Long-term Outcome of Residential Treatment for Anorexia Nervosa and Bulimia Nervosa

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Abstract

Objective: We analyzed results from surveys of respondents who had completed $\geq$ 30 days of treatment at Monte Nido Residential Treatment Program over a 10 year period. Methods: Participants with anorexia nervosa (AN) (n=66) and bulimia nervosa (BN) (n=52) completed the Eating Disorders Inventory-2 (EDI-2), the Beck Depression Inventory (BDI), and a structured eating disorder assessment at admission and follow-up. Results: Mean duration between discharge and last follow-up was 4.6 years and 3.8 years for AN and BN respectively. For AN there were significant improvements in BMI, BDI, 10 of 11 EDI-2 subscales, and frequencies of bingeing and purging. For BN there were significant improvements in BDI, all EDI subscales, and frequencies of bingeing and purging. Eighty-nine percent of AN graduates and 75% of BN graduates had good or intermediate outcomes. Using linear regression, the best model contained the single variable, discharge BMI, which predicted 23% of the variance explaining full recovery from AN ($p \leq 0.02$). For BN, the best model contained vomiting frequency and the bulimia subscale score of the EDI-2 at discharge, which accounted for 37% of the variance explaining full recovery from BN ($p \leq 0.02$). Discussion: The great majority of patients showed significant improvement at long-term follow-up after this program of residential treatment. In addition, these outcome results underscore the importance of weight gain for AN patients and cessation of bulimic symptoms for BN patients when predicting long-term recovery.

Keywords: eating disorder, anorexia nervosa, bulimia nervosa, longitudinal study, outcome, follow-up, long-term course, predictors, residential treatment

INTRODUCTION

We have previously reported significant improvement at discharge in 215 patients with anorexia nervosa (AN) and bulimia nervosa (BN) following intensive treatment in Monte Nido residential treatment program (RTC) (Brewerton & Costin, in press). In this paper we report our results of a long-term follow-up study of these patients. Long-term follow-up studies of individuals with AN and BN following intensive treatment are limited and have been reviewed in detail elsewhere (Fichter & Quadflieg, 2004; Fichter, Quadflieg & Hedlund, 2006; Steinhausen 2002; 2008). Many studies are primarily on adolescents and/or outpatients, and others have included individuals who have not received any treatment. To our knowledge only three RTCs have published outcome data, and these studies have ranged between 3 months to 3 years following discharge. Lowe et al. (2003) reported follow-up survey results from 98 patients with AN and 52 patients with BN 3 months following discharge from a RTC, although this was a small proportion of the original sample (35% of AN patients and 27% of BN patients). No significant changes in BMI were noted in the AN patients 3 months after discharge, and in general, improvements in depression and eating disorder symptomatology following residential treatment were still evident at 3 month follow-up. Bean et al. (2004) reported results from a follow-up telephone survey of 35 patients with AN (26 women and 7 men) conducted 12-21 months (mean = 15 months) after discharge from the residential treatment program at Rogers Memorial Hospital. In the women with AN, BMI significantly increased from 17 $\pm$ 2 at discharge to 18 $\pm$ 3 at follow-up ($p \leq 0.025$), and 53.9% of women were reported to weigh greater than 85% of ideal body weight at follow-up. Gleaves et al. (1993) reported on the outcome of residential treatment in a consecutive group of 497 patients with BN one to three years following discharge. At follow-up, the women surveyed were still bingeing and purging an average of 5 times per week, and only 25.4% reported being completely

abstinent from bingeing and purging. No other outcome studies have been reported for eating disordered patients who have been treated in RTCs, even though RTCs offer the advantage of a long-term, structured and intensive treatment setting outside of a hospital environment generally at lower cost (Frisch, Herzog & Franko, 2006).

METHODS

Participants

We analyzed results from a survey of respondents who had completed 30 days or more of treatment at Monte Nido Residential Treatment Program in Malibu, CA over a 10 year period. As previously described (Brewerton & Costin, in press), 30 days was used as an *a priori* minimum effective duration of treatment, and these treatment completers are referred to as "graduates." Of 215 graduates with AN or BN as defined by DSM-IV (American Psychiatric Association, 1994), 55% (118) participated in the study, including 66 with AN and 52 with BN and these patients are called "participants." Graduates, who for various reasons, such as non completion of the necessary evaluation forms, did not participate in the study, are called "non-participants." Analyses included a comparison of admission assessment variables with post-graduate (PG) assessment variables for each diagnosis. The demographic and clinical characteristics of the study participants and the non-participants are shown in tables 1 and 2 by diagnosis. The age range of the participants with AN was 17 to 55 years, while that of the BN participants was 22 to 57 years.

Assessments

At each assessment, participants completed the Eating Disorders Inventory-2 (EDI-2) (Garner, 1991), the Beck Depression Inventory (BDI) (Beck, Steer & Brown, 1996), and a structured eating

disorder assessment questionnaire developed for outcome assessment of eating disorder behaviors. Possible responses for each behavior were as follows: 0) Not at all; 1) Once a month or less; 2) A few times a month; 3) At least once a week; 4) At least twice a week; 5) Daily; 6) More than once a day. Only those who had responses at least one year out from discharge were included in the PG analyses. For all PG analyses only the most recent responses were used to obtain the longest follow-up period possible. The assessment time points used for this study were: 1-year, 18-mos, 2-years, 3-years, 4-years, 5-years, 6-years, 7-years, 8-years, 9-years and 10-years after discharge. All participants gave written informed consent for their responses to be used for both clinical and research purposes. To protect the client's confidentiality and anonymity, each respondent was identified with a computer-generated number, so no names were used. By 2003, an Internet system was created allowing for direct entry into the database by the Monte Nido graduate. An anonymous weight response card to be filled out and submitted by the graduate's outside treatment professional was provided in order to obtain accurate, reliable weight data. Graduates gave the weight card with their ID number on it to their physician, therapist, or dietitian who then filled it out and sent back to our data collection source. This system effectively ruled out inaccurate self reporting in regards to weight and maintained an important treatment philosophy of the program which emphasizes abstinence from self weighing.

The mean duration of time between discharge and last PG follow-up was 4.6 $\pm$ 3.1 years for the AN subjects and 3.8 $\pm$ 2.7 years for the BN subjects.

Classification of Outcomes

Outcomes of AN were based on the original classification of Morgan and Russell as determined by weight and menstrual function (Morgan & Russell, 1975). A "good" outcome or full recovery was defined by the return of normal weight (BMI $\geq$ 18.0) AND the resumption of normal menstrual function.

"Intermediate" outcome or partial recovery was indicated by EITHER weight restoration (BMI $\geq$ 18.0) OR resumption of normal menstrual function. "Poor" outcome was indicated by the absence of both. For BN, a "good" or full recovery was defined by the complete cessation of binge eating AND purging behaviors. An "intermediate" outcome or partial recovery was defined by at least a 50% reduction in binge eating AND purging, and a "poor" outcome was defined by the failure to meet either of the above goals.

Statistics

Means are presented with standard deviations (SD). Comparisons of parametric independent samples were completed using analyses of variance (ANOVA) and for nonparametric independent samples Kruskal-Wallis tests were used. Related parametric data were analyzed using paired t-tests, and related nonparametric data were analyzed using Wilcoxon Signed Ranks Tests. Post-hoc Bonferroni corrections were made for multiple comparisons. A significance level of 0.05 (after corrections) was used throughout.

To explore possible predictors of response, correlational analyses were performed using a variety of clinical variables to explore possible predictors of outcome. These included age, age of illness onset, duration of illness, number of previous hospitalizations, admission and discharge BMI's, admission and discharge BDI scores, admission and discharge EDI-2 subscale scores, and admission and discharge frequencies of eating disordered behaviors. Variables which correlated with degree of outcome (good, intermediate, poor) were entered into stepwise linear regression analyses in an attempt to identify predictors of full recovery from AN and BN.

RESULTS

Baseline Group Comparisons

In order to establish that the study participants were representative of all patients graduating from Monte Nido Residential Treatment Program, they were compared (by diagnosis) on a number of demographic and clinical variables with the non-participants who were admitted to and graduated from Monte Nido. Results of these analyses are shown in Tables 1 for the AN group and Table 2 for the BN group.

For those with a diagnosis of AN, the study participants were not significantly different from the non-participants on any of the variables measured. Likewise, for those with a diagnosis of BN, the two groups did not significantly differ on any of the variables measured.

Clinical Outcome: AN

In the AN group, there was a statistically significant increase in mean BMI from 15.8 $\pm$ 1.6 to 19.0 $\pm$ 3.3 ($p < 0.001$, paired t-test). In addition, 10 of 11 EDI-2 subscales significantly increased from admission to follow-up (see Figure 1). Body dissatisfaction was the only subscale that did not show statistically significant improvement after post-hoc corrections. Frequencies of bingeing, vomiting, chewing and spitting, compulsive exercising, stimulant abuse and restricting behavior were all significantly reduced at the time of follow-up ($p \leq 0.01$, Wilcoxon Signed Rank Tests, see Figure 2). There were no significant differences between admission and follow-up frequencies for laxative abuse, diuretic abuse, ipecac abuse, and enema abuse, largely due to low base rates of and/or large variations in the frequencies of these behaviors in the AN group. Mean BDI scores significantly improved from admission (30.5 $\pm$ 12.4) to PG follow-up (13.4 $\pm$ 14.3, $p < 0.001$, paired t-test).

At PG follow-up 70% of AN graduates achieved weight recovery (BMI $\geq$ 18); in addition, 42% had a good outcome (BMI $\geq$ 18 AND resumption of normal menses), 47% an intermediate outcome

(BMI $\geq$ 18 OR resumption of normal menses) and 11% a poor outcome (neither restoration of weight nor resumption of normal menses).

In terms of weight at the time of PG follow-up, mean BMI was 19.0 $\pm$ 3.3. Twenty graduates (30%) had BMI's < 18 and 13 (20%) had BMI's < 17.5. None of the graduates treated for AN were obese (BMI $\geq$ 30) and 2 (3%) were overweight (BMI between 25 and 30) at the time of PG follow-up.

Clinical Outcome: BN

In the BN group, there was no statistically significant change in mean BMI between admission (20.6 $\pm$ 3.1) and follow-up (20.8 $\pm$ 2.8; NS, paired t-test). All 11 EDI-2 subscales significantly improved from admission to follow-up ($p \leq 0.05$, Bonferroni corrected paired t-tests; see Figure 3). Frequencies of bingeing, vomiting, laxative abuse, diuretic abuse, chewing and spitting, and compulsive exercising were all significantly reduced at the time of follow-up ($p < 0.01$, Wilcoxon Signed Rank Tests, see Figure 4). There were no significant differences between admission and follow-up frequencies for stimulant abuse, restricting behavior, ipecac abuse and enema abuse, in part due to low base rates of and large variations in the frequencies of these behaviors. Mean BDI scores significantly improved from admission (29.3 $\pm$ 10.9) to PG follow-up (12.5 $\pm$ 12.8, $p < 0.001$, paired t-test).

At PG follow-up 61% of BN graduates reported a good outcome (100% cessation of their binge, purge and other compensatory behaviors), 14% an intermediate outcome ($\geq$ 50% reduction in both) and 25% a poor outcome (< 50% reduction).

In terms of weight, the mean BMI at follow-up was 20.8 $\pm$ 2.8. Four graduates (4.2%) had BMI's < 18 and 3 (3.2%) had BMI's < 17.5. One BN graduate met criteria for AN, binge-purge type, at PG follow-up. None of the graduates treated for BN were obese (BMI > 30) and 3 (6%) were overweight (BMI between 25 and 30) at the time of PG follow-up.

Predictors of Good Outcome

A variety of clinical variables were tested to see if they correlated with degree of outcome (good, intermediate, poor), including age, age of onset, duration of illness, number of previous hospitalizations, admission and discharge BMI's, admission and discharge BDI scores, admission and discharge EDI-2 subscale scores, and admission and discharge frequencies of eating disordered behaviors. For AN, there were significant correlations between good outcome and admission BMI (Spearman rho = 0.40, $p \leq 0.001$) and discharge BMI (Pearson $r = 0.37$, $p \leq 0.003$). For BN, there were significant correlations between good outcome and both vomiting frequency (Spearman rho = -0.40, $p \leq 0.008$) and binge frequency at discharge (Spearman rho = -0.33, $p \leq 0.05$).

In stepwise linear regression analyses the best predictive model consisted of the single variable of discharge BMI and predicted 23% of the variance explaining full recovery from AN at follow-up ($r = 0.48$, $p \leq 0.015$). For BN, the best predictive model contained the variables of vomiting frequency at time of discharge and the bulimic subscale scores of the EDI-2 at discharge, and these two variables accounted for 37% of the variance explaining full recovery from BN at follow-up ($r = 0.60$, $p \leq 0.02$).

Mortality

There were 3 deaths of subjects enrolled in the study, none of which were due to the direct effects of an eating disorder. One of the 66 participants (1.5%) with AN died, which was from suicide that occurred approximately 4 years after weight recovery and discharge. Two of the 52 participants (3.8%) with BN died, one of brain cancer unrelated to her eating disorder over 4 years after discharge and 1 from a seizure secondary to mixing illicit drugs and alcohol over 3 years after discharge.

DISCUSSION

This is the longest follow-up study of patients treated in an intensive residential treatment facility. The great majority of patients showed significant improvement at long-term follow-up after intensive residential care. Eighty-nine per cent of those with AN had a good or intermediate outcome an average of 4.6 years after discharge, while 75% of those with BN had a good or intermediate outcome an average of 3.8 years after discharge. In addition, both AN and BN patients showed significant improvement in multiple measures of eating disorder symptomatology and attitudes as well as depressive symptoms. This is despite the fact that these individuals had been ill for several years (mean duration of 8-9 years). Residential treatment using this particular treatment philosophy may be an effective and less costly alternative to inpatient treatment (Costin, 2007).

Given that there are so few other published outcome studies of eating disorder patients treated in residential treatment facilities, in order to put our results in some perspective, we compared our results to those of the 12 year outcome study of AN and BN patients treated in an inpatient setting (Fichter & Quadflieg, 2004; Fichter, Quadflieg & Hedlund, 2006). For AN, Fichter and colleagues reported that 67% of their patients had achieved weight recovery (BMI $\geq$ 18) at 12 year follow-up (Fichter, Quadflieg & Hedlund, 2006), while 70% of our patients had achieved the same level of weight recovery an average of 4.6 years following discharge. For BN, Fichter and Quadflieg reported that 70% had a good outcome at 12 years and (complete cessation of bingeing and purging) (Fichter & Quadflieg, 2004), as compared to 62% in our study at an average of 3.8 years following discharge.

In terms of predictors of treatment response, this study identified some important predictors of recovery or good outcome. Discharge BMI was singularly the best predictor of full recovery from AN. This finding emphasizes that full weight restoration during treatment is crucial for full and sustained recovery. Unfortunately, all too often economic and other forces compel early discharges prior to

attainment of complete weight restoration. Other outcome studies have reported this finding (Clausen, 2008; Fichter, Quadflieg & Rehm, 2003; Steinhausen, 2009). The best predictor of a good outcome for BN patients was the combination of low vomiting frequency and low bulimia subscale scores on the EDI-2 at discharge. This finding clearly underscores the importance of attaining complete abstinence during treatment, a finding which has also been reported in studies of outpatients with BN (Agras et al., 2000; Fairburn, Agras, Walsh, Wilson & Stice, 2004).

Although our results are notable, there are a number of limitations to this study that warrant acknowledgment and discussion. The principal limitation is that it lacks a control or comparison group, which makes us unable to definitely conclude that residential treatment was the cause of these patients' favorable outcome. However, it is not likely that these patients would have maintained their improvement to the extent that they did without having had the benefit of intensive residential care given that the great majority (> 90%) had been "treatment refractory" and had failed prior outpatient, inpatient and/or residential programs prior to coming to Monte Nido. Another limitation is that approximately 45% of eligible individuals did not participate at all in the study. However, these subjects did not significantly differ on any of the baseline demographic and clinical measures used in the study, including age, admission BMI, admission BDI, admission EDI subscales or frequency of eating disordered behaviors. This is strong evidence indicating that the respondents were largely representative of the graduating group of patients in terms of level of illness. The only significant difference between the study participants and non-participants with AN was that the study participants with AN had significantly higher mean discharge BMI's. The reasons for this finding are unclear, but it is possible that this group may have had a worse outcome given that discharge BMI was a predictor of long-term recovery.

Another significant limitation of this study is that the follow-up interval between discharge and post-graduate follow-up varied significantly, from 1 to 10 years. Although not ideal, this was done in order to increase the available number of responses and therefore sample size. It is noteworthy that the time to follow-up did not predict recovery or a good outcome for either AN or BN in multiple stepwise linear regression analyses. This is relevant because other studies have reported that duration of follow-up is associated with good outcome for both AN (Steinhausen, 2002) and BN (Fichter and Quadflieg, 2004).

In this study mail-in and web-based surveys were used rather than person-to-person interviews for follow-up assessment. However, it has been shown that respondents may provide increased and more accurate rates of eating pathology on questionnaire assessments as compared to face-to-face interviews, which may in part be due to increased frankness when participants feel more anonymous (Keel, Crow, Davis & Mitchell, 2002). In addition, other studies show that mail-in paper and pencil self-report responses are essentially no different from those elicited on the web (Fouladi, McCarthy & Moller, 2002; McCabe, Diez, Boyd, Nelson & Weitzman, 2006). It is also notable that an anonymous weight response card was completed and submitted by the graduate's outside treatment professional in order to obtain accurate, reliable weight data, which enhances the veracity of our results.

Future directions of this work will include continued data collection in order to extend the duration of follow-up. In addition, growing the sample sizes of the study as well as increasing the long-term compliance of survey completion by Monte Nido graduates will be important priorities, as well as identifying any other possible predictors of response.

REFERENCES

Agras, W.S., Crow, S.J., Halmi, K.A., Mitchell, J.E., Wilson, G.T., Kraemer, H.C. (2000). Outcome predictors for the cognitive behavior treatment of bulimia nervosa: data from a multisite study. *American Journal of Psychiatry*, **157**, 1302-1308.

American Psychiatric Association (1994). *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV*) (4th ed.). American Psychiatric Association: Washington, DC.

Bean, P., Loomis, C.C., Timmel, P., Hallinan, P., Moore, S., Mammel, J., Weltzin, T. (2004). Outcome variables for anorexic males and females one year after discharge from residential treatment. *Journal of Addictive Disease*, 2**3**, 83-94.

Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, **4**, 561–571.

Beck, A.T., Steer, R.A., Brown, G.K. (1996). *The Beck Depression Inventory Manual, 2nd ed.* San Antonio, TX: Psychological Corporation Harcourt Brace & Company.

Brewerton, T.D., Costin, C. (in press): Treatment Results of Anorexia Nervosa and Bulimia Nervosa in a Residential Treatment Program. *Eating Disorders: The Journal of Treatment and Prevention.*

Clausen, L. (2008). Time to remission for eating disorder patients: a 2(1/2)-year follow-up study of outcome and predictors. *Nordic Journal of Psychiatry*, **62**, 151-159.

Costin, C. (1996). *The Eating Disorders Source Book: A Comprehensive Guide to the Causes, Treatments, and Prevention of Eating Disorders.* 1st Ed., Los Angeles: Lowell House.

Costin, C. (2007). *The Eating Disorders Source Book: A Comprehensive Guide to the Causes, Treatments, and Prevention of Eating Disorders.* 3rd Ed. New York: McGraw-Hill.

Fairburn, C.G., Agras, W.S., Walsh, B.T., Wilson, G.T., Stice, E. (2004). Prediction of outcome in bulimia nervosa by early change in treatment. *American Journal of Psychiatry*, **161**, 2322-2324.

Fichter, M.M., Quadflieg, N. (2004). Twelve-year course and outcome of bulimia nervosa. *Psychological Medicine*, **34**, 1395-1406.

Fichter, M.M., Quadflieg, N., Hedlund, S. (2006). Twelve-year course and outcome of anorexia nervosa. *International Journal of Eating Disorders*, **39**, 87-100.

Fichter, M.M., Quadflieg, N., Rehm, J. (2003). Predicting the outcome of eating disorders using structural equation modeling. *International Journal of Eating Disorders*, **34**, 292–313.

Fouladi, R.T., McCarthy, C.J., Moller, N.P. (2002). Paper-and-pencil or online? Evaluating mode effects on measures of emotional functioning and attachment. *Assessment*, **9**, 204-125.

Frisch, M.J., Herzog, D.B., Franko, D.L. (2006). Residential treatment for eating disorders. *International Journal of Eating Disorders*, **39**, 434-442.

Garner, D.M., Olmstead, M.P., Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory of anorexia nervosa and bulimia. *International Journal of Eating Disorders*, **2**, 14–34.

Garner, D.M. (1991). *Eating Disorder Inventory-2 professional manual*. Odessa, FL: Psychological Assessment Resources.

Gleaves, D.H., Post, G.K., Eberenz, K.P., Davis, W.N. (1993). A report of 497 women hospitalized for treatment of bulimia nervosa. *Eating Disorders: The Journal of Treatment and Prevention*, **1**, 134-146.

Keel, P.K., Crow, S., Davis, T.L., Mitchell, J.E. (2002). Assessment of eating disorders: comparison of interview and questionnaire data from a long-term follow-up study of bulimia nervosa. *Journal of Psychosomatic Research*, **53**, 1043-1047.

Lowe, M.R., Davis, W.N., Annunziato, R.A., Lucks, D.L. (2003). Inpatient treatment for eating disorders: Outcome at discharge and 3-month follow-up. *Eating Behaviors*, **4**, 385-397.

Morgan, H.G., Russell, G.F. (1975). Value of family background and clinical features as predictors of long-term outcome in anorexia nervosa: four-year follow-up study of 41 patients. *Psychological Medicine*, **5**, 355-371.

McCabe, S.E., Diez, A., Boyd, C.J., Nelson, T.F., Weitzman, E.R. (2006). Comparing web and mail responses in a mixed mode survey in college alcohol use research. *Addictive Behavior*, **31**, 1619-1627.

Steinhausen, H-C. (2002) Outcome of anorexia nervosa in the 20th century. *American Journal of Psychiatry*, **159**, 1284–1293.

Steinhausen, H-C. (2008). Outcome of eating disorders. *Child Adolescent Psychiatric Clinics of North America*, **18**, 225–242.

Steinhausen, H-C., Grigoroiu-Serbanescu, M., Boyadjieva, S., Neumarker, K-J., Metzke, C.W. (2009). The relevance of body weight in the medium-term to long-term course of adolescent anorexia nervosa. *International Journal of Eating Disorders*, **42**, 19–25.

Table 1. Demographic and clinical characteristics of Participants and Non-participants with AN (mean ± SD). Uncorrected p-values are provided, and when appropriate, corrected p-values are given in parentheses. Significance at the $p \leq 0.05$ level (corrected) is indicated by an asterisk (*).

	Study Participants	Nonparticipants	P-value (unpaired t-test)
Sample Size (N)	66	49	
Age (yrs)	31.4 ± 9.0	31.3 ± 7.5	0.96
Length of Illness (yrs)	8.1 ± 6.2	8.8 ± 6.1	0.61
Age of Onset (yrs)	17.4 ± 6.2	16.4 ± 4.8	0.45
Past Hospitalizations	1.4 ± 1.5	2.1 ± 2.2	0.07 (corrected p = 0.77)
Length of Stay (days)	94.1 ± 51.6	104.1 ± 81.9	0.42
Admit BMI	15.8 ± 1.6	15.5 ± 1.7	0.32
Discharge BMI	18.1 ± 1.4	17.5 ± 1.6	0.036 (corrected p = 0.36)
Admit BDI	29.5 ± 12.2	28.2 ± 11.3	0.58
Discharge BDI	13.5 ± 9.8	11.4 ± 8.8	0.34
Any Prior Treatment	90%	93%	0.67

Table 2. Demographic and clinical characteristics of Participants and Non-participants with BN (mean ± SD). Uncorrected p-values are provided, and when appropriate, corrected p-values are given in parentheses. Significance at the $p \leq 0.05$ level (corrected) is indicated by an asterisk (*).

	Study Participants	Nonparticipants	P-value (ANOVA)
Sample Size (N)	52	42	
Age (years)	29.9 ± 7.4	29.7 ± 8.7	0.6
Length of Illness (yrs)	8.6 ± 7.0	8.4 ± 8.1	0.72
Age of Onset (yrs)	16.7 ± 5.1	17.0 ± 6.1	0.86
Past Hospitalizations	0.6 ± 1.1	0.9 ± 1.8	0.32
Length of Stay (days)	82.6 ± 50.7	60.0 ± 34.0	0.015 (corrected p = 0.15)
Admit BMI	20.6 ± 3.1	21.1 ± 3.8	0.49
Discharge BMI	21.2 ± 2.4	21.7 ± 4.7	0.52
Admit BDI	27.4 ± 12.4	30.3 ± 12.6	0.3
Discharge BDI	9.6 ± 8.0	12.1 ± 10.1	0.26
Any Prior Treatment	95%	86%	0.24

Figure Captions

Figure 1. EDI-2 subscale scores in respondents with anorexia nervosa (AN) at admission and post-graduate follow-up. Significant differences between admission and follow-up scores are indicated by an asterisk (*), $p < 0.05$, paired t-test following Bonferroni correction.

Figure 2. Frequency of eating disordered behaviors in respondents with anorexia nervosa (AN) at admission and post-graduate follow-up. Possible responses for each behavior were: 0) Not at all; 1) Once a month or less; 2) A few times a month; 3) At least once a week; 4) At least twice a week; 5) Daily; 6) More than once a day. Significant differences between admission and follow-up scores are indicated by an asterisk (*), $p < 0.01$, Wilcoxon Signed Rank test following Bonferroni correction.

Figure 3. EDI-2 subscale scores in respondents with bulimia nervosa (BN) at admission and post-graduate follow-up. Significant differences between admission and follow-up scores are indicated by an asterisk (*), $p < 0.05$, paired t-test following Bonferroni correction.

Figure 4. Frequency of eating disordered behaviors in respondents with bulimia nervosa (BN) at admission and post-graduate follow-up. Possible responses for each behavior were: 0) Not at all; 1) Once a month or less; 2) A few times a month; 3) At least once a week; 4) At least twice a week; 5) Daily; 6) More than once a day. Significant differences between admission and follow-up scores are indicated by an asterisk (*), $p < 0.01$, Wilcoxon Signed Rank test following Bonferroni correction.