one-factor principal axis factor analysis of items from the EDI Bulimia subscale, among men and women, study 2

Item	Women	Men
1. Eat when upset	.58	.49
2. Stuff self with food	.62	.47
3. Eating binges/could not stop	.83	.72
4. Think about binging	.86	.71
5. Eat moderately/stuff self when others are gone	.69	.51
6. Thought of trying to vomit	.65	.35
Eigenvalue	3.49	2.49

Note: EDI = Eating Disorders Inventory. For women, $N = 472$; for men, $N = 453$.

Table 4. Rotated factor loadings from three-factor principal axis factor analysis of items from the EDI Bulimia subscale, using oblique rotation, among men and women, study 2

	Women			Men		
Item	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
1. Eat when upset	−.06	.80	.05	.01	.47	.28
2. Stuff self with food	.28	.46	−.04	.15	.63	−.19
3. Eating binges/could not stop	.82	.10	−.07	.68	.09	−.04
4. Think about binging	.89	.00	.00	.79	−.09	.06
5. Eat moderately/stuff self when others are gone	.26	.25	.44	.41	.11	.05
6. Thought of trying to vomit	.62	−.06	.16	.19	−.01	.38
Eigenvalues	3.49	0.80	0.56	2.49	0.95	0.79

Note: EDI = Eating Disorders Inventory. For women, N = 562; for men, N = 234.

factor among men as defensible, despite its relatively low eigenvalue, on the basis of the criterion of interpretability (Gorsuch, 1983). Study 2, like Study 1, raises a question of whether separate categorization of bulimia nervosa and binge eating disorder among women is appropriate. Study 3, described next, provided an additional replication; unlike the participants in Studies 1 and 2, who were enrolled in Ivy League universities, Study 3's participants were recruited from a large state university.

STUDY 3

Participants, Procedure, Measures, and Data-Analytic Strategy

Participants (N = 294; 186 women; 108 men) were drawn from psychology classes at a large southwestern university. Average age was 19.4 years (SD = 1.54); ethnic composition was as follows: 68% Caucasian, 19% Asian-American, 8% Hispanic, and 5% African-American. Participants completed questionnaires as part of a study on health and behavior, including the EDI. We again used PAF, first extracting one factor. We then extracted as many factors as needed to detect a purge factor, should it exist, as long as such was defensible in light of standard extraction criteria.

Results and Discussion

One-Factor Analysis

Table 5 displays the factor loadings for the PAF extracting one factor, separately for women and men. As in Studies 1 and 2, the purge item was not as strong an indicator of this general factor among men as it was among women (loadings = .75 vs. -.20 in women and men, respectively). As in Study 1, eigenvalues and item loadings were higher among women than among men.

Multifactor Analysis

In two- and three-factor analyses among both men and women, results were not easily interpretable. Among men, a four-factor solution was supported by the scree test (eigen-

Table 5. Rotated factor loadings from one-factor principal axis factor analysis of items from the EDI Bulimia subscale, among men and women, study 3

Item	Women	Men
1. Eat when upset	.75	.66
2. Stuff self with food	.74	.78
3. Eating binges/could not stop	.78	.11
4. Think about binging	.66	.26
5. Eat moderately/stuff self when others are gone	.32	.58
6. Thought of trying to vomit	.75	−.20
Eigenvalue	2.72	1.49

Note: EDI = Eating Disorders Inventory. For women, N = 186; for men, N = 108.

values = 1.49, 1.10, 1.05, 0.98, 0.77, and 0.60) and produced a purge factor. For sake of comparison, a four-factor analysis was also conducted among women.

Table 6 displays the Oblimin-rotated factor loadings and eigenvalues for an analysis extracting four factors. Consistent with expectation, a purge factor emerged among men but not among women (Factor 4 in Table 6). Among women, the purge item loaded onto other factors defined by binge items. Study 3's pattern of findings was thus similar to results of Studies 1 and 2.

GENERAL DISCUSSION

Although the distinction between the binge eating and bulimia nervosa syndromes appears to exist for men (consistent with proposed DSM nosology), the two may be factorially inseparable among women. In three studies on 2,015 young men and women, separate binge and purge factors emerged among men. However, among women, the purge item never emerged as its own factor and was a strong indicator of a general binge-purge factor corresponding to the bulimic syndrome. It appears from our analyses that women who engage in binge eating are also likely to engage in compensatory behaviors such as induced vomiting and laxative abuse. Men who engage in binge eating may or may not engage in compensatory behaviors.

Table 6. Rotated factor loadings from four-factor principal axis factor analysis of items from the EDI Bulimia subscale, using oblique rotation, among men and women, study 3

	Women				Men			
Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 1	Factor 2	Factor 3	Factor 4
1. Eat when upset	.09	−.04	.87	−.05	.46	.11	.50	−.11
2. Stuff self with food	−.06	.03	.93	.07	.67	−.38	.20	−.02
3. Eating binges/could not stop	.93	.03	.08	−.10	−.03	−.95	−.09	−.01
4. Think about binging	.01	.01	.06	.95	−.16	.03	.88	.07
5. Eat moderately/stuff self when others are gone	.01	.98	.00	.01	.83	.16	−.26	.04
6. Thought of trying to vomit	.65	−.04	−.04	.36	.05	.00	.06	.98
Eigenvalues	2.72	1.01	0.96	0.52	1.49	1.10	1.05	0.98

Note: EDI = Eating Disorders Inventory. For women, N = 186; for men, N = 108.

Our findings may be related to sociocultural influences. Among men, there is less pressure toward thinness. Accordingly, binge eating may be unaccompanied by urges to rid oneself of food. By contrast, among women, there is considerable drive for thinness, which may compel women who binge to also purge.

Our findings should be viewed within the context of several cautions and considerations. First, the EDI Bulimia subscale contains only one purge indicator. Although it was reassuring that results using this scale converged across our three studies, this limitation should nonetheless be considered when interpreting our results. Also, our results were obtained on college students and may or may not be applicable to other populations. In this context, it is interesting to note that dieting and disordered eating among men may be quite rare in the teens and early 20s (the age range of our samples), but may increase as men enter their 30s (Heatherton, Mahamedi, Striepe, Field, & Keel, 1997). The factorial structure of binge and purge symptoms among men in their 30s and older (as well as women in their 30s and older) thus represents an interesting avenue for future research. It may be that as dieting and disordered eating increase among men, the factor structure of binge and purge symptoms may converge with the factor structure among women. Such a finding would suggest that binge eating disorder and bulimia nervosa are factorially inseparable among everyone except young men.

Another consideration is that the number of extracted factors needed to detect a purge factor in men varied across the three studies. In each case, however, we justified our extraction criteria. More importantly, regardless of extraction procedure, in no instance did a separate purge factor emerge in women. Finally, it is important to note that our results are applicable to binge and purge symptoms as assessed by the EDI and not eating disorders as assessed by structured clinical interview. We look forward to future research that addresses these limitations and which further evaluates the claim that DSM nosology, as applied to the relation between binge eating and bulimic symptoms, may be valid only for men.

REFERENCES

American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders (4th ed.). Washington, DC: Author.

Cattell, R.B. (1966). The scree test for the number of factors. Multivariate Behavioral Research, 3, 245–276.

Garner, D.M., Olmsted, M.P., & Polivy, J. (1983). The Eating Disorder Inventory: A measure of cognitive-behavioral dimensions of anorexia nervosa and bulimia. In P.L. Darby, P.E. Garfinkel, D.M. Garner, & D.V. Coscina (Eds.), Anorexia nervosa: Recent developments in research (pp. 173–184). New York: Liss.

Gorsuch, R. (1983). Factor analysis. Hillsdale, NJ: Erlbaum.

Heatherton, T.F., Mahamedi, F., Striepe, M., Field, A.E., & Keel, P. (1997). A 10-year longitudinal study of body weight, dieting, and eating disorder symptoms. Journal of Abnormal Psychology, 106, 117–125.

Kaiser, H. (1961). A note on Guttman's lower bound for the number of common factors. Multivariate Behavioral Research, 1, 249–276.

Zuckerman, D.M., Colby, A., Ware, N.C., & Lazerson, J.S. (1986). The prevalence of bulimia among college students. American Journal of Public Health, 76, 1135–1137.