Prevalence and Correlates of Bulimia Nervosa and Bulimic Behaviors in a Racially Diverse Sample of Undergraduate Students in Two Universities in Southeast Texas

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This cross-sectional survey used a self-report questionnaire to measure the prevalence and correlates of bulimia nervosa and bulimic behaviors in a sample of undergraduate students enrolled in two state-supported universities in Texas in 1990. In one university, the student population was predominantly white; in the other, it was predominantly nonwhite. Bulimia status was assessed using criteria from the Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised (DSM-III-R), of the American Psychiatric Association and was operationalized using the Revised Bulimia Test. Overall, 0.9% of the sample, 1.3% of the females, and 0.2% of the males were classified as having bulimia nervosa. The prevalence of bulimic behaviors was 5.4% overall, 6.6% for females, and 3.6% for males. There was no racial/ethnic difference in the prevalence of bulimia nervosa or bulimic behaviors; 1.5% of the whites (n = 459) and 0.4% of the nonwhites (n = 693) were classified as having bulimia nervosa, while 5.5% of the whites and 5.3% of the nonwhites reported bulimic behaviors. In univariate analysis, female sex, obesity, dieting behavior, and a family history of alcoholism, drug abuse, and depression were statistically associated with bulimic behaviors. After adjustment for covariates, only obesity and dieting behavior were statistically significant. We concluded that the sex difference in bulimic behaviors reported in other studies may be due to the failure to control for confounding factors. Am J Epidemiol 1996;144:450-5.

Bulimia nervosa, a cycle of binge eating followed by self-induced vomiting and/or laxative abuse, is a disorder that has become a recent focus of public health interest and scientific inquiry (1, 2). The clinical features as defined by the Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised (DSM-III-R) (3) include recurrent episodes of binge eating, purging behaviors, and a variety of other symptoms (table 1). Persons with a clinical diagnosis of bulimia nervosa may develop medical complications that cause distress for both the patient and the family (4). In addition to impairing physical health, psychological health and social functioning also may be affected.

Despite anecdotal claims from clinicians (5), at present there is no unequivocal evidence that bulimia nervosa is becoming more prevalent. Increasing recognition by physicians as well as greater willingness on the part of bulimics to admit to a problem may be important factors in creating the impression of an increase in the disorder (5).

A number of studies have investigated the prevalence of binge eating and the use of purging techniques (6–8). Others (9–13) have attempted to operationalize the criteria for bulimia outlined in the Diagnostic and Statistical Manual of Mental Disorders, Third Edition (DSM-III) (14) or its revision, the DSM-III-R (3), for questionnaire surveys. The prevalence rates reported from these studies vary widely. For example, in a study of college students using DSM-III criteria, Halmi et al. (15) reported that 19 percent of the women and 5 percent of the men surveyed were bulimic. However, Drenowski et al. (9) found that only 1 percent of college women and 0.2 percent of college men were bulimic based on DSM-III-R criteria. Scant information is available regarding differences in prevalence by other characteristics such as race/ethnicity, although studies designed to estimate the prevalence...
of bulimic behaviors in nonwhites are beginning to appear in the literature (16, 17).

The inconsistency in reported prevalence rates is most likely due to methodological differences between studies, e.g., sample sizes, data collection methods, the populations studied, and perhaps most important, the operational definition of bulimia (17). Obviously, increased prevalence rates have been reported when less stringent criteria were used. When more stringent criteria were used, such as the requirement that binging be coupled with self-induced vomiting or laxative abuse, the prevalence rate dropped substantially (18).

The purpose of this study was to determine the prevalence of bulimia nervosa and bulimic behaviors among undergraduate university students in southeast Texas by using standardized criteria. In addition, we examined the prevalence of bulimic behaviors by characteristics that have been suggested by other investigators as possibly being associated with this eating disorder.

MATERIALS AND METHODS

A cross-sectional survey was used to determine the prevalence of bulimia nervosa and bulimic behaviors among undergraduate students enrolled in two state-supported, accredited universities in southeast Texas. In one university, the student population was predominantly white; in the other, it was predominantly nonwhite. The study population consisted of undergraduate students enrolled in introductory political science courses during the 1990 fall semester. Because introductory political science courses are a state requirement, a sample of classes chosen from these courses provided a cross-section of the entire student population.

Approval to conduct the study was requested and received from the chairs of the two political science departments and from all of the professors teaching the introductory courses. Thus, all political science classes at both universities constituted the sampling frame. A stratified (universities) cluster (political science classes) sample was chosen with a selection probability proportional to the number of students enrolled in each class. Considering the expected prevalence of bulimia, the desired precision of the estimates, and the possible design effect of the cluster sampling, the target sample size was set at 600 students at each university. We assumed a 70 percent class attendance rate and randomly selected 15 of 29 classes at the predominantly white university and 20 of 28 classes at the predominantly nonwhite university. Of 1,720 students in the 35 classes, 1,205 students (70 percent) were present on the days when the questionnaire was administered. The response rate was 97.5 percent of those who attended class: 465 whites, 611 blacks, 92 students from other racial/ethnic groups, and seven who did not indicate their race/ethnicity. Of the 30 nonrespondents, six refused to participate, six were postbaccalaureate, and 18 returned unusable questionnaires. Also excluded from the analysis were 16 students who did not identify their sex and the seven who did not indicate their race/ethnicity. For purposes of analysis, the racial/ethnic category “other” was combined with the category “black” and labeled “nonwhite.” Thus, the analysis is based on 1,152 students (95.6 percent of those who attended class).

All professors granted permission to distribute an anonymous, self-administered questionnaire during class and to allow 20 minutes of class time to complete the questionnaire. A letter of introduction described the study as an investigation of “eating practices of undergraduate students enrolled in Texas universities.”

The questionnaire contained demographic questions on sex, race/ethnicity, class (e.g., freshman), college major, religion, marital status, living arrangements, and mother’s and father’s educational attainments as well as questions on height, weight, dieting behavior, and family history of depression, alcoholism, and drug abuse. Self-reported height and weight were used to calculate body mass index (weight/height²), and standard body mass index categories (19) were used to classify persons as underweight or normal weight, overweight, or severely overweight.

Bulimia status was assessed by the Revised Bulimia Test (BULIT-R) developed by Thelen et al. (20). The BULIT-R was developed and validated on samples of clinically identified female bulimics who met DSM-III-R criteria for a diagnosis of bulimia nervosa and on nonclinical samples of female college students. It contains 28 items, covering all of the DSM-III-R criteria for bulimia nervosa listed on table 1. Sixteen of the 28 items pertain to binging and loss of control while

| Recurrent episodes of binge eating (rapid consumption of a large amount of food in a discrete period of time) |
| A feeling of lack of control over eating behavior during the eating binges |
| The person regularly engages in self-induced vomiting, use of laxatives or diuretics, strict dieting or fasting, or vigorous exercise to prevent weight gain |
| A minimum average of two binge eating episodes a week for at least 3 months |
| Persistent overconcern with body shape and weight |

* Published by the American Psychiatric Association (3).
eating, nine concern general use of radical weight loss measures and body image, and three refer to vomiting. Items are presented in a five-point, forced choice, Likert format, and item scores are summed. Following Thelen et al. (20), bulimia nervosa was operationally defined as a score over 103 (of a possible score of 140), and presence of bulimic behaviors was defined as a score over 84. Cross-validation has shown that a cutoff of 104 is a reliable and valid predictor of bulimia nervosa in a nonclinical sample of college females; the specificity, positive predictive value, and negative predictive value of the BULIT-R were 0.82 or higher, and the sensitivity was 0.62 (20).

We imputed missing values for several variables. For respondents with only one or two missing items on the BULIT-R, we assigned the average item score. For the independent variables (except for sex and race), persons with missing values were assigned to the reference category for that variable. This imputation procedure affected about 50 respondents, less than 5 percent of the sample.

Prevalence estimates are presented with 95 percent confidence intervals. Chi-square statistics were used in univariate analysis. Multivariate analysis was conducted using logistic regression techniques and was summarized by odds ratios and 95 percent confidence intervals. The presence or absence of bulimic behaviors was the primary dependent variable, and characteristics that were statistically significant in univariate analysis at $p < 0.05$ were the independent variables. Sex and race/ethnicity were included in all analyses. The design effect associated with cluster sampling was negligible, i.e., 1.08, and was ignored in the analysis.

## RESULTS

The mean age of respondents was 22 years, and the standard deviation was 5.3 years. Fifty-nine percent of the respondents were female, and over 50 percent were nonwhite. Most students were at normal weight according to the body mass index. About 17 percent reported dieting at the time of the study, and 43 percent reported a history of dieting. Approximately 20 percent reported a family history of alcoholism, 13 percent reported a family history of drug use, and 18 percent reported a family history of depression.

### Prevalence of bulimia nervosa and bulimic behaviors

As measured by the BULIT-R, only 10 of 1,152 students (0.9 percent) in the sample gave responses consistent with a probable diagnosis of bulimia nervosa (table 2). Nine (1.3 percent) were female, and one
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(0.2 percent) was male; seven (1.5 percent) were white, and three (0.4 percent) were nonwhite.

The prevalence of bulimic behaviors, i.e., a BULIT-R score of over 84, was considerably higher (table 2). The overall prevalence was 5.4 percent—6.6 percent for females and 3.6 percent for males. Although prevalence estimates were similar for whites (5.5 percent) and nonwhites (5.3 percent), white females were three times more likely than white males to report bulimic behaviors, while nonwhite females were only slightly more likely than nonwhite males to report bulimic behaviors.

Factors associated with bulimia nervosa and bulimic behaviors

In univariate analysis, no factors were statistically associated with bulimia nervosa; however, sex, obesity, dieting behavior, and a family history of alcoholism, drug abuse, and depression were associated with bulimic behaviors (table 3). Factors that were not significantly associated with bulimic behaviors in univariate analysis were race/ethnicity, class, college major, religion, marital status, living arrangements, and mother’s and father’s educational attainments.

The unadjusted and adjusted odds ratios for the association of selected risk factors and bulimic behaviors are shown in table 4. Before adjustment for covariates, students who were female, overweight or severely overweight, or currently or previously dieting or who had a family history of alcoholism, drug abuse, or depression were more likely to report bulimic behaviors. After adjustment for covariates, only severely overweight and currently or previously dieting remained statistically significant (table 4).

DISCUSSION

This study underscores the need to distinguish between bulimia nervosa and bulimic behaviors. Bulimia nervosa, as defined by scoring over 103 on the BULIT-R, was exhibited by only 0.9 percent of the study population; however, the prevalence of bulimic behaviors was 5.4 percent. Although much lower than reported in earlier studies (15), our prevalence estimates were almost identical to those from studies that also used DSM-III-R criteria and that studied a cross-sectional sample of students (9, 10). It is difficult to compare findings across studies, especially those conducted before 1985, because investigators used different definitions of bulimia nervosa. At the time of this study, there was general agreement that the DSM-III-R criteria were the best available for epidemiologic studies (2). The discrepancy between recent estimates and earlier findings emphasizes the importance of using standardized criteria and rigorous research designs to study the epidemiology of eating disorders (21).

In univariate analysis, females were more likely to report bulimia nervosa and bulimic behaviors than were males, a finding consistent with other reports (13, 16, 17, 22). For bulimic behaviors, the sex difference was limited to white students and became nonsignificant after adjustment for covariates. This discrepancy with other studies may be due to their failure to measure and control for confounding factors.

It is interesting to note that of the 62 subjects with bulimic behaviors in this study, 27 percent were men. Carlat and Camargo (23) suggested that males make up approximately 10–15 percent of bulimic persons in the community. Because eating disorders are commonly assumed to be female disorders, they may be underdiagnosed in males (4).
TABLE 4. Odds ratios and 95% confidence intervals for the association of bulimic behaviors and selected factors in undergraduate students in two universities in southeast Texas, 1990 (n = 1,152)

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Unadjusted OR</th>
<th>95% CI</th>
<th>Adjusted OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female (vs. male)</td>
<td>1.87</td>
<td>1.02–3.44</td>
<td>1.31</td>
<td>0.66–2.60</td>
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<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White (vs. nonwhite)</td>
<td>1.02</td>
<td>0.59–1.77</td>
<td>1.17</td>
<td>0.68–2.03</td>
</tr>
<tr>
<td>Obesity</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Severely overweight</td>
<td>8.40</td>
<td>4.62–15.31</td>
<td>5.31</td>
<td>2.84–9.95</td>
</tr>
<tr>
<td>Overweight (vs. underweight/normal weight)</td>
<td>2.99</td>
<td>1.13–7.57</td>
<td>2.20</td>
<td>0.83–5.87</td>
</tr>
<tr>
<td>Dieting behavior</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currently dieting (vs. never)</td>
<td>20.07</td>
<td>8.30–50.77</td>
<td>10.70</td>
<td>4.43–25.84</td>
</tr>
<tr>
<td>Past dieter (vs. never)</td>
<td>7.54</td>
<td>3.02–19.65</td>
<td>4.39</td>
<td>1.85–10.41</td>
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<tr>
<td>Family history of alcoholism</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (vs. no)</td>
<td>1.92</td>
<td>1.07–3.41</td>
<td>1.01</td>
<td>0.52–1.97</td>
</tr>
<tr>
<td>Family history of drug use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (vs. no)</td>
<td>2.42</td>
<td>1.25–4.61</td>
<td>1.80</td>
<td>0.87–3.73</td>
</tr>
<tr>
<td>Family history of depression</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (vs. no)</td>
<td>2.16</td>
<td>1.18–3.92</td>
<td>1.42</td>
<td>0.74–2.71</td>
</tr>
</tbody>
</table>

* OR, odds ratio; CI, confidence interval.
† Adjusted for other risk factors shown in the table.

Our study is one of the few to survey a large number of nonwhite students. Recently, Warheit et al. (17) used DSM-III criteria and found that adult blacks reported eight of 10 bulimic symptoms as frequently as or more frequently than whites did. In another study of adults based on DSM-III criteria, Langer et al. (16) found that blacks were more likely than whites to report binging followed by vomiting, eating less in public followed by heavier eating when alone, perceiving a weight problem, and having their lives dominated by conflicts about eating. Neither study stratified their analysis by sex and race simultaneously.

Our study included most of the variables identified in the clinical literature as being associated with bulimia. When these factors were evaluated simultaneously, only obesity and dieting behavior were significantly associated with bulimic behaviors. In a survey designed to measure eating disorders based on DSM-III criteria, Whitaker et al. (22) found that the combined effects of age, sex, and body mass index were predictive of eating disorders in an adolescent population. Girls and heavier students of both sexes were more likely to engage in weight control, and the number of weight control measures used in the previous year increased with age. A recent cross-sectional survey (24) examined psychosocial and health behavior correlates of frequent dieting and of purging among adolescents and found that, among other factors, a history of binge eating was independently associated with both outcomes in males and females. Positive body image was inversely associated with dieting and with purging in both sexes.

Our study overcame a number of methodological limitations of previous research on eating disorders. The sample consisted of an ethnically diverse, randomly selected cross-section of classrooms of university students rather than students with a single major, the sample size was large, and the response rate was high. In addition, we used the most rigorous diagnostic criteria available, the BULIT-R, an instrument shown to be a reliable and valid predictor of a diagnosis of bulimia nervosa (20).

Our results, however, should be generalized with caution. First, although the results are representative of undergraduates enrolled in two state-supported universities in southeast Texas, they may or may not be generalized to the entire student enrollment of these universities. Only students present in class on the days the questionnaire was administered were surveyed. Some anecdotal writings have suggested bulimics may not attend class regularly (25). Second, the results may not generalize to students in other universities because admission standards vary or to young adults who do not attend college. Third, this study relied on data collected by a self-administered questionnaire. Limitations of such instruments include individual differences in interpretation of questions, differences in literacy skills (26, 27), and the potential for social...
desirability response bias such as underreporting bulimic symptoms (28). In university students, some degree of literacy can be assumed; only 18 students turned in unusable questionnaires. Fourth, the study design was cross-sectional, making causal attribution problematic.

Even with these limitations, our findings add to the epidemiologic literature on the prevalence of bulimia nervosa and bulimic behaviors in nonwhites. Our study focused on university students; future studies might focus on ethnically diverse samples of young adults in the general population. Because the diagnostic criteria for eating disorders have changed over time, it is important that investigators make explicit their criteria so that findings can be compared across studies.

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