

PREVALENCE OF BINGE EATING DISORDER, OBESITY, AND DEPRESSION IN A BIRACIAL COHORT OF YOUNG ADULTS¹

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ABSTRACT

This article examined the prevalence of binge eating disorder (BED), obesity, and depressive symptomatology in a biracial, population-based cohort of men and women participating in a longitudinal study of cardiovascular risk factor development. The Revised Questionnaire on Eating and Weight Patterns was used to establish BED status among the 3,948 (55% women, 48% Black) participants (age 28–40 years). Body mass index (BMI: kg/m²) was used to define overweight (BMI ≥ 27.3 in women and ≥27.8 in men). Depressive symptomatology was assessed with the Center for Epidemiologic Study Depression Scale. Prevalence of BED was 1.5% in the cohort overall, with similar rates among Black women, White women, and White men. Black men had substantially lower BED rates. Depressive symptomatology was markedly higher among individuals with BED. Among overweight participants, BED prevalence (2.9%) was almost double that of the overall cohort. There were no differences in BED rates between overweight Black and White women. Thus, BED was common in the general population, with comparable rates among Black women, White women, and White men, but low rates among Black men. Obesity was associated with substantially higher prevalence of BED. Treatment studies that target obese men and minority women with BED are indicated.

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INTRODUCTION

Binge eating disorder (BED) is a provisional eating disorder diagnosis (1) characterized by recurrent episodes of binge eating that occur in the absence of inappropriate compensatory behaviors, such as purging. High rates of BED have been observed among overweight individuals presenting at university-based weight con-

trol programs, with as many as 20% to 30% of individuals meeting diagnostic criteria (2). Rates of BED in community samples appear to be much lower. Approximately 2% of individuals met BED criteria in the initial, multisite field trials (3,4). BED was slightly more common among women than men (2.5% versus 1.1%), but this difference was not statistically significant. These prevalence rates are in dramatic contrast to bulimia and anorexia nervosa, where the overwhelming majority of affected individuals are women (5,6). However, a limitation of the community samples in these initial BED prevalence studies was that they were not representative of the general population; over half the community sample consisted of job applicants to a large, urban medical center and college freshmen (3,4). Thus, epidemiological data on the prevalence of BED in the general population are limited.

Population-based data on BED prevalence rates in women have been reported recently (7–9). Point prevalence rates have ranged from 0.7% among French women (7) to 1.8% among American women (8). However, none of these studies included men. Thus, questions about BED prevalence among men and whether BED is more common among women in the general population remain unanswered.

In addition to limited information on BED among men, the majority of studies have included primarily White women. Therefore, data on BED prevalence among ethnic minority groups are lacking. In contrast to the other eating disorders which are more common among Whites, BED prevalence may be similar in some ethnic groups as in Whites (10). Several studies have reported that BED rates did not differ between Black and White women (8,11,12). However, the limited representation of Blacks in these studies and the failure to assess BED in men precludes comparison of BED prevalence across the race and gender groups.

In addition, little is known about the correlates of BED within the general population. BED has been positively associated with obesity in both treatment-seeking (3,4,15) and community samples (8). However, body weight may not be as strongly associated with BED in some ethnic groups (11). To date, there has been no research in multiethnic, population-based samples that will permit examination of the associations between obesity and BED across race and gender. Given the high rates of obesity, particularly among minority women, a clearer understanding of the association between BED and obesity is important.

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Depressive symptomatology also has been consistently associated with BED. For example, major depression is more common among obese individuals with BED than in obese individuals without BED (12,14). Furthermore, depressive symptoms may be a more salient feature of BED for some ethnic groups. Preliminary data indicate that depressive symptomatology may be more strongly associated with binge eating among Hispanic and White women than among Black women (11). Additional information about the associations between BED and depressive symptomatology within the general population would help elucidate the relationship between depression and BED.

Taken cumulatively, the data suggest the need to determine BED prevalence in a biracial, population-based cohort of both men and women and to explore associations among obesity, depression, and BED across gender–race groups.

METHODS AND PROCEDURES

Study Population

The Coronary Artery Risk Development in Young Adults (CARDIA) study is a population-based, prospective epidemiologic investigation of the determinants and evolution of cardiovascular risk factors in a large, biracial cohort of young adults. A total of 5,115 men and women aged 18 through 30 were recruited using community-based sampling (Birmingham, AL; Chicago, IL; and Minneapolis, MN) and through the membership of a large prepaid health care plan (Oakland, CA). Fifty-one percent of eligible persons contacted from total community or census tract enumerations (or from health plan membership roster for Oakland) were enrolled and assessed at baseline. Details of the CARDIA study design and cohort characteristics have been previously described (15). The study population was approximately balanced with respect to gender (46% men and 54% women), race (52% Black and 48% White), age (45% aged 18 through 24 years and 55% aged 25 through 30 years), and education (40% \leq 12 years and 60% $>$ 12 years) at the baseline exam in 1985–1986. The present analyses use data from the Year 10 exam (Exam 5) in which 3,948 participants were reassessed (79% of the surviving cohort). Participants who returned for the Year 10 exam were older at baseline than those who did not attend (25.0 versus 24.2 years, $p < .00001$), were more likely to be White (83% of Whites attended versus 75% of Blacks, $p < .001$), and reported more years of education at baseline (13.9 versus 13.4, $p < .00001$). However, attenders and non-attenders did not differ by baseline obesity.

Data Collection

Demographics: Race, sex, age, and years of education were obtained by interviewer-administered questionnaire.

Body Weight: Body weight was measured in light clothing to the nearest 0.2 kg with a calibrated scale, and height was measured without shoes to the nearest 0.5 cm using a vertical ruler. Body Mass Index (BMI) was calculated as weight (in kilograms)/height (in meters²). Overweight was defined as BMI \geq 27.3 kg/m² in women or 27.8 kg/m² in men, corresponding to the 85th percentile of non-pregnant, non-institutionalized U.S. adults in NHANES II (16).

Binge Eating Disorder: A diagnosis of Binge Eating Disorder was established using the Questionnaire on Eating and Weight Patterns—Revised (QEWP-R) (4), a self-report questionnaire developed for the multisite diagnostic criteria field trial. The QEWP-R includes items that assess the individual components of the BED diagnosis and it has been used by other investigators to

establish BED diagnosis (7,11). Further, the validity and reliability of the instrument are good (3,17). Guidelines for establishing BED using the QEWP-R outlined by Spitzer and his colleagues (4) were used in the current study. BED was considered present if a participant indicated: (a) binge eating (consumption of a large amount of food within any two-hour period) accompanied by loss of control; (b) binge eating episodes frequency of at least two to three days per week on average over the previous six months; (c) a minimum of three of the associated features during binge episodes (rapid eating, eating until uncomfortably full, eating large amounts when not hungry, embarrassed about amount eating, and feeling disgusted, depressed, or guilty after overeating); (d) marked distress regarding the binge episodes; and (e) absence of regular purging (e.g. self-induced vomiting or laxative abuse) or non-purging (e.g. fasting or excessive exercise) compensatory behavior over the previous three months (exclusion due to current bulimia nervosa). These criteria correspond to the *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition) (DSM-IV) (1) diagnostic criteria for binge eating disorder.

Concerns have been raised that self-report measures of eating psychopathology may inflate estimates of the prevalence of eating disorders (18). However, examination of the concordance between clinician-administered interview to diagnose BED and diagnosis by the QEWP-R demonstrated reasonable agreement, with a kappa of .57 (19). This level of agreement in diagnosis is comparable to that found between trained interviewers administering a structured diagnostic interview (20) and is higher than that found with other self-report measures of binge eating pathology (21). Confirmation of BED diagnosis by clinical interview was not possible within the scope of the examination, the primary purpose of which was to assess longitudinal changes in cardiovascular risk factors.

Depressive Symptoms: The Center for Epidemiologic Study Depression (CES-D) Scale (22) was administered to assess depressive symptomatology. This 20-item scale has been shown to have acceptable sensitivity and specificity as a screening tool for depression casefinding in non-clinical populations (23) and has demonstrated reliability and validity (24–26). The CES-D questionnaire presents a range of depressive symptoms, with an emphasis on the affective component of depression. Potential scores range from 0 to 60, with higher scores indicating greater severity of depressive symptomatology. The survey is widely used in epidemiologic studies to classify individuals as depressed or not depressed, using a cutoff score of \geq 16 (25,27,28). Accordingly, individuals with scores of 16 or higher were categorized as depressed for the present analyses.

Statistical Analysis

Cohort characteristics were examined with analyses of variance and chi-square analyses, as appropriate. Prevalence of BED across race–gender groups was compared using chi-square analyses with post-hoc pairwise comparisons adjusted for multiple comparisons. Logistic regression was used to compare prevalence rates controlling for age, years of education, and CES-D score. Univariate analyses comparing characteristics of participants with and without BED used t-tests and chi-square analyses, as appropriate. Similar analyses were done using only the subset of the cohort who met overweight criteria. All reported p -values are two-tailed. Version 6.12 of the SAS software package (SAS Institute, Cary, NC) was used for all analyses.

TABLE 1
Mean (SD) Cohort Characteristics

	Black Men	Black Women	White Men	White Women	<i>p</i> *
<i>N</i>	801	1,101	947	1,062	
Age (years)	34.3 (3.7)	34.5 (3.9)	35.5 (3.4)	35.6 (3.4)	race: <.0001
Education (years)	13.5 (2.2)	13.8 (2.1)	15.5 (2.8)	15.5 (2.5)	race: <.0001 gender: =.04
Body Mass Index (kg/m ²)	27.8 (5.8)	30.0 (7.9)	26.6 (4.4)	25.5 (6.2)	race: <.0001 gender: <.006 race × gender: <.0001
CES-D Score	11.1 (7.9)	13.0 (9.5)	9.0 (6.8)	9.5 (7.6)	race: <.0001 gender: <.0001 race × gender: =.01
Prevalence of Overweight# (%)	43.1	55.9	31.0	26.7	<i>p</i> = .001
Prevalence of Depression§ (%)	22.5	31.3	14.0	17.4	<i>p</i> = .001

* Analysis of variance or chi-square, as appropriate.

BMI ≥ 27.8 for men and ≥ 27.3 for women.

§ CES-D Score ≥ 16.

TABLE 2
Characteristics Associated with BED in Women and White Men§

	Black Women		White Men		White Women	
	BED+ (<i>N</i> = 24)	BED- (<i>N</i> = 1,077)	BED+ (<i>N</i> = 11)	BED- (<i>N</i> = 936)	BED+ (<i>N</i> = 21)	BED- (<i>N</i> = 1,041)
Body Mass Index (kg/m ² ; M ± SD)	35.9 (8.5)	29.9 (7.9)***	32.4 (8.2)	26.5 (4.3)*	31.9 (8.8)	25.4 (6.1)**
CES-D Score (M ± SD)	17.3 (10.1)	12.9 (9.5)*	16.6 (8.1)	8.9 (6.7)***	12.3 (6.7)	9.5 (7.6)*
Prevalence of Overweight (%)	83.3	55.3**	81.8	30.5**	61.9	26.0**
Prevalence of Depression (%)	45.8	31.0	45.5	13.7**	33.3	17.1

§ Within race-gender group comparisons used t-test or chi-square, as appropriate. Black men were omitted due to the small number with BED (0.4%).

* *p* < .05.

** *p* < .01.

*** *p* < .001.

RESULTS

Cohort Characteristics

Characteristics of participants assessed at the Year 10 exam are presented in Table 1. Black participants were significantly younger (*p* < .0001), heavier (*p* < .0001), and had fewer years of education (*p* < .0001) than White participants. Black participants had higher levels of depressive symptomatology (*p* < .0001) and were more likely to be classified as depressed (*p* < .001) and overweight (*p* < .001). Women tended to have more education (*p* = .04) and greater depressive symptomatology (*p* < .0001) than men. There were race-gender interactions such that Black women were heavier than Black men, but White men were heavier than White women (*p* < .0001). Further analyses of associated characteristics are race-gender specific due to these race-gender group differences and interactions.

Binge Eating Disorder Prevalence and Characteristics

Prevalence of BED in the overall cohort was modest, with 1.5% of individuals meeting criteria. There were, however, significant differences in the prevalence across the race-gender groups [χ^2 (3, *N* = 3911) = 12.61, *p* = .006]. BED rates were 2.2% among Black women, 2.0% among White women, and 1.2% among White men. There was no difference in BED rates between Black and White women. Although BED rates among White men were lower than women of either race group, these rates were not statistically different. However, BED rates were significantly lower

among Black men (0.4%) than the other race-gender groups. Adjustment for age and education did not change these patterns.

Binge eating disorder diagnosis was positively associated with body weight in women and White men (Table 2). Compared to those without BED, individuals with BED had significantly higher BMIs and prevalence of overweight. Particularly high rates of overweight were evident among Black women and White men with BED, in whom over 80% of those with BED were overweight. Although depressive symptomatology was higher among individuals with BED across all race-gender groups, only among White men was there a significantly higher rate of depression. Due to the small number of Black men with BED, we did not include comparisons of Black men with and without BED. There was no association between BED and age or education.

Binge Eating Disorder Among Overweight Individuals

The prevalence of BED among overweight participants (2.9%) was almost double that of the overall cohort (1.5%). There were significant differences in the prevalence across the race-gender groups [χ^2 (3, *N* = 1538) = 9.85, *p* = .02]. Although BED prevalence did not differ significantly between overweight White women, overweight Black women, and overweight White men (Figure 1), overweight Black men had significantly lower rates than the other race-gender groups. Neither adjustment for age and education nor further adjustment for depressive symptomatology altered this pattern.

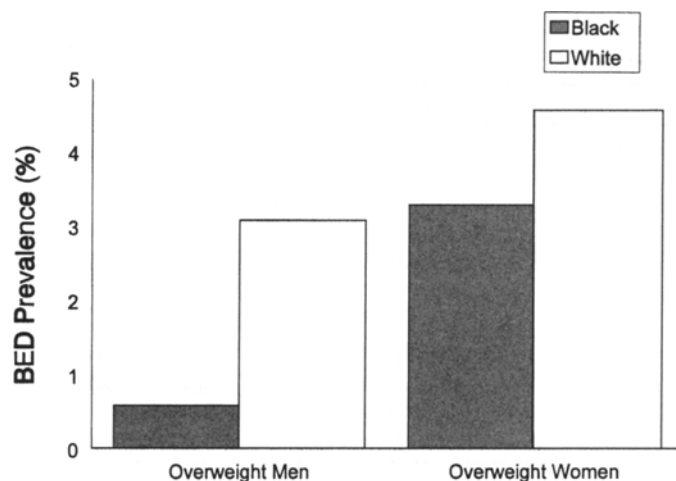


FIGURE 1: Prevalence of Binge Eating Disorder among Overweight Participants ($N = 1,538$).

Among the overweight participants, those with BED tended to weigh more and report more depressive symptoms (Table 3). Overweight Black women with BED had a significantly higher mean BMI than overweight Black women without BED, and a similar trend was apparent among overweight White women. Although the difference in BMI between overweight White men with BED and those without BED was not statistically significant, it was in the expected direction. Additionally, overweight White men with BED had significantly higher levels of depressive symptomatology as evidenced by higher CES-D scores. Both overweight Black and White women with BED also had higher CES-D scores than those without BED; however, neither of these comparisons reached a level of statistical significance.

DISCUSSION

This study provides the first population-based data on BED prevalence in a racially-diverse sample that includes both men and women. Most striking was the finding of comparable rates of BED in Black and White women, despite substantial differences in obesity and depression between these groups. Further, White men did not differ significantly from either Black or White women in BED prevalence. This is markedly different from bulimia and anorexia nervosa which have been experienced almost exclusively by women. Men are not immune from BED nor are women of color. However, BED does appear to be uncommon among Black men.

The BED prevalence rates among women in the CARDIA cohort are comparable to those reported in other population-based epidemiologic studies of women. Two percent of women in the overall CARDIA cohort met BED criteria. Götestam and Agras (9) found a 1.5% point prevalence rate of BED among Norwegian women in the general population using a self-report questionnaire. Similarly, Bruce and Agras (8) reported rates of 1.8% among predominantly White women in the San Francisco area responding to a telephone-administered structured interview.

The current study found substantially higher rates of BED among overweight individuals than in the cohort overall, with almost 3% of overweight participants meeting diagnostic criteria. Data from the National Health and Nutrition Examination Survey indicate that over 30% of the adult American population are overweight (29). Thus, BED affects a large number of individuals nationwide.

Similar to the prevalence patterns in the overall CARDIA cohort, there were no significant differences in BED rates among overweight Black and White women and White men. Most treatment studies of BED among obese individuals have included only women, with few exceptions (30). These population-based data underline the importance of adequately assessing BED in overweight White men. The finding that overweight White men with BED had particularly high levels of depressive symptomatology (levels that were significantly higher than those of overweight men without BED) indicates that this subgroup may warrant specific clinical attention.

The prevalence rate of BED of 3% among overweight individuals in the CARDIA cohort was lower than the 8% prevalence reported by Bruce and Agras (8) in the only other epidemiologic investigation to examine BED rates in an overweight subgroup of a population-based sample. Bruce and Agras examined only women; however, this factor alone would not seem to account for the difference in prevalence rates, in as much as the prevalence among the overweight women in CARDIA was 4% which is still much lower than that reported by Bruce and Agras. Alternatively, methods of case identification could account for the difference in rates. However, Bruce and Agras used an interview to establish BED diagnosis and interview methodologies tend to indicate a lower prevalence of eating disorders (18). Thus, it would seem that the differences in prevalence between these two studies reflect differences in the populations sampled.

Comparisons between the rate of BED among overweight men in the CARDIA study (1.7%) cannot be made since these are the first population-based data of which we are aware on BED in overweight men. However, it was noteworthy that there appeared to be differences in the relationship between obesity and BED prevalence in White and Black men. BED prevalence among overweight White men was almost three times that of the general cohort of White men (3.0% versus 1.2%, respectively) while the rates among overweight Black men were quite similar to the rates among Black men in the overall cohort (0.6% versus 0.4%). Thus, not only were Black men less likely to meet BED criteria, overweight did not seem to confer added risk.

In addition to strong associations with obesity, BED was strongly associated with depressive symptomatology across all race-gender groups examined. Previous studies have indicated high levels of psychological distress among individuals with BED who present for treatment, particularly with respect to high rates of depressive disorders (12,14,31). Similarly, Fitzgibbon and colleagues (11) found a positive association between depressive symptomatology and binge eating severity among women participating in community-based nutrition education programs. The data from the CARDIA cohort support the association between depressive symptoms and BED in the general population and, importantly, extend the available information to include men.

The complex interrelationships among obesity, depression, and BED present a challenge to disentangle. Binge eating appears to precede obesity in about half of individuals with BED (32,33). It is very likely that binge eating contributes to the development or maintenance of obesity (13). The relationship is further complicated in that both binge eating and obesity may increase depressive symptomatology (34). Further, among some individuals, episodes of depression can be accompanied by periods of substantial weight gain (35). Finally, a lifetime history of depression may increase vulnerability for BED (12,14,36). Clearly, further longitudinal studies to tease out the direction of the associations among obesity, depression, and BED are required before the implications for

TABLE 3
 Characteristics (M ± SD) Associated with BED Among Overweight Individuals§

	Overweight Black Women (N = 615)		Overweight White Men (N = 294)		Overweight White Women (N = 284)	
	BED+ (N = 20)	BED- (N = 595)	BED+ (N = 9)	BED- (N = 285)	BED+ (N = 13)	BED- (N = 271)
Body Mass Index (kg/m ²)	38.3 (7.2)	35.1 (6.6)*	34.6 (7.2)	31.4 (3.9)	36.7 (7.0)	33.6 (5.6)‡
CES-D Score	16.4 (9.5)	13.5 (9.7)	17.8 (8.5)	9.2 (6.9)**	13.2 (7.6)	10.1 (8.1)

§ Analysis of variance within race-gender group.

* $p < .05$.

** $p < .001$.

‡ $p = .05$.

prevention and treatment of both obesity and BED can be established.

In conclusion, these data establish BED prevalence rates in young Black and White men and women from the general population. The overall prevalence rate of 1.5% indicates that BED is much more common than general population rates of bulimia nervosa and anorexia nervosa. Moreover, individuals with BED suffer the morbidity associated with both disordered eating and obesity. Treatment studies that target men and minority women are clearly indicated. However, there are limitations to these data which merit consideration. BED diagnosis was established using a self-report questionnaire, a methodology that has been shown to overestimate prevalence in comparison to more rigorous standardized clinical interview in epidemiologic studies of other eating disorders (5). However, the self-report instrument selected in the current study is the one which has had the widest application across a variety of populations (3,4,7,11). Nonetheless, perceptions of control over eating and thresholds for what constitutes overeating or a binge may vary by important characteristics, such as race, gender, and weight status. This would be of particular importance in light of recent data to suggest that the critical components of the BED diagnosis that distinguish clinical samples from a comparison sample were episodic overeating and the perception of loss of control (17). Finally, these data are cross-sectional and, therefore, do not address the temporal associations among obesity, depression, and BED. Longitudinal studies designed to clarify the causal paths and risk factors for BED within a racially-diverse general population are needed to begin to address these salient questions.

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