

Outcome in Bulimia Nervosa

Pamela K. Keel, A.B., and James E. Mitchell, M.D.

Objective: The authors sought to synthesize existing data on outcome for individuals diagnosed with bulimia nervosa in order to better understand long-term outcome and prognostic factors. **Method:** They reviewed 88 studies that conducted follow-up assessments with bulimic subjects at least 6 months after presentation. Findings are summarized for the areas of mortality, recovery, relapse, crossover, and prognostic variables. **Results:** The crude mortality rate due to all causes of death for subjects with bulimia nervosa in these studies was 0.3% (seven deaths among 2,194 subjects); however, ascertainment rates and follow-up periods were small and likely to produce underestimation. Five to 10 years following presentation, approximately 50% of women initially diagnosed with bulimia nervosa had fully recovered from their disorder, while nearly 20% continued to meet full criteria for bulimia nervosa. Approximately 30% of women experienced relapse into bulimic symptoms, and risk of relapse appeared to decline 4 years after presentation. Few prognostic factors have been consistently identified, but personality traits, such as impulsivity, may contribute to poorer outcome. In addition, participation in a treatment outcome study was associated with improved outcome for follow-up periods less than 5 years. **Conclusions:** Treatment interventions may speed eventual recovery but do not appear to alter outcome more than 5 years following presentation. Long-term outcome for women diagnosed with bulimia nervosa remains unclear. However, this disorder may be chronic for at least a subset of women.

(Am J Psychiatry 1997; 154:313–321)

Although binge eating and purging were observed in women with anorexia nervosa, bulimia nervosa is a relatively recent addition to the medical literature, having been first described in 1979 (1). Consistent with the negative impact that binge eating and purging were observed to have on anorectic patients' outcome (2), bulimia nervosa was termed "an ominous variant of anorexia nervosa." This dire description was tempered with the recognition that "only a brief comment on the prognosis of bulimia nervosa is appropriate, for long-term follow-up studies have not been undertaken" (1). Now, more than 15 years later, little additional in-

formation seems available. A single study of 44 women diagnosed with bulimia nervosa 10 years earlier (3) provides the only available data on long-term outcome. Indeed, DSM-IV states, "The long-term outcome of Bulimia Nervosa is not known."

Comparing and summarizing results across those outcome studies which do exist are complicated by methodological differences among and within studies. For example, one study (4) employed four different measures of eating disorder outcome in order to attribute differences in recovery estimates to the impact of assessment methods. That study found that the range of those considered recovered was 29% to 42%. Thus, inconsistent findings across studies may be partially attributed to differences in methods of assessment, as well as sample characteristics, definitions of terms, and ascertainment rates.

The limited availability and comparability of research findings leave the following questions largely unanswered: What is the long-term physical, psychological, and psychosocial outcome among women diagnosed with bulimia nervosa? What percentage of women re-

Received March 4, 1996; revisions received July 10 and Aug. 26, 1996; accepted Sept. 9, 1996. From the Department of Psychology, University of Minnesota, Twin Cities. Address reprint requests to Ms. Keel, Department of Psychology, University of Minnesota, 75 East River Rd., Minneapolis, MN 55455.

Supported in part by a McKnight Center Grant for Eating Disorders Research, an NIH Obesity Center grant, and an NIMH research training grant.

The authors thank Ross D. Crosby and Joshua S. Rodefer for their assistance.

TABLE 1. Follow-Up Study Estimates of Recovery Rates for Subjects With Bulimia Nervosa

Study	Length of Follow-Up	Number of Subjects	Subjects With or Without Bulimia at Follow-Up (%)		
			Full Bulimia Nervosa	Partial Bulimia Nervosa	Remission
Drewnowski et al. (5), 1994	6 months	19	42	—	—
Drewnowski et al. (6), 1988	6 months	18	44	28	28
Herzog et al. (7), 1988	6 months	30	67	—	33
Johnson et al. (8), 1990	1 year	55	43	—	28
Mitchell et al. (9), 1986	1 year	75	36	—	33
King (10), 1989	1 year	7	86	—	—
King (11), 1991	2.0–2.5 years	5	60	20	20
Keller et al. (12), 1992	2.5–3.0 years	26	50	—	38
Olmsted et al. (13), 1994	2 years	62	—	—	69
Abraham et al. (4), 1983	1–6 years ^a	43	36	29	35
Swift et al. (14), 1985	2–5 years ^b	30	—	—	13
Brotman et al. (15), 1988	3.5 years	14	—	29	57
Mitchell et al. (16), 1988	2–5 years ^c	91	25	9	66
Fallon et al. (17), 1991	2–9 years ^d	46	41	20	39
Fichter et al. (18), 1994	2 years	196	40	—	—
	6 years	—	20	—	—
Hsu and Sobkiewicz (19), 1989	4–6 years	35	20	20	60
Johnson-Sabine et al. (20, 21), 1992; 1995	5 years	36	25	—	31
Collings and King (3), 1994	10 years	44	9	39	52

^aMean=3 years.^bMean=3.3 years.^cMean=3.5 years.^dMean=4.5 years.

cover completely from this disorder, maintain a partial syndrome, or continue to suffer from the full syndrome more than a decade after diagnosis? What characteristics of the disorder and the individual predict long-term outcome? Which, if any, treatment approaches achieve superior long-term outcome? This review presents a summary of findings from studies relevant to long-term outcome in bulimia nervosa (i.e., studies with follow-up periods ranging from 6 months to 10 years) and provides a brief, critical evaluation of study findings. Although a broad scope of outcomes is preferable, this review will focus on those aspects of outcome for which relatively strong data exist: mortality, recovery, relapse, crossover, and prognostic variables.

METHOD

Eighty-eight published studies assessing outcome at least 6 months after initial evaluation for bulimia nervosa or bulimia coupled with inappropriate compensatory behavior were identified through both manual and computerized searches. Twelve studies are not included because the outcome of bulimia nervosa was confounded by the outcome of anorexia nervosa or what is currently considered binge eating disorder. Sixteen additional studies are not specifically referenced because they did not report findings relevant to the present review; therefore, data for subjects in the remaining 60 studies are referenced. Studies appear to present data for 56 cohorts (N=2,194 women diagnosed with bulimia nervosa).

The existing literature relevant to bulimia nervosa outcome was divided according to two main approaches, which overlap: follow-up studies and treatment outcome studies. Follow-up studies employed both "naturalistic" and specially selected samples (to compare the impact of characteristics such as borderline personality disorder on outcome). The follow-up periods for these studies ranged from 6 months to 10 years. Treatment outcome studies generally selected a relatively homogeneous pool of women diagnosed with bulimia nervosa and then randomly assigned subjects to different treatment approaches. The follow-up period for these studies ranged from 6 months to 9 years; most studies followed patients from 6 months to 1 year after treatment.

Follow-up studies and treatment outcome studies are reviewed separately for estimates of recovery rates because of differences in subject samples, length of follow-up period, and the potential impact of treatment interventions on outcome. Table 1 presents data for follow-up studies—that is, all studies not involving the comparison of randomly assigned treatment protocols or selection of individuals according to treatment response. Although many of these studies involved subjects who received treatment, this variable was not controlled, and thus any conclusions regarding the impact of treatment must be tentative. Table 2 presents data for treatment outcome studies.

Although studies varied in how recovery was defined, the present review accepts the authors' definitions of recovery with only minor adjustment to provide consistent interpretation of data. For example, all rates of remission at follow-up were calculated as percentages of the number of women assessed at follow-up, rather than the number at presentation. In addition, rates of both remission and full bulimia nervosa at follow-up were examined as indicators of recovery. All rates were rounded to the nearest whole percent. Studies were grouped by length of follow-up period (6 months, 1 year, 2 to 4 years, and 5 or more years). When studies could be placed in more than one follow-up period, assignment was determined by rounding down the number (or average number) of years since presentation. Because of the large number of studies, rates are reported as ranges and mean weighted percentages. Mean weighted percentages were calculated by weighting each study's reported rate with its sample size before determining the mean percentage for all studies within a follow-up period, thus giving greater weight to findings from studies with larger samples. In addition, tables 1 and 2 report rates from each study reviewed. For studies that reported rates by subgroup, overall rates were calculated as the mean of results for subgroups weighted by the number of subjects in each subgroup. One study (24) did not report the number of subjects within each subgroup; therefore, an unweighted mean was calculated.

In order to compare recovery rates between study types (follow-up and treatment outcome) and across follow-up periods (6 months, 1 year, 2–4 years, and 5 or more years), data for all studies were converted back into individual cases coded as being in remission (yes, no, or data missing) or continuing to meet full criteria for bulimia nervosa (yes, no, or data missing). Individual cases were then assigned to the study type and follow-up period to which their study belonged. Hierarchical log-linear analyses with backward elimination were used to determine which effects (main, two-way interaction, or three-way interaction) best described the distribution of frequencies within each

TABLE 2. Treatment Outcome Study Estimates of Recovery Rates for Subjects With Bulimia Nervosa

Study	Length of Follow-Up	Number of Subjects	Subjects With or Without Bulimia at Follow-Up (%)		
			Full Bulimia Nervosa	Partial Bulimia Nervosa	Remission
Freeman et al. (22), 1985	6 months	39	28	13	59
Pyle et al. (23), 1990	6 months	61	30	—	51
Thackwray et al. (24), 1993	6 months	39	26	33	41
White and Boskind-White (25), 1981	6 months	14	29	50	21
Stevens and Salisbury (26), 1984	10 months	8	25	—	75
Huoun and Brown (27), 1985	10 months	40	5	—	68
Agras et al. (28), 1994	1 year	61	—	—	51
Fairburn (29), 1981	1 year	6	16	—	83
Russell et al. (30), 1987	1 year	14	79	16	5
Rossiter and Wilson (31), 1985	1 year	3	33	33	33
Lacey (32), 1983	1 year	28	3	28	69
Hudson et al. (33), 1989	1 year	36	28	22	50
Wooley and Kearney-Cooke (34), 1986	1 year	15	—	—	47
Fairburn et al. (35), 1993	1 year	50	—	—	44
Treasure et al. (36), 1996	1.5 years	40	—	—	41
Maddocks et al. (37), 1992	2 years	35	28	26	46
Pope et al. (38), 1985	2 years	20	—	—	50
Fairburn et al. (39), 1995	5 and 9 years	89	19	24	54

three-dimensional table (study type \times duration of follow-up \times cases in remission, and study type \times duration of follow-up \times cases with full bulimia nervosa). Separate analyses for presence of full bulimia nervosa and remission were run because the two variables are necessarily related within a single case (e.g., a woman who meets full criteria for bulimia nervosa cannot be in remission). The use of individual cases as the basic unit of measurement avoided placing equal emphasis on studies with unequal sample sizes. However, it did not control for other study parameters (such as differences in ascertainment rates, definitions of remission, or inclusion/exclusion criteria) as a larger meta-analysis would. Statistical analyses were run by using SPSS for Macintosh.

Findings from follow-up and treatment outcome studies were combined in the review of mortality, relapse, crossover, and prognostic factors because of the limited number of studies reporting data for these aspects of outcome.

RESULTS

Mortality

Deaths were reported in only five cohorts of subjects (3, 16, 17, 20, 21, 37, 40). For two cohorts, death was reported for a single subject, and cause of death was accidental (car accident [3, 20, 21] and hypertensive episode due to ingestion of an antacid during the course of phenelzine treatment [17]). Suicide was the reported cause of single deaths within the third and fourth cohorts (16, 37). In the fifth cohort, two deaths resulted from traffic accidents, and a third death was the result of complications related to severe weight loss; the standardized mortality ratio was 9.38 but was statistically insignificant because of the small number of deaths (40).

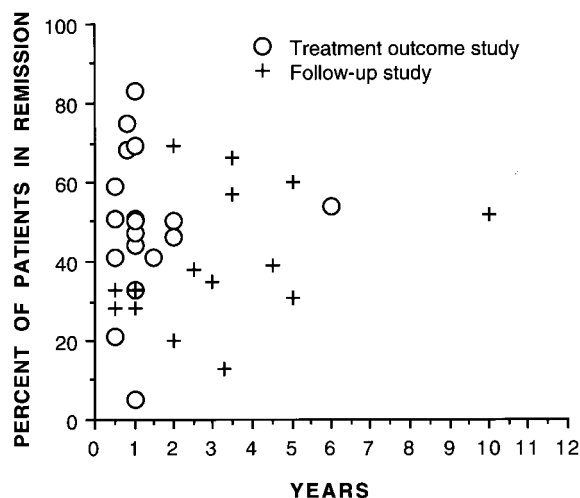
All deaths were reported as occurring in cohorts of similar size and represented approximately 1%–3% of the original sample. Most studies found no deaths at follow-up but had such varying ascertainment rates (as low as 50% [41]) that some of the subjects who could not be traced may have died during the follow-up pe-

riod. Indeed, the mean ascertainment rate among studies that reported deaths at follow-up was greater than the mean ascertainment rate across all studies reviewed (87% and 74%, respectively). Compared to the 5.9% crude rate of mortality for anorexia nervosa (42), bulimia nervosa seems less lethal than was initially surmised (1). However, follow-up periods have been much longer in the literature for anorexia nervosa and have shown that the mortality rate increases as length of follow-up increases (42). Therefore, although death appears to be a relatively rare outcome at follow-up (seven deaths among 2,194 women, representing 0.3%), the mortality rate for bulimia nervosa may be underestimated because of low ascertainment rates and short follow-up periods.

Recovery

Six months after initial presentation, follow-up studies reported that 28% to 33% of women were in remission (mean weight percentage=31%), compared to 21% to 75% (mean weight percentage=53%) reported by treatment outcome studies. After 1 year, follow-up studies reported that the range of women in remission was 28% to 33% (mean weight percentage=31%), compared to treatment outcome studies, which found that 5% to 83% of women were in remission (mean weight percentage=48%). Two to 4 years after presentation, follow-up studies reported a range of 13% to 69% remission (mean weight percentage=50%). Remission 2 years after intervention in treatment outcome studies was 46% to 50% (mean weight percentage=47%). For follow-up of 5 or more years, the range was 31% to 60% (mean weight percentage=48%). Maintained remission after 5 or more years in a treatment outcome study was 54% (39). These results represent higher remission rates for women in treatment outcome studies than for women in follow-up studies (Pearson

FIGURE 1. Treatment Outcome Study and Follow-Up Study Estimates of Percent of Subjects With Bulimia Nervosa Who Are in Remission Over Time

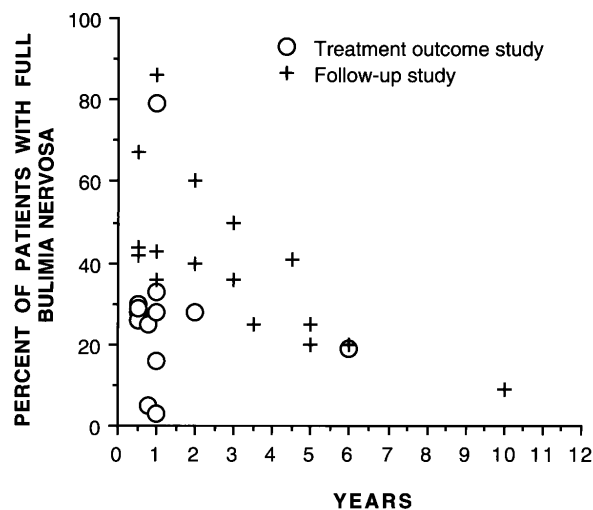


$\chi^2=412.26$, $df=7$, $p<0.0001$ for all two-way interactions; remission \times study type coefficient=0.18, 95% confidence interval=0.11 to 0.25).

Reported rates of women who continued to meet full criteria for bulimia nervosa demonstrate a pattern similar to that found for reported rates of remission. Six months after initial assessment, 42% to 67% continued to meet full criteria for bulimia nervosa (mean weight percentage=54%) in follow-up studies, compared to 5% to 30% (mean weight percentage=24%) reported by treatment outcome studies. For a follow-up period of 1 year, 36% to 86% of women were bulimic (mean weight percentage=41%). For 1-year treatment outcome the range was 3% to 79% (mean weight percentage=28%). At 2- to 4-year follow-up, the range of women who still met criteria for bulimia nervosa was 25% to 60% (mean weight percentage=37%). Two years after treatment in a treatment outcome study, 28% met full criteria for bulimia nervosa (37). For a follow-up period of 5 or more years, the range was 9% to 25% (mean weight percentage=19%). For treatment outcome measured after 5 or more years, approximately 19% continued to meet criteria for bulimia nervosa (39).

These findings demonstrate that 6 months to 4 years after presentation, treatment outcome studies found lower rates of full bulimia nervosa than did follow-up studies (Pearson $\chi^2=485.82$, $df=7$, $p<0.0001$ for all two-way interactions; full bulimia nervosa \times study type coefficient=-0.20, 95% confidence interval=-0.27 to -0.12). These findings, combined with data concerning remission, indicate that women in treatment outcome studies appear to have greater recovery from bulimia nervosa than do women in follow-up studies. However, 5 or more years after presentation, few differences seem to remain between study types. Follow-up studies' rates of remission appear to increase over time to meet the values produced by treatment outcome studies (figure 1). Similarly, cases of full bulimia ner-

FIGURE 2. Treatment Outcome Study and Follow-Up Study Estimates of Percent of Subjects With Full Bulimia Nervosa Over Time



vosa decrease dramatically over time within follow-up studies but change little in treatment outcome studies (figure 2). Hierarchical log-linear analyses supported only the latter observed pattern (Pearson $\chi^2=3.76$, $df=3$, $p=0.29$ for study type \times follow-up duration \times remission; Pearson $\chi^2=16.61$, $df=3$, $p=0.0009$ for study type \times follow-up duration \times full bulimia nervosa). One study (18) with a 6-year follow-up period contributed 196 cases to the analysis of full bulimia nervosa but did not report rates of remission. The resulting difference in number of cases may explain why the three-way interaction was significant for full bulimia nervosa but not for remission. Overall, 5 to 10 years following presentation, approximately 50% of women are fully recovered, and 20% have full bulimia nervosa.

Relapse

Only a handful of studies investigated relapse rates, but findings were relatively consistent. Over follow-up periods of 6 months to 6 years, relapse rates ranged from 26% to 43% (13, 16, 19, 22, 23, 36, 37, 43); five of eight studies reported rates between 28% and 32%. Thus, relapse rates converge near 30%; this suggests that approximately one-third of those who improve experience a resurgence of bulimic symptoms.

One study employed a prospective design to explore relapse as a function of time and revealed a bimodal pattern, with relapse peaking at 9 to 18 weeks and 36 to 46 weeks after recovery (12). Thus, relapse occurred within approximately 2 years following presentation. Fifty percent of women ($N=5$ of 10) who recovered from their index episode of bulimia nervosa relapsed into another episode. These data suggest higher rates of relapse but were derived from a small sample of 26 women. The prospective design and repeated measures provided a more sensitive assessment of relapse and may partially explain the higher rate of relapse found

TABLE 3. Number of Studies Finding Associations Between Prognostic Variables and Positive Outcome for Subjects With Bulimia Nervosa

Variable	Association ^a								
	Positive			Negative			Insignificant		
	Number of Studies	Mean Number of Subjects	Mean Ascertainment Rate (%)	Number of Studies	Mean Number of Subjects	Mean Ascertainment Rate (%)	Number of Studies	Mean Number of Subjects	Mean Ascertainment Rate (%)
Axis I disorders									
Depression	0	—	—	4	71	83	14	54	82
Substance abuse	0	—	—	1	196	—	4	50	88
Personality disturbance	0	—	—	11	58	78	3	33	81
History of anorexia nervosa	0	—	—	0	—	—	7	53	87
Age at onset or presentation	1	62	77	1	44	86	7	57	81
Severity of symptoms	0	—	—	4	53	90	8	55	83
Duration of symptoms	0	—	—	4	53	88	3	54	87
Treatment	8	55	73	0	—	—	6	51	85

^aMean numbers and ascertainment rates are rounded to nearest whole number.

in this study than in others. The substantial relapse reported across all studies suggests that a subgroup of women with bulimia nervosa is at risk for experiencing additional episodes of the disorder.

Crossover

Although crossover from anorexia nervosa to bulimia nervosa has been noted often, little is known about the extent to which women who present with bulimia nervosa “recover” from this syndrome or lose weight while bulimic and develop their first episode of anorexia nervosa. With the exception of one study (4), reported rates of crossover from bulimia nervosa to anorexia nervosa at follow-up ranged from 0% to 7% (3, 14, 17, 19–21, 39, 44, 45). The single exception determined that 21% of its sample met criteria for anorexia nervosa at follow-up on the basis of a measure different from that used at evaluation (4). Thus, 21% does not necessarily represent new cases of anorexia nervosa emerging after initial diagnosis with bulimia nervosa; it seems plausible that several women considered anorectic at follow-up would have been considered anorectic at presentation if the same measure had been used at both assessments.

It is possible that the numerous studies that did not include information regarding crossover found no crossover to anorexia nervosa, as was specifically reported for two cohorts (3, 14, 20, 21, 44). From the research reviewed, it appears that the rate of crossover from bulimia nervosa to anorexia nervosa is much smaller than the crossover from anorexia nervosa to bulimia nervosa at follow-up (estimated range=10% to 50%) (46). This conclusion is supported by the relatively infrequent report of prior episodes of bulimia nervosa among women diagnosed with their first episode of anorexia nervosa. Peak ages at onset associated with each disorder may explain the differential risk of crossover between anorexia and bulimia nervosa; the risk for developing anorexia nervosa occurs at a younger age than the risk for developing bulimia nervosa.

Prognostic Factors

Few prognostic factors have been replicated across studies, and the list of variables that are not associated with outcome far exceeds the list indicating significant association. The number of studies employing large sample sizes has been quite limited, and thus many of the available studies have probably lacked sufficient power to find variables of prognostic significance. In addition, variables that are associated with negative outcome also may be associated with attrition. Table 3 presents potential prognostic variables; the number of studies suggesting positive, negative, or no association with positive outcome; and the mean sample size and ascertainment rate of studies within each finding.

Axis I Disorders

In general, studies have not found comorbid axis I disorders at presentation to be predictive of outcome (11, 17, 47). Of the 18 studies assessing the predictive value of comorbid depression at presentation for outcome in bulimia nervosa, 14 (4, 7, 9, 12, 13, 16, 17, 20, 33, 47–51) found no association. All four studies that reported significant findings regarding the prognostic value of depression (3, 14, 15, 18) found that depression was associated with poorer outcome. In one of these studies (3), depressive symptoms lost predictive significance after being entered into a logistic regression with other variables significantly associated with outcome in bulimia nervosa. In addition, none of these studies reported systematically assessing depression through use of diagnostic criteria or structured interviews. One study (15) did not specify how it assessed depression during initial evaluations. Another study (14) reviewed medical charts retrospectively to assess initial depression, while the two remaining studies (3, 18) used depression rating scales. Although many studies that found no predictive value for depression also used chart diagnoses or rating scales or failed to report their methods, studies that used structured clinical in-

interviews to assess comorbid depression were consistent in finding no significant association with outcome (7, 50). Thus, clinical depression at presentation does not appear to be a strong predictor of outcome for bulimia nervosa.

As with the findings for depression, the majority of studies (4, 9, 17, 49) have found no association between a history of substance or alcohol abuse and outcome. A single study (18) reported that a history of substance abuse predicted 3-year outcome. Of note, fewer studies have focused on substance and alcohol problems than on depression. In addition, a number of studies (particularly treatment outcome studies) excluded subjects with comorbid substance abuse or dependence at presentation. Thus, a history of psychoactive substance abuse or dependence does not appear to be a robust predictor of outcome, but this conclusion is based on a limited number of studies, many of which may have had inadequate sample sizes. Studies reporting prognostic significance for depression or substance abuse had greater mean sample sizes than studies reporting no significant association (table 3). This may be attributable to significant results produced by one study (18) with 196 subjects.

Axis II Disorders

Equivocal findings have been produced for the impact of axis II disorders on outcome in bulimia nervosa. One study (52) found no difference in the rates of recovery between women with and without axis II disorders but did find that bulimic women with axis II disorders had more severe eating disorder symptoms at presentation. Thus, despite equal rates of improvement, women with comorbid personality disorders continued to have more severe bulimic symptoms at 5-year follow-up. Conversely, another study (53) found that personality disorders did not predict outcome in bulimia nervosa. Despite contradictory findings for the importance of axis II disorders in general, a number of studies (15, 35, 48, 54, 55) have found an association between outcome and initial comorbid impulse control problems, such as those found in borderline personality disorder or the "multi-impulsivist" syndrome.

Borderline personality disorder has been frequently associated with bulimia nervosa; this is attributable in part to overlap of criteria (such as binge eating) but is also apparently because of a genuinely higher rate of borderline personality disorder in women with bulimia nervosa than in mental health clinic outpatients (48). One study (8) compared bulimic women with and without comorbid borderline personality disorder at presentation and at 1-year follow-up. Despite no differences in symptom severity, age at onset, or duration of eating disorder symptoms at presentation, women with comorbid borderline personality disorder had a significantly and dramatically lower recovery rate at 1 year than did bulimic subjects without borderline personality disorder (10% and 47%, respectively). In addition, significantly more bulimic subjects with borderline per-

sonality disorder remained unimproved (24%) or were worse (19%) at 1-year follow-up than bulimic subjects without borderline personality disorder (5% and 5%, respectively). At follow-up, 62% of the borderline group continued to meet DSM-III-R criteria for bulimia nervosa, compared to 21% of the nonborderline group. It is of interest that the impact of therapy appeared to differ depending on the presence or absence of borderline personality disorder. Women without borderline personality disorder had significantly shorter treatment interventions (fewer sessions) but better outcome than did women with borderline personality disorder; however, within the group of women with borderline personality disorder, those with the better outcome had been in therapy longer than those with worse outcome. For the women with borderline personality disorder, two things are of note in the comparison of the responders—those who recovered—and the nonresponders. The responders had lower scores on an instrument measuring borderline personality traits and had higher vomiting frequencies at presentation than nonresponders. Thus, it seems possible that within the borderline personality disorder group, some of the women may have had a less severe personality disturbance, but greater symptom severity made them appear more characterologically disturbed.

The multi-impulsivist syndrome appears to overlap phenomenologically with borderline personality disorder. The syndrome has been defined as including at least three of the following behaviors: suicide attempts, severe autoaggression, shoplifting (other than food), alcohol abuse, drug abuse, and sexual promiscuity, and it is characterized by increased anxiety, depression, anger, and hostility and greater problems with relationships (56). In a comparison of 32 "multi-impulsive" bulimic subjects and 32 age-matched "uni-impulsive" bulimic subjects, no differences in baseline duration or severity of bulimia nervosa symptoms were found; however, multi-impulsive bulimic subjects had a worse course and outcome than uni-impulsive bulimic subjects (56). Uni-impulsive bulimic subjects tended to have a decrease in bulimic symptoms over the course of 2 years, while multi-impulsive bulimic subjects experienced an initial increase in bulimic symptoms, followed by a decrease (56).

Two studies (17, 52) found no association between bulimia nervosa outcome and borderline personality characteristics at presentation, and one study (57) found no predictive value for impulsivity scores. However, a total of five studies found that borderline personality disorder (8, 18, 49) or impulsivity (20, 56) negatively affected bulimia nervosa outcome.

Whether axis II disorders are associated with more severe eating pathology or poorer course of bulimia nervosa or both remains unclear. However, most studies reviewed suggested that axis II disorders involving impulse control problems predict a poorer outcome for women diagnosed with bulimia nervosa. The overlap among axis II disorders, especially borderline personality disorder, and depression and psychoactive sub-

stance abuse must also be considered as a possible explanation for why these axis I disorders have been found to be predictive of outcome in some but not all studies. Indeed, one study (58) reported that subjects who did not respond to treatment had diagnoses of both depressive disorders and borderline personality disorder—a combination absent in those who responded to treatment; unfortunately, the authors did not report the prognostic significance of these variables independently.

History of Anorexia Nervosa

Although it seems reasonable to posit that a history of anorexia nervosa is predictive of poor outcome in bulimia nervosa (because bulimic women with a history of anorexia nervosa have exchanged eating disorders rather than fully recovering), no studies (3, 4, 17, 48, 49, 51, 59) found an association between a history of anorexia nervosa and outcome. One study (47) reported better 2-year outcome for normal-weight bulimic women than for anorectic bulimic women; this finding suggests that very low weight at presentation may predict negative outcome in women with bulimic symptoms.

Age at Onset and Presentation

No clear pattern is apparent concerning the importance of age at onset or presentation for bulimia nervosa outcome. Fewer studies found age to be a significant predictor (3, 13) than those that found it not predictive (4, 9, 47, 51, 53, 59, 60). In the two studies that found that age at study entry predicted outcome, one (13) found that older age predicted positive outcome, and the other (3) found that younger age predicted positive outcome. Overall, age seems to be an unreliable predictor of outcome for bulimia nervosa; however, most of the data for age at onset are based on retrospective reporting. One study (14) that included adolescents found poorer outcome than did studies of bulimic adults with comparable follow-up periods; the authors attributed the lower rates of remission to assessing subjects earlier in the course of their disorder. Unfortunately, too few follow-up studies have included adolescents to allow any conclusion.

Severity and Duration of Symptoms

Evaluation of severity and duration of eating disorder symptoms has provided mixed results in terms of their prognostic significance. Four studies (13, 16, 32, 50) found greater severity to be a significant predictor of poor outcome, while several others (8, 9, 14, 17, 20, 48, 51, 59) found severity to be unassociated with outcome. Studies reporting no association had a lower mean ascertainment rate than studies reporting a significant association (table 3). Symptom severity may be related to study attrition and may thus obscure the impact of this variable.

Slightly more studies found greater duration to be a significant predictor of negative outcome (17, 51, 55, 59) than found it to be insignificant (3, 4, 9). However, duration at presentation may select a subset of women with a more chronic form of the disorder (e.g., the nearly 20% who continue to meet full criteria more than 5 years after presentation). Thus, duration would predict itself rather than elucidating what specifically contributes to the elongated course of the disorder within this subset of women.

Treatment

Whether treatment is predictive of outcome is an important question not only for understanding the nature of bulimia nervosa as a disorder but also for evaluating the efficacy of interventions. A trend emerged among studies' reports of treatment efficacy: treatment outcome studies tended to favor treatment interventions as predicting positive outcome (23, 24, 28, 33, 39, 61, 62), while naturalistic studies found previous treatment interventions to be unassociated with outcome (4, 8, 9, 17, 59). Two exceptions to this pattern exist. A single naturalistic follow-up study (41) reported that treatment was associated with positive outcome. Conversely, one treatment outcome study (53) found no difference between subjects who complied fully with medication treatment and those who did not; it is notable that the number of noncompliers was small and resulted in limited power to detect significant differences.

Several possible explanations for the difference in findings by study type exist; some reasons follow. First, treatment outcome studies tended to have shorter follow-up periods and may not have encompassed the full period in which relapse occurs (estimated to be approximately 4 years; see earlier discussion). Second, treatment outcome studies were more likely to follow a structured treatment plan specifically designed for patients with bulimia nervosa than were treatment interventions that women reported receiving in their community. Supporting this possibility, the naturalistic follow-up study that found a significant association between treatment intervention and outcome compared women who chose not to follow treatment recommendations with women who received recommended treatment through a single university-affiliated research clinic (41). Third, naturalistic studies do not control for differences among women who do or do not seek treatment, while treatment studies employ strict inclusion/exclusion criteria and randomly assign women to waiting list or placebo groups. In naturalistic studies, it is possible that women who choose not to seek treatment have less severe eating disorders. Conversely, women who do not accept free treatment offered in treatment outcome studies may be less ready to change their eating behaviors. Fourth, a lower mean ascertainment rate was produced by studies that found a significant effect for treatment on outcome than by studies that found no impact; it is possible that women with poorer outcome (or poor treatment response) were less

likely to participate in follow-up assessment. These trends would obscure the impact of treatment and partially account for the difference found between follow-up studies and treatment outcome studies in their estimates of treatment efficacy.

DISCUSSION

On the basis of results from short-term and intermediate follow-up and treatment outcome studies, the following summary is provided. Mortality rates fall between 0% and 3% (crude mortality proportion=0.3%) but may be underestimated because of short follow-up periods and low ascertainment rates. At intermediate follow-up (5 to 10 years), approximately 50% of women initially diagnosed with bulimia nervosa have recovered fully from this disorder, while nearly 20% continue to meet full criteria for bulimia nervosa. The risk of relapse is substantial; almost one-third of women who had been in remission experience relapse during the first 4 years following presentation. Conversely, the risk of developing a subsequent episode of anorexia nervosa seems low.

Treatment interventions, at least as they were applied in treatment outcome studies 5 to 10 years ago, do not seem to significantly alter the percentage of women who recover from bulimia nervosa at long-term follow-up. Women who participated in treatment outcome studies had higher rates of remission than women drawn from general samples. This advantage seems to dissipate over time so that 5 or more years after presentation, no difference in recovery rates exists between a sample of women who received early and consistent intervention and women whose treatment varied in the community or who received no treatment at all. Important limitations to this conclusion exist. This pattern was statistically supported for the analyses of women who continued to meet full criteria for bulimia nervosa but was not supported in the analysis of women in remission. In addition, follow-up studies contained large numbers of treated women. Finally, a limited number of studies followed women 5 or more years; thus, longer-term recovery rates rely on sharply decreasing numbers of women (342 women followed for 5 to 6 years, compared to 68 women followed for 9 to 10 years). Contingent on stronger support of this trend in future studies, one possible interpretation of treatment efficacy is that interventions speed the recovery of women who would eventually recover 5 to 10 years after presentation. The trend does, however, set a raised expectation for future treatments to demonstrate increased impact on long-term outcome. Finally, prognostic factors are poorly understood (partially because of variable sample sizes and ascertainment rates); however, personality characteristics, such as impulsivity, may contribute to a more chronic course for the disorder.

More research on outcome for bulimia nervosa is clearly necessary. This research can increase the knowledge base for this disorder by improving definitions for

recovery and relapse, standardizing methods of assessment, increasing ascertainment rates, increasing scope of outcome areas assessed, and lengthening the follow-up period. Such research has the potential to improve the understanding, diagnosis, and treatment of bulimia nervosa.

REFERENCES

1. Russell G: Bulimia nervosa: an ominous variant of anorexia nervosa. *Psychol Med* 1979; 9:429-448
2. Theander S: Anorexia nervosa: a psychiatric investigation of 94 female patients. *Acta Psychiatr Scand Suppl* 1970; 214:1-194
3. Collings S, King M: Ten-year follow-up of 50 patients with bulimia nervosa. *Br J Psychiatry* 1994; 164:80-87
4. Abraham SF, Mira M, Llewellyn-Jones D: Bulimia: a study of outcome. *Int J Eating Disorders* 1983; 2:175-180
5. Drenowski A, Yee DK, Kurth CL, Krahn DD: Eating pathology and DSM-III-R bulimia nervosa: a continuum of behavior. *Am J Psychiatry* 1994; 151:1217-1219
6. Drenowski A, Yee DK, Krahn DD: Bulimia in college women: incidence and recovery rates. *Am J Psychiatry* 1988; 145:753-755
7. Herzog DB, Keller MB, Lavori PW, Ott IL: Short-term prospective study of recovery in bulimia nervosa. *Psychiatry Res* 1988; 23:45-55
8. Johnson C, Tobin DL, Dennis A: Differences in treatment outcome between borderline and nonborderline bulimics at one-year follow-up. *Int J Eating Disorders* 1990; 9:617-627
9. Mitchell JE, Davis L, Goff G, Pyle R: A follow-up study of patients with bulimia. *Int J Eating Disorders* 1986; 5:441-450
10. King MB: Eating disorders in a general practice population: prevalence, characteristics and follow-up at 12 to 18 months. *Psychol Med Monogr Suppl* 1989; 14:1-34
11. King MB: The natural history of eating pathology in attenders to primary medical care. *Int J Eating Disorders* 1991; 10:379-387
12. Keller MB, Herzog DB, Lavori PW, Bradburn IS, Mahoney EM: The naturalistic history of bulimia nervosa: extraordinarily high rates of chronicity, relapse, recurrence, and psychosocial morbidity. *Int J Eating Disorders* 1992; 12:1-9
13. Olmsted MP, Kaplan AS, Rockert W: Rate and prediction of relapse in bulimia nervosa. *Am J Psychiatry* 1994; 151:738-743
14. Swift WJ, Kalin NH, Wamboldt FS, Kaslow N, Ritholz M: Depression in bulimia at 2- to 5-year follow-up. *Psychiatry Res* 1985; 16:111-122
15. Brotman AW, Herzog DB, Hamburg P: Long-term course in 14 bulimic patients treated with psychotherapy. *J Clin Psychiatry* 1988; 49:157-160
16. Mitchell JE, Pyle RL, Hatsukami D, Goff G, Glotter D, Harper J: A 2-5 year follow-up study of patients treated for bulimia. *Int J Eating Disorders* 1988; 8:157-165
17. Fallon BA, Walsh T, Sadik C, Saoud JB, Lukasik V: Outcome and clinical course in inpatient bulimic women: a 2- to 9-year follow-up study. *J Clin Psychiatry* 1991; 52:272-278
18. Fichter MM, Quadflieg N, Rief W: Longer-term course (6-year) course of bulimia nervosa. *Neuropsychopharmacology* 1994; 10:772S
19. Hsu LKG, Sobkiewicz TA: Bulimia nervosa: a four- to six-year follow-up study. *Psychol Med* 1989; 19:1035-1038
20. Johnson-Sabine E, Reiss D, Dayson D: Bulimia nervosa: a 5-year follow-up study. *Psychol Med* 1992; 22:951-959
21. Reiss D, Johnson-Sabine E: Bulimia nervosa: 5-year social outcome and relationship to eating pathology. *Int J Eating Disorders* 1995; 18:127-133
22. Freeman RJ, Beach B, Davis R, Solyom L: The prediction of relapse in bulimia nervosa. *J Psychiatr Res* 1985; 19:349-353
23. Pyle RL, Mitchell JE, Eckert ED, Hatsukami D, Pomeroy C, Zimmerman R: Maintenance treatment and 6-month outcome for bulimic patients who respond to initial treatment. *Am J Psychiatry* 1990; 147:871-875
24. Thackwray DE, Smith MC, Bodfish JW, Meyers AW: A com-

- parison of behavioral and cognitive-behavioral interventions for bulimia nervosa. *J Consult Clin Psychol* 1993; 61:639-645
25. White WC, Boskind-White M: An experiential-behavioral approach to the treatment of bulimarexia. *Psychotherapy: Theory, Research and Practice* 1981; 18:501-507
 26. Stevens EV, Salisbury JD: Group therapy for bulimic adults. *Am J Orthopsychiatry* 1984; 54:156-161
 27. Huoun GF, Brown LB: Evaluating a group treatment for bulimia. *J Psychiatr Res* 1985; 19:479-483
 28. Agras WS, Rossiter EM, Arnow B, Telch CF, Raeburn SD, Bruce B, Koran LM: One-year follow-up of psychosocial and pharmacologic treatments for bulimia nervosa. *J Clin Psychiatry* 1994; 55:179-183
 29. Fairburn C: A cognitive behavioural approach to the treatment of bulimia. *Psychol Med* 1981; 11:707-711
 30. Russell GFM, Szmuckler GI, Dare C, Eisler I: An evaluation of family therapy in anorexia nervosa and bulimia nervosa. *Arch Gen Psychiatry* 1987; 44:1047-1056
 31. Rossiter EM, Wilson GT: Cognitive restructuring and response prevention in the treatment of bulimia nervosa. *Behav Res Ther* 1985; 23:349-359
 32. Lacey JH: Bulimia nervosa, binge eating, and psychogenic vomiting: a controlled treatment study and long-term outcome. *Br Med J* 1983; 286:1609-1613
 33. Hudson JI, Pope HG, Keck PE, McElroy SL: Treatment of bulimia nervosa with trazodone: short-term response and long-term follow-up. *Clin Neuropharmacol* 1989; 12(suppl 1):S38-S46
 34. Wooley SC, Kearney-Cooke A: Intensive treatment of bulimia and body-image disturbance, in *Handbook of Eating Disorders*. Edited by Brownell KD, Foreyt JP. New York, Basic Books, 1986, pp 476-502
 35. Fairburn CG, Peveler RC, Jones R, Hope RA, Doll HA: Predictors of 12-month outcome in bulimia nervosa and the influence of attitudes to shape and weight. *J Consult Clin Psychol* 1993; 61:696-698
 36. Treasure J, Schmidt U, Troop N, Tiller J, Todd G, Turnbull S: Sequential treatment for bulimia nervosa incorporating a self-care manual. *Br J Psychiatry* 1996; 168:94-98
 37. Maddocks SE, Kaplan AS, Woodside DB, Langdon L, Piran N: Two year follow-up of bulimia nervosa: the importance of abstinence as the criterion of outcome. *Int J Eating Disorders* 1992; 12:133-141
 38. Pope HG Jr, Hudson JI, Jonas JM, Yurgelun-Todd D: Anti-depressant treatment of bulimia: a two-year follow-up study. *J Clin Psychopharmacol* 1985; 5:320-327
 39. Fairburn CG, Norman PA, Welch SL, O'Connor ME, Doll HA, Peveler RC: A prospective study of outcome in bulimia nervosa and the long-term effects of three psychological treatments. *Arch Gen Psychiatry* 1995; 52:304-312
 40. Patton GC: Mortality in eating disorders. *Psychol Med* 1988; 18:947-951
 41. Norman DK, Herzog DB, Chauncey S: A one-year outcome study of bulimia: psychological and eating symptom changes in a treatment and non-treatment group. *Int J Eating Disorders* 1986; 5:47-57
 42. Sullivan PF: Mortality in anorexia nervosa. *Am J Psychiatry* 1995; 152:1073-1074
 43. Mitchell JE, Davis L, Goff G: The process of relapse in patients with bulimia. *Int J Eating Disorders* 1985; 4:457-463
 44. Swift WJ, Ritholz M, Kalin NH, Kaslow N: A follow-up study of thirty hospitalized bulimics. *Psychosom Med* 1987; 49:45-55
 45. Hsu LKG: Treatment of bulimia with lithium. *Am J Psychiatry* 1984; 141:1260-1262
 46. Herzog DB, Keller MB, Lavori PW: Outcome in anorexia nervosa and bulimia nervosa: a review of the literature. *J Nerv Ment Dis* 1988; 176:131-143
 47. Herzog DB, Sacks NR, Keller MB, Lavori PW, von Ranson KB, Gray HM: Patterns and predictors of recovery in anorexia nervosa and bulimia nervosa. *J Am Acad Child Adolesc Psychiatry* 1993; 32:835-842
 48. Rossiter EM, Agras WS, Telch CF, Schneider JA: Cluster B personality disorder characteristics predict outcome in the treatment of bulimia nervosa. *Int J Eating Disorders* 1993; 13:349-357
 49. Herzog T, Hartmann A, Sandholz A, Stammer H: Prognostic factors in outpatient psychotherapy of bulimia. *Psychother Psychosom* 1991; 56:48-55
 50. Keller MB, Herzog DB, Lavori PW, Ott IL, Bradburn IS, Mahoney EM: High rates of chronicity and rapidity of relapse in patients with bulimia nervosa and depression. *Arch Gen Psychiatry* 1989; 46:480-481
 51. Walsh BT, Hadigan CM, Devlin MJ, Gladis M, Roose SP: Long-term outcome of antidepressant treatment for bulimia nervosa. *Am J Psychiatry* 1991; 148:1206-1212
 52. Wonderlich SA, Fullerton D, Swift W, Klein MH: Five-year outcome from eating disorders: relevance of personality disorders. *Int J Eating Disorders* 1994; 15:233-243
 53. Edelstein CK, Yager J, Gitlin M, Landsverk J: A clinical study of anti-depressant medications in the treatment of bulimia. *Psychiatr Med* 1989; 7:111-121
 54. Nash ES, Colborn AL: Outcome of hospitalized anorexics and bulimics in Cape Town, 1979-1989. *S Afr Med J* 1994; 84:74-79
 55. Fahy TA, Eisler I, Russell GFM: Personality disorder and treatment response in bulimia nervosa. *Br J Psychiatry* 1993; 162:765-770
 56. Fichter MM, Quadflieg N, Rief W: Course of multi-impulsive bulimia. *Psychol Med* 1994; 24:591-604
 57. Fahy T, Eisler I: Impulsivity and eating disorders. *Br J Psychiatry* 1993; 162:193-197
 58. Giles TR, Young RR, Young DE: Behavioral treatment of severe bulimia. *Behavior Therapy* 1985; 16:393-405
 59. Hsu LKG, Holder D: Bulimia nervosa: treatment and short-term outcome. *Psychol Med* 1986; 16:65-70
 60. Fairburn CG, Kirk J, O'Connor M, Cooper PJ: A comparison of two psychological treatments for bulimia nervosa. *Behav Res Ther* 1986; 24:629-643
 61. Fairburn CG, Jones R, Peveler RC, Hope RA, O'Connor M: Psychotherapy and bulimia nervosa: longer-term effects of interpersonal psychotherapy, behavior therapy, and cognitive behavior therapy. *Arch Gen Psychiatry* 1993; 50:419-428
 62. Laessle RG, Beumont PJV, Butow P, Lennerts W, O'Connor M, Pirke KM, Touyz SW, Waadt S: A comparison of nutritional management with stress management in the treatment of bulimia nervosa. *Br J Psychiatry* 1991; 159:250-261