ABSTRACT

Objective: This study reports 20-year outcome of bulimia nervosa (BN) and related eating disorders not otherwise specified (EDNOS) and point prevalence of BN and EDNOS for a cohort of women and men in late adolescence (mean age = 20 ± 2 years), adulthood (30 ± 2 years), and mid-life (40 ± 2 years).

Method: N = 654 women and men, 73% of those assessed in 1982, completed 20-year follow-up in a two-stage design including questionnaires and structured clinical interviews.

Results: Approximately 75% of women with BN were in remission at 20-year follow-up, and outcome did not differ significantly between BN and EDNOS. Eating disorder point prevalence declined in women but not men from late adolescence to mid-life.

Discussion: Despite patterns of improvement in women, 4.5% reported a clinically significant eating disorder at mid-life, suggesting the need for more research on potential risk factors in this age group, such as pressures for women to maintain a youthful appearance.

Keywords: bulimia nervosa; eating disorder NOS; outcome; prevalence

Introduction

Few studies are available to describe the outcome of bulimia nervosa (BN) more than 10 years following diagnosis.1,2 Participants from these studies have met fairly narrow diagnostic inclusion criteria and provide limited data for examining and comparing long-term outcome between BN and related eating disorders not otherwise specified (EDNOS). Studies describing illness course in BN and EDNOS at 5-34 and 10-year follow-up5 have found no significant effect of diagnosis on outcome. Such data are crucial for understanding whether there are valid boundaries between BN and EDNOS. Finally, although existing studies1356 have provided important information for describing long-term outcome among those seeking treatment for specific eating disorders, they do not provide information on the natural course of eating disorders, particularly those that do not meet full criteria for BN. To our knowledge, only a single study describes 5-year natural course of BN and EDNOS.4 This study addresses these limitations by describing 20-year outcome in individuals with BN and related EDNOS ascertained through an epidemiological study of a college population.7

In addition to examining the natural course of eating disorders, it is important to evaluate whether the period for risk of eating disorder onset ends in early adulthood. Epidemiological data suggest that the period of peak risk for developing BN is during adolescence and early adulthood8,9; BN point prevalence is highest among adolescent and young adult females compared with any other female age group. While these findings may reflect true developmental differences in vulnerability for developing BN, cohort effects could explain these age differences. BN incidence increased during the latter half of the 20th century,10 suggesting that changing sociohistorical factors, such as the increasing idealization of thinness,11 increased risk for developing the disorder. These sociohistorical factors may have had the greatest impact on adolescents and young adults, especially women. During this period of increasing idealization of thinness, young women may have been more likely than older adult women to adopt a value system that equated...
self-worth with body shape and weight—a value that has been posited as the core vulnerability for developing BN. This could create an association between age group and BN prevalence observed in epidemiological studies. Thus, like any cross-sectional comparison, different prevalence rates in different age groups would confound cohort effects with developmental effects. The only way to compare risk of eating disorder onset during different developmental periods is to examine a single cohort over time.

Finally, as with other topics in the field of eating disorders, few data are available to understand outcome or developmental influences on the epidemiology of BN and related EDNOS in men. Recent data from the replication of the National Comorbidity Study suggest a less dramatic gender difference in the lifetime prevalence of eating disorders, particularly syndromes characterized by binge eating, but cohort analyses controlled for sex rather than examining possible sex differences. Further, to our knowledge, longitudinal data on eating disorders in adult men have been published for relatively short durations of follow-up (<5 years) on select samples (e.g., inpatients and men in the military).

Here, we report a 20-year longitudinal study of BN and related EDNOS in women and men, following them from late adolescence to mid-life. The purpose of the study was twofold: (1) to evaluate the natural course of BN and related EDNOS over 20-year follow-up and (2) to evaluate changes in eating disorder point prevalence from late adolescence to mid-life in a single cohort. These data are unique in that they represent the only 20-year follow-up data of BN and related EDNOS, to our knowledge.

**Method**

**Participants**

Participants in this study (N = 654) had been college students at a selective northeastern college in 1982 with a mean age of 20 ± 2 years. This sample comprised 465 women and 189 men; mean age at follow-up was 40 ± 2 years. This group was 81% White, 5% Black, 8% Asian, 4% Hispanic, and 1% Mixed/Other.

**Procedure**

In the spring of 1982, researchers affiliated with the Henry Murray Center of Radcliffe College sent out a self-report survey to a randomly selected sample of 800 women and 400 men. The response rate for the initial survey was 78% for women (N = 624) and 69% for men (N = 276). During the spring of 2002, we attempted to follow-up all participants from the first study (N = 900). Of those who participated in college, 8 had died (5 women and 3 men). None of these individuals had eating disorders according to surveys at baseline or 10-year follow-up. Of the remaining 892 participants, 465 (75%) women and 189 (70.0%) men returned completed surveys. Finally, 10 (1%) returned blank surveys, 214 (24%) did not respond to surveys (we mailed two follow-up surveys to maximize participation), and 14 (1.6%) were untraceable.

Participants did not differ from non-participants on age or ethnicity. However, women were somewhat more likely than men to participate in follow-up assessment (χ²(1) = 3.57, p = .059). In addition, participants did not differ from non-participants at baseline on height or weight. However, compared with non-participants, participants described themselves as being thinner (t(888) = 2.26, p < .025), as dieting more frequently (t(894) = 2.82, p < .006), and as having a higher drive for thinness (t(893) = 2.32, p < .022) at baseline. No other significant differences were found between participants and non-participants on baseline data. In particular, there was no significant association between presence of an eating disorder at baseline and participation at 20-year follow-up (χ²(1) = 2.08, p = .15).

Consistent with recommendations for the use of a two-stage study design in epidemiological research, participants who met criteria for an eating disorder based on survey responses and demographically matched non-eating disorder controls were invited to participate in structured clinical interviews. Interviews were conducted over the telephone by a research assistant who was blind to participants’ survey responses. Research indicates no significant biases in detection of eating pathology between interview assessments that are conducted face-to-face versus over the telephone. Interviews were conducted with 215 participants from the 1982 cohort, representing 85% of identified cases at baseline and their matched controls. Participants in the interview portion of the study did not differ significantly from non-participants on any baseline variable.

**Measures**

The 2002 survey was based closely on the 1982 survey. Of participants in 20-year follow-up, 561 (86%) completed 10-year follow-up assessments on which we reported previously. Surveys distributed in 1982, 1992, and 2002 included the same set of questions on demographic background, height, weight, body image, and specific eating disorder symptoms (binge eating, self-induced vomiting, laxative use, diuretic use, and fasting) to allow consistent evaluation of eating disorder status from late adolescence to adulthood to mid-life in the cohort.
Consistent with our report of changes in BN point prevalence across three separate cohorts, DSM-III-R diagnoses of BN were based on survey responses using a computer algorithm that required: (a) Current binge eating occurring twice or more per week; (b) lack of control over eating during binge episodes; (c) use of self-induced vomiting, fasting, diet pills, laxatives, and/or diuretics to control weight once or more per week; and (d) over concern with weight or shape. Algorithms for EDNOS diagnoses included the following: (1) a subthreshold BN-type EDNOS requiring a combination of over concern with weight or shape, recurrent binge-eating episodes, and compensatory behavior at a frequency that fell short of that required to diagnose full BN; (2) a binge-eating disorder type EDNOS requiring binge-eating episodes at least once per week, lack of control over episodes, and worry over episodes; and (3) purging disorder that required self-induced vomiting, laxatives, and/or diuretic use to control weight once or more per week and over concern with weight or shape. Although data on long-term outcome associated with purging disorder are greatly needed, too few cases were observed in the 1982 sample (n = 8 women [1.7%] and n = 0 men) to draw reliable conclusions regarding outcome for this or any other specific form of EDNOS.

The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) was used to assess DSM-IV BN and EDNOS diagnoses in participants from the survey phase using the case-control design described earlier. For all interview-based EDNOS diagnoses, participants were required to endorse disordered eating behaviors that were associated with present distress, functional impairment, or increased risk of suffering from death, pain, or disability. Interrater reliability for SCID-based lifetime and current eating disorder diagnoses in the current sample were $\kappa = 0.86$ and 0.70, respectively, indicating good interrater reliability.

Survey sensitivity was 87% and specificity was 98%, using interviews as the gold standard, and $\kappa = 0.77$ for agreement between survey and interview-based diagnoses. Due to high correspondence between survey- and interview-based diagnoses, we present findings based on surveys (which include information on relapse based on data from the 10-year follow-up) in addition to findings based on interviews. This approach allows us to apply a multimethod approach in describing 20-year outcome for BN and related EDNOS.

Results

Eating Disorder Diagnoses Based on Survey Data

Of the 21 women (4.5%) who met DSM-III-R criteria for BN in 1982, 16 (76%) had recovered, 3 (14%) still had an eating disorder 20 years later (although none continued to meet full criteria for BN according to surveys), and 2 (19%) women did not provide enough information on surveys to make a determination of whether or not they had an eating disorder. Of the 58 women (12.5%) who had an EDNOS in 1982, 50 (86%) had recovered and 8 (14%) still had an EDNOS diagnosis. Baseline diagnosis of BN versus EDNOS was not significantly associated with likelihood of remission at 20-year follow-up ($\chi^2(1) = 1.13$, $p = .29$). The number of men with eating disorder diagnoses at baseline was too small to make meaningful interpretations of long-term outcome ($n = 2$ men with DSM-III-R BN [1%], and $n = 6$ men [3%] with an EDNOS).

Table 1 presents results concerning stability and change in eating disorder status, combining cases of BN and EDNOS, for participants with data in 1982, 1992, and 2002.

For women, 77% had no eating disorder at any assessment, and 1% had a current eating disorder at all three assessments. Among women with an eating disorder in 1982, 81% (62/77) did not have an eating disorder at 10-year follow-up in 1992. Of the women who had recovered at 10-year follow-up, 10% (6/62) relapsed and had an eating disorder at 20-year follow-up. Of the women who had not recovered at 10-year follow-up, 67% (10/15) had recovered by 20-year follow-up. Thus, although women continued to recover between 10- and 20-year follow-up, probability of recovery declined from 81% to 67% ($\chi^2(1) = 3.85$, $p < .050$).

Among women who did not have an eating disorder in 1982, 4% (12/323) had a current eating disorder in 1992. Of these women, 83% (10/12) had recovered by 2002, representing a 10-year recovery rate that did not differ significantly from that.

<table>
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<tr>
<td>Women</td>
<td>Yes No</td>
<td>Women</td>
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<tr>
<td>No</td>
<td>306 (77)</td>
<td>5 (1)</td>
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<tr>
<td>Yes</td>
<td>10 (3)</td>
<td>2 (&lt;1)</td>
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<tr>
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<td>$\chi^2(1) = 5.5$, $p &lt; .020$</td>
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<tr>
<td>Men</td>
<td>Yes No</td>
<td>Men</td>
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<tr>
<td>No</td>
<td>140 (90)</td>
<td>3 (2)</td>
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<tr>
<td>Yes</td>
<td>4 (3)</td>
<td>0 (0)</td>
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<tr>
<td>$\chi^2(1) = 0.1$, $p = .77$</td>
<td>Cannot be tested</td>
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Bold indicates individuals for whom eating disorder status remained constant across assessments.

Italic differentiates percentages from n’s of subjects.
Twenty-year Follow-up of BN and Related Eating Disorders

observed for 10-year follow-up of cases identified in 1982 ($\chi^2(1) = 0.05$, $p = .82$). Finally, 2% (5/311) of women who did not report a current eating disorder in 1982 or 1992 reported a current eating disorder in 2002. Thus, new onset cases per decade decreased non-significantly from 4% to 2% from 10- to 20-year follow-up in women ($\chi^2(1) = 2.70$, $p = .10$).

For men, 90% had no eating disorder at any assessment, and 0% had a current eating disorder at all three assessments. Among men with an eating disorder in 1982, 88% (7/8) did not have an eating disorder at 10-year follow-up. Of the men who had recovered from their 1982 eating disorder in 1992, 0% relapsed in 2002. The one man who had not recovered from his 1982 eating disorder by 1992 had recovered by 2002.

Among men who did not have an eating disorder in 1982, 3% (4/147) had a current eating disorder in 1992. Of these men, all had recovered by 2002. Finally, 2% (3/143) of men who did not report a current eating disorder in 1982 or 1992 reported a current eating disorder in 2002.

These patterns indicate that from 1992 to 2002 the rate of new onset eating disorders was equal between men and women at 2%. However, across all individuals who completed surveys in 2002, one woman (0.2%) and no men (0%) met criteria for DSM-III-R BN in 2002, and there were a total of 19 women (4%) and 3 men (1.6%) who were classified as having an eating disorder in 2002 ($\chi^2(1) = 5.19$, $p < .023$).

**Eating Disorder Diagnoses Based on Structured Clinical Interview Data**

Interviews confirmed baseline diagnoses of DSM-IV BN in 18a women. Even though the number of respondents meeting DSM-IV criteria for BN was small (i.e., $N < 20$), the patterns are informative given that this is the first study to report 20-year follow-up data for BN. Of women with DSM-IV BN in college, 13 (72%) had recovered, and 5 (28%) still had an eating disorder 20 years later (2 of whom met full criteria for DSM-IV BN based on interviews).

In contrast to the small number of respondents receiving diagnoses of BN, a relatively large number of women ($n = 64$) met criteria for an EDNOS during college according to interviews. Among women with EDNOS diagnoses, 48 (75%) had recovered, and 16 (25%) still had an eating disorder 20 years later, all of whom met criteria for an EDNOS at follow-up. Rates of disorder continuation and remission observed based on self-report surveys did not differ significantly from those found using structured clinical interviews or between BN and EDNOS (all $p$-values > .10).

In addition to the 21 women whose eating disorder persisted from college, there were 9 women (1.9%) with an eating disorder at 20-year follow-up who did not have an eating disorder in college. Thus, 68% of women with DSM-IV eating disorders at 20-year follow-up had eating disorders in college, and the estimated point prevalence of DSM-IV eating disorders declined significantly from late adolescence (18%) to mid-life (4%) in women (McNemar test = 55.4, $p < .001$).

Similar to results based on surveys, the number of men with interview-based eating disorder diagnoses was too small at baseline ($N < 10$) to make meaningful interpretations of long-term outcome in this group.

**Discussion**

Approximately 75% of women initially diagnosed with BN using surveys or interviews had achieved remission by 20-year follow-up. Twenty-year remission rates did not differ significantly between methods of assessment, suggesting good agreement between survey- and interview-based measures. Twenty-year remission rates did not differ significantly between women with baseline diagnoses of BN versus EDNOS using survey- or interview-based assessments, suggesting that thresholds that distinguish BN from related EDNOS may have poor predictive validity. These findings are consistent with studies comparing course of BN and EDNOS (e.g., purging disorder) were too small to allow for a comparison of BN with specific forms of EDNOS. Thus, it is possible that variable prognosis across different forms of EDNOS were masked in the current analyses. These are the first results to present 20-year follow-up data on women suffering from BN and related EDNOS, and survey findings suggest that eating disorder point prevalence declines in women over time. In addition to most women achieving remission over 10- and 20-year follow-up, 10-year eating disorder incidence declined by 50% for women from late adolescence to mid-life.

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*aThe difference in number of BN cases reflects attrition from participation in surveys to participation in interviews rather than diagnostic disagreement between methods of assessment.*
Despite these patterns of improvement, it is important to note that 4.5% of women reported clinically significant eating disorders at 20-year follow-up. Thus, while eating disorders are typically characterized as disorders of adolescence and early adulthood, findings from this study suggest that clinically significant eating disorders are present in nearly 1 in 20 women in mid-life. Most of these women had reported eating disorders in college, suggesting the persistent nature of eating disorders. However, approximately one third of these cases onset after the period of peak risk, suggesting that women remain vulnerable for the development of eating pathology throughout mid-life. One possible explanation for these new cases may be society’s emphasis on maintaining a youthful appearance despite the natural aging process. More research on the maintenance or new development of eating disorders in women during mid-life is necessary, especially given some evidence for an association between maternal eating disorders and childhood feeding problems, which may be a precursor to later eating pathology. Thus, understanding and preventing or treating eating pathology in mid-life women may help prevent the intergenerational transmission of eating disorders. Disorders in this age group fell mostly within the EDNOS category. A preponderance of EDNOS among individuals with eating disorders has also been observed in treatment-seeking samples. Given that most individuals with eating disorders in both treatment-seeking and nontreatment seeking samples suffer from EDNOS, more research on these problems in women through mid-life is needed.

In contrast to incidence patterns observed in women, 10-year incidence for eating disorders declined only slightly in men. Indeed, between 10- and 20-year follow-up women and men demonstrated the same 10-year incidence rate. Comparable incidence rates for men and women between young adulthood and mid-life is a striking finding given that eating disorders are typically thought of as occurring predominantly in women. Results suggest that middle-aged men may be at greater risk for developing clinically significant problems with their eating than previously appreciated. Given the relative dearth of research on eating disorders in men, this work suggests that more effort should be made to understand eating problems in this demographic group. Specifically, problems may reflect a closer tie between body weight and body image in men that leaves men at greater risk to develop eating disorders as they age and gain weight. Alternatively, recent changes in sociocultural ideals may leave men, particularly middle-aged men, more aware of the discrepancy between their current body type and the lean, hypermuscular build considered ideal by current norms.

This study had several notable strengths. In addition to being the first study to report on 20-year outcome of BN and related EDNOS, this is the first study to examine developmental trajectories of eating disorder point prevalence in a single cohort of women and men from young adulthood to mid-life. This study employed random sampling of college students in 1982, retained high participation rates from baseline to follow-up assessments, and utilized multiple methods of assessment to evaluate eating disorder status. Measures demonstrated good concurrent validity, increasing confidence in study findings.

Despite its strengths, limitations of this study warrant discussion as they may impact interpretation of results. First, to examine 20-year outcome, we were limited by the methods used in the 1982 study. The greatest shortcoming was the under-sampling of men. Although inclusion of men in this study represents a significant advance over other longitudinal studies that have excluded male participants (e.g., Refs. 2, 6, 24, 25) or have had too few male participants to examine them separately, the relatively small sample of men, combined with the lower base rate of eating disorders in men, reduced our ability to examine eating disorder outcome in this group.

A second limitation is the nature of the sample from which data were collected. The randomly selected sample came from a single, prestigious university, raising questions about the generalizability of results from this population. Of note, estimates of point prevalence and outcome over 10-year follow-up are consistent with data collected in other populations suggesting no clear biases in the current sample. However, no other data on 20-year outcome have been published for BN or related EDNOS, making it impossible to determine whether results of this study are representative of findings for other groups.

Third, the study design provides snap-shots of eating disorder status in 10-year increments. This precludes description of illness course such as fluctuations in illness severity, frequency of remissions and relapses, and diagnostic cross-over that took place during the 10-year periods between each assessment. Findings from studies with more frequent assessments over shorter periods of follow-up indicate considerable fluctuations are likely to have occurred between assessments.

BN appears to represent a relatively recent historical phenomenon, and the syndrome was first
introduced to the medical nomenclature in 1979. These factors contribute to the limited amount of information regarding its long-term outcome as well as limited information on developmental factors that influence disorder point prevalence. Results from this article support findings from cross-sectional studies suggesting that BN and related EDNOS are more common during late adolescence than during mid-life in women. However, the same is not true for men. While men are less vulnerable than women to developing eating disorders, the peak period of risk for men is not restricted to late adolescence. In addition, ~1 in 20 women in mid-life had clinically significant disorders of eating. Overall, results support greater need to understand eating disorders in older women and in men of all ages. Greater understanding of factors that contribute to the maintenance of eating disorders across the lifespan is particularly crucial for older women as likelihood of recovery diminishes in women who have had the illness for longer.

**Clinical Implications**

Clinicians can expect the course of EDNOS that resemble BN (e.g., binge-eating and purging that occurs, on average, once per week accompanied by body image disturbance) to display a long-term course that is similar to that for BN. Specifically, 75% of women and the vast majority of men will achieve recovery from their illness by 20 years following diagnosis. When eating disorders are encountered in middle-aged individuals, it is likely to represent a long-standing illness in women who are most likely to develop an eating disorder during adolescence and young adulthood. In contrast, middle-aged men may present with an eating disorder that developed later in life.

**References**