Comparison of Long-Term Outcomes in Adolescents With Anorexia Nervosa Treated With Family Therapy

JAMES LOCK, M.D., PH.D., JENNIFER COUTURIER, M.D., AND W. STEWART AGRAS, M.D.

ABSTRACT

Objective: To describe the relative effectiveness of a short versus long course of family-based therapy (FBT) for adolescent anorexia nervosa at long-term follow-up. **Method:** This study used clinical and structured interviews to assess psychological and psychosocial outcomes of adolescents (ages 12–18 years at baseline) who were previously treated in a randomized clinical trial using family therapy between 1999 and 2002. **Results:** Eighty-three percent (71/86) of subjects participated in follow-up assessments of current psychological and psychosocial functioning. In addition, 49% (35) were interviewed using the Eating Disorder Examination. Mean length of follow-up was 3.96 years (range 2.3–6.0 years). There were no statistically significant differences between the two groups on any measure at long-term follow-up. As a whole, the group was doing well with 89% above 90% ideal body weight, 74% with Eating Disorder Examination scores within the normal range, and 91% of postmenarcheal females not on birth control had menstrual return. **Conclusions:** A short course of family therapy is as effective as a longer course at follow-up. *J. Am. Acad. Child Adolesc. Psychiatry,* 2006;45(6):666–672. **Key Words:** adolescents, family therapy, anorexia nervosa, long-term outcome.

Although anorexia nervosa (AN) is a serious psychological illness with the potential for severe long-term psychiatric and medical problems, treatment of AN remains understudied with fewer than 15 randomized clinical trials published in the world literature focused on psychological interventions (Birmingham et al., 2005; Herzog et al., 2000; Le Grange and Lock, 2005; Rome et al., 2003). Studies of long-term outcomes of these psychological treatments are even more limited, with only one study reporting on follow-up beyond 1 year (Eisler et al., 1997). Of the treatments studied for AN, only one, a specific form of family therapy based on an approach developed by Dare and Eisler at the Maudsley Hospital, has been examined in more than one clinical trial (Le Grange and Lock, 2005). Evaluations completed at the end of treatment from the available studies of this approach suggest that it is effective in the short term, whereas one study suggests maintenance of treatment effects after 5 years; however, because the relevant study subgroup was small (*N* = 21), confidence in the outcome is somewhat limited (Eisler et al., 1997).

The present study is a follow-up of adolescent subjects who were treated in a randomized clinical trial designed to examine the relative benefits of a short (6 months and 10 sessions) versus longer course (12 months and 20 sessions) of family therapy for AN (Lock et al., 2005). The outcomes of the initial trial suggested that there were no differences between the short-course and long-course treatment groups at the end of 12 months. There was, however, a suggestion in post hoc analyses that subjects with severe obsessive eating patterns or those who came from nonintact families benefited from receiving the longer course. However, it was unclear whether differences would emerge between the groups or if the progress made during the study would be maintained at follow-up. Thus, the present study was primarily designed to

examine the comparative long-term follow-up outcomes between subjects involved in the short versus long course of family therapy study for adolescents with AN. Our hypothesis was that there would continue to be no differential benefit to the longer course of family therapy over a shorter course. A related secondary hypothesis was that there would no longer be a moderating effect of obsessional concerns about eating and weight or of family status on outcome. Finally, we hypothesized that the overall outcomes of the study group as a whole would be maintained and possibly improved on as suggested by the findings from the previous 5-year follow-up study of this approach.

METHOD

Participants and Procedure

In the original study, subjects and families were randomly assigned for treatment with manual-based family therapy for 6 or 12 months (Lock et al., 2005). Efficacy was compared at the end of 1 year by examining primary outcomes of body mass index (BMI) and global Eating Disorder Examination (EDE) score. Eighty-six subjects were involved in this study, ranging in age from 12 to 18 years. All of the subjects were diagnosed with AN by *DSM-IV* criteria with the exception that for those subjects who were female and postmenarcheal, one missed menstrual period was sufficient rather than three. The mean age of participants was 15.2 years. The average duration of illness was just under 1 year. Ten percent were boys and 22% were from ethnic or cultural minority groups. Seventy-eight percent were from intact families. Nineteen percent of subjects were diagnosed with the binge-purge subtype of AN and 14% were on psychotropic medications for anxiety or depressive disorders at baseline. Ninety percent had undergone previous treatment for AN and 30% had been hospitalized within 30 days of starting treatment in the study protocol.

Recruitment and assessment procedures from the original study are described in detail elsewhere (Lock et al., 2005). A manual-based form of family-based treatment (FBT) was used in this study (Dare and Eisler, 1997; Lock et al., 2001). In the comparison of short-versus long-term treatment, a 6-month/10-session therapy was compared with a 12-month/20-session therapy. In either version, FBT has three distinct phases. In the initial phase, the therapist supports parents in taking responsibility for changing dieting, excessive exercise, and any other behaviors that maintain low weight or that are precipitating ongoing weight loss. The goal of the first phase is a return to normal weight. In the second phase of treatment, the therapist helps parents to return control of eating and related behaviors to the adolescent under their supervision. In the third phase, more general issues of adolescence are addressed, but only to the extent that they have been negatively affected by AN.

In the original study, of the 86 subjects randomized, 8 were lost to follow-up and 9 were treatment dropouts (defined as not attending 80% of assigned sessions). At the end of treatment, 96% were above weight thresholds for AN and 67% had BMIs >20 and global EDE scores within 2 SDs of published norms.

The study protocol and consent procedures for this follow-up study were approved by our institution's institutional review board. For this study, families and subjects were contacted by mail and telephone and invited to participate in a follow-up assessment. Heights and weights were obtained as well as information on further treatment (psychological and medication), additional diagnoses, admissions to hospital, residential treatment, changes in family structure, and general psychosocial functioning. Participation in current treatment was defined as being within 6 months of our interview.

Measures

Subjects were asked to complete the EDE (Cooper and Fairburn, 1987; Passi et al., 2003). The EDE is a structured interview designed to assess all aspects of eating behavior and is considered the gold standard assessment instrument for eating psychopathology. The EDE interview was conducted by a trained assessor. The EDE provides information on four subscales (Dietary Restraint, Eating Concern, Shape Concern, and Weight Concern) to assess psychopathology related to eating disorders.

Additional data were collected during interviews conducted in person or on the telephone with subjects and parents, depending on willingness to participate and ease of attending the clinic.

Data Analysis

Initially, a lost case analysis was done to determine whether there were differences between those individuals who had agreed to participate in follow-up and those who had not responded. Individuals who agreed to complete the EDE were also compared with those who refused.

BMI at follow-up was the main endpoint of interest with the treatments compared using analysis of covariance (ANCOVA), controlling for BMI at 12 months. An exploratory analysis was done using the global EDE score on follow-up comparing treatments using ANCOVA, controlling for the global EDE score at 12 months.

Categorical outcomes (current psychological or psychiatric treatment and admissions to hospital) were compared between treatment groups using a Pearson r^2 test. Treatment group was also correlated with poststudy treatment using a Pearson correlation coefficient.

A moderator analysis was conducted to examine possible moderators of outcome at follow-up (Kraemer et al., 2002; Lock et al., 2005). A linear regression model was used with BMI at follow-up as the dependent variable, controlling for BMI at 12 months because moderators specific to maintenance of treatment effects were of interest. Independent variables were centered. Because the original study was powered for the primary outcome (change in BMI) and because there was incomplete follow-up on the EDE ($n = 35$), an exploratory moderator analysis was done using follow-up global EDE score. In this analysis, we controlled for the global EDE score at 12 months because moderators of maintenance of treatment effects were of interest. Potential moderators that were examined included age, session attendance, comorbidity, duration of illness, EDE restraint scores, gender, intact family, the principal investigator as primary therapist, purging status at 12 months, medication use, prior hospitalization, Yale-Brown-Cornell Eating Disorder Scale score at 12 months, internalizing score on the Child Behavior Checklist at 12 months, internalizing score on the Youth Self-Report at 12 months, and family income. Significance was set at 0.05.

RESULTS

In this follow-up study, 86% (74/86) of the subjects were contacted. Three refused to participate. This resulted

in a sample size of 71 (83%) subjects, of whom 35 (49%) completed EDEs. Information was largely obtained through the subjects themselves and through parents (Table 1). Mean length of follow-up was 3.96 years (range 2.3–6.0), and the mean age of subjects was 19.2 years (range 15.5–23.2) at the time of follow-up.

Follow-up Outcomes

The results of the lost cases analyses indicated that there were no substantive differences between those who agreed to participate in follow-up and those who did not (Table 2) and no apparent differences on the items examined between those who were willing to be interviewed using the EDE and those who refused.

There were no significant statistical differences observed between treatment groups in terms of long-term outcome (Tables 3 and 4). BMI and global EDE score were first analyzed by ANCOVA, and no statistically significant differences were detected ($F = 0.79$, $p = .38$ for BMI, and $F = 0.003$, $p = .95$ for global EDE). The need for admissions to hospital for medical problems associated with AN and further treatment were not significantly different between groups using categorical analyses (Table 4). When treatment group was correlated with further treatment poststudy, there were no significant correlations for admission to hospital ($r = -0.03$, $p = .80$), medication use since study end ($r = -0.05$, $p = .70$), or psychological treatment since study end ($r = 0.12$, $p = .33$). Because the finding of no statistically significant differences does not disprove the null hypothesis, we conducted an analysis of the effect size (ES), area under the curve (AUC), and the number needed to treat to find one additional subject who would benefit from longer treatment (NNT). For our main outcome variable of BMI, the ES was small (ES = 0.08; 95% CI -0.39–0.54) with an AUC of 52% and an NNT of 22. These data strongly suggest that there is a low likelihood that a difference between the two groups exists for this variable. Although there were no statistically significant group differences on the EDE scale scores, the ES, AUC, and NNT to treat calculations favor longer treatment, with the ES for several subscales nearly approaching moderate levels (e.g., 0.4).

In addition, there were no moderators of maintenance of treatment effects using either BMI or EDE as dependent variables. The only general nonspecific predictor of outcome (higher BMI) was a high restraint score at 12 months (standardized β coefficient = .27, $t = 2.1$, $p = .04$). Intact family was a nonspecific predictor of global EDE score at follow-up (standardized β coefficient = $-.513$, $t = -3.62$, $p = .001$) so that an intact family predicted lower EDE scores at follow-up.

A summary of clinical outcomes is reported in Table 5. BMIs of both groups were largely in the normal range. Overall, only four subjects reported amenorrhea. The majority of subjects (99% or 70/71) were attending college or high school or were working. More than half had moved out of the family home and were living independently. The majority (85%) had not

TABLE 1
Follow-Up Data, Including Type of Informant Contacted and Information Obtained

	Contact Type	No.	%
Follow-up information obtained (*n* = 86)	In person	28	32.6
	Telephone: subject	11	12.8
	Telephone: mother	28	32.6
	Telephone: father	4	4.7
	Complete refusal	3	3.5
	Lost to follow-up	6	7.0
	No response	6	7.0
Overall response rate		71	82.6
Type of information obtained (*n* = 71)	Height and weight, EDE in person	28	39.4
	Height, weight, and treatment history reported by parent by telephone	32	45.1
	Height, weight, treatment history reported by subject by telephone	3	4.2
	Height, weight, EDE by telephone	8	11.3

Note: EDE = Eating Disorder Examination.

TABLE 2
Lost Cases Analysis

	No Follow-up Data	EDE Not Obtained	EDE Obtained
Age at baseline	14.8 (1.6) (*n* = 15)	15.4 (1.7) (*n* = 36)	15.1 (1.6) (*n* = 35)
EDE score at 12 mo	0.91 (1.41) (*n* = 12)	1.14 (1.32) (*n* = 25)	1.56 (1.35) (*n* = 32)
BMI at 12 mo	19.94 (2.73) (*n* = 12)	19.74 (2.13) (*n* = 24)	20.00 (1.78) (*n* = 32)

Note: EDE = Eating Disorder Examination; BMI = body mass index.

required admission to hospital since the study ended, and 7% (*n* = 5) had required residential treatment for AN. Furthermore, one subject who was above 85% ideal body weight at the end of the study relapsed below this weight at follow-up, and one subject who was below this weight threshold at 12 months was above it at follow-up. Most were not currently treated with psychotherapy (73%) or medication (66%), but many had received some type of therapy (61%) or medication (52%) at some point since the end of the study. Of those treated with medication, 69% were being treated for diagnoses other than AN including depression, obsessive-compulsive disorder, anxiety disorders, bipolar disorder, and bulimia nervosa.

DISCUSSION

Our hypothesis that there would be no differences between the short and long versions of family treatment at long-term follow-up was supported by the findings of this study. No statistical differences were detected between the two groups at a mean of almost 4 years after the end of treatment. Furthermore, there was no evidence of increased treatment utilization by the shorter-term treatment group in terms of psychotherapy, medication, or hospitalization. Thus, it is reasonable to conclude that a short course of FBT is as effective as a longer one both at the end of treatment and at long-term follow-up. However, it is noteworthy that on all of the variables examined, the raw scores and percentages favor longer-term treatment, especially for EDE results. Nevertheless, it is unlikely that these findings have clinical significance because the mean scores for both groups on the EDE subscales fall within the published community mean scores for the instrument (Fairburn and Cooper, 1993).

We predicted that there would be no moderators for long-term follow-up. We expected this in part because the overall outcomes at the end of treatment were promising in both groups, even though at the 12-month outcome point, two subgroups (i.e., those with non-intact families, those with higher levels of obsessive thinking about food and weight) appeared to benefit from longer treatment, there was a reasonable probability that the impact of these variables may diminish over time. Our findings suggested that there were no moderators of maintenance that would differentiate the two treatments on follow-up.

TABLE 3
Comparison of Long- and Short-Term Treatment at Follow-up

	Short	Long	ES (95% CI)	AUC (%)	NNT
BMI	20.57 (2.03) (*n* = 37)	20.74 (2.25) (*n* = 34)	0.08 (−0.39–0.54)	52	22
Global EDE	1.34 (1.36) (*n* = 20)	0.91 (1.04) (*n* = 15)	0.35 (−0.33–1.01)	60	5
EDE restraint (norm = 0.79 + 0.97)[a]	1.04 (1.60) (*n* = 20)	0.52 (0.76) (*n* = 15)	0.40 (−0.29–1.06)	61	4
EDE eating concern (norm = 0.20 + 0.51)[a]	0.50 (0.94) (*n* = 20)	0.44 (0.93) (*n* = 15)	0.06 (−0.61–0.73)	52	30
EDE shape concern (norm = 1.14 + 0.98)[a]	1.97 (1.57) (*n* = 20)	1.36 (1.43) (*n* = 15)	0.40 (−0.28–1.07)	61	4
EDE weight concern (norm = 1.00 + 0.87)[a]	1.86 (1.74) (*n* = 20)	1.32 (1.48) (*n* = 15)	0.33 (−0.35–1.00)	59	5

Note: Data presented as means with SDs. ES = effect size; CI = confidence interval; AUC = area under the curve (probability that a long-term subject will have a better outcome than a short-term subject); NNT = number of additional subjects needed to treat to find one additional subject who would benefit from longer treatment; EDE = Eating Disorder Examination.
[a]Fairburn and Cooper, 1993.

	Short	Long	Pearson Γ^2/T Statistic	P Value
Any psychological treatment	24/36	17/31	0.98	.32
Current psychological treatment	11/36	7/31	0.54	.46
Any medications	18/36	17/31	0.16	.69
Current medications	11/36	12/31	0.49	.48
Admission to hospital after study	5/36	5/31	0.07	.80

We also predicted that the overall outcomes of the group as a whole would be good based on the generally positive outcome of the group at the end of treatment as well as the evidence that FBT effects were enduring in the only other long-term follow-up study of FBT for adolescent AN. Indeed, the average BMIs and EDE scale scores of the group as a whole were in the normal range. At follow-up, 89% (63/71) were >90% of ideal body weight and 74% (26/35) were within the adult norms on all subscales of the EDE. Only 9.5% (4/42 eligible females) had amenorrhea, and 5.6% were <85% of ideal body weight. In addition, in contrast to some previous studies suggesting high rates of bulimia nervosa in subjects treated for AN, we found conversion to bulimia nervosa or binge eating to be low (about 9%). Furthermore, relapse to extremely low weight was low (one subject), whereas general psychosocial functioning of the group as a whole was high, with almost the entire sample either working or in school.

There are a number of strengths of this study that increase the credibility of the findings. First, the initial study was designed to have adequate power to detect a moderate difference between the two treatments, and most of the original sample (83%) was assessed to some extent at follow-up (Kraemer and Thienemann, 1987). Second, during the treatment phase, manuals were used for the two levels of therapy, helping to ensure that treatments were consistently and accurately applied (Lock et al., 2001). Third, the quality of the therapy was closely monitored to ensure fidelity to the treatment type and to

the intensity and duration of its application. Fourth, the follow-up interviews were conducted by researchers not involved in the end of treatment assessments, thereby limiting expectation bias.

Limitations

There are a number of important limitations of this study. As noted in our previous work, the study sample consisted of participants who agreed to family treatment from referrals to a tertiary treatment center for eating disorders (Lock et al., 2005). In addition, the

TABLE 5
Summary of Clinical Outcomes

	Short	Long	Total	Overall %
Current psychological treatment				
(total, $n = 67$; short, $n = 36$; long, $n = 31$)				
None	25	24	49	73.1
Individual	6	4	10	14.9
Combination	2	0	2	3.0
Non-ED related	3	3	6	9.0
Any psychological treatment				
(total, $n = 67$; short, $n = 36$; long, $n = 31$)				
No	12	14	26	38.8
Yes	24	17	41	61.2
Current medications				
(total, $n = 67$; short, $n = 36$; long, $n = 31$)				
No	25	19	44	65.7
Yes	11	12	23	34.3
Any medications				
(total, $n = 67$; short, $n = 36$; long, $n = 31$)				
No	18	14	32	47.8
Yes	18	17	35	52.2
Additional diagnoses by self-report				
(some have >1 diagnosis)				
(total, $n = 67$; short, $n = 36$; long, $n = 31$)				
None	22	18	40	59.7
Attention-deficit/ hyperactivity disorder	1	1	2	3.0
Anxiety (not obsessive- compulsive disorder)	4	2	6	9.0
Depression	8	8	16	23.9
Binge eating	1	0	1	1.5
Bipolar	0	2	2	3.0
Bulimia	2	3	5	7.5
OCD	3	3	6	9.0
Residential treatment following study				
(total, $n = 70$; short, $n = 37$; long, $n = 33$)				
None	32	31	63	90.0
Yes	4	1	5	7.1
Non-ED related	1	1	2	2.9

TABLE 5
Continued

	Short	Long	Total	Overall %
Admissions to hospital				
(total, *n* = 67; short, *n* = 36; long, *n* = 31)				
0	31	26	57	85.1
1	2	3	5	7.5
2	0	1	1	1.5
≥3	2	0	2	3.0
Non-ED related	1	1	2	3.0
Change in family structure				
(total, *n* = 67; short, *n* = 36; long, *n* = 31)				
None	14	12	26	38.8
Moved out of the home	21	15	36	53.7
Parents separated	1	4	5	7.5
Psychosocial functioning				
(total, *n* = 71; short, *n* = 37; long, *n* = 34)				
Attending college	20	13	33	46.5
Attending high school	9	10	19	26.8
Working full-time	1	3	4	5.6
Working part-time	1	0	1	1.4
Attending school and working part-time	7	6	13	18.3
Not working or going to school	0	1	1	1.4
Weight (total, *n* = 71; short, *n* = 37; long, *n* = 34)				
IBW <85%	3	1	4	5.6
85% < IBW < 90%	2	2	4	5.6
IBW >90%	32	31	63	88.7
BMI <17.5	3	2	5	7.0
17.5 < BMI < 20.0	10	10	20	28.2
BMI >20	24	20	44	62.0
Menses in past 6 mo				
(total, *n* = 60; short, *n* = 32; long, *n* = 28)				
Menstruation return	20	18	38	90.5 (38/42)
Amenorrhea	3	1	4	9.5 (4/42)
Birth control pills	9	9	18	30 (18/60)

Note: ED = eating disorder; IBW = ideal body weight; BMI = body mass index.

conclusions pertain to help-seeking families willing and able to participate in FBT. Furthermore, the socio-economic status of the sample and education of the parents were on average higher than expected in the general community, although they were similar to many samples of participants with AN. The treatment setting also is characterized by having the availability of medical hospitalization for acutely ill subjects and expert medical treatment for the medical problems associated with AN that may affect outcome. It is also unclear what role psychiatric medications and expectation effects of participation in a treatment study had on follow-up outcome.

Data were obtained indirectly (through parents) in many cases because of the difficulty of contacting the subjects who were often away at college at this point. Furthermore, even among those subjects contacted directly, some assessments were conducted by telephone rather than in person. It is possible that some of these subjects provided inaccurate information. Face-to-face evaluations, especially for weight outcomes, would have provided substantially more confidence in the findings. Finally, the norms used on the EDE are based on an adult sample because adolescent means are not available.

Clinical Implications

The results of this follow-up study suggest several important conclusions. First, FBT in a short course is likely an effective intervention with a lasting impact on adolescents with short-duration AN. Although this finding needs to be replicated, the main clinical implication of this finding is that FBT may well be a cost-effective intervention that delimits the course of the illness, helping to reduce the likelihood of a more chronic and devastating course (Lock, 2003; Streigel-Moore et al., 2000). Second, the study suggests that although there may be important moderators operating early in treatment such as family structure or obsessive thinking related to eating and weight, their long-term impact appears negligible.

It is also noteworthy that the results of both the original study and the follow-up study provide strong support for the effectiveness of FBT for AN in adolescents compared with findings from randomized, controlled trials in adults (Le Grange and Lock, 2005). Of note, adolescent subjects are more easily recruited and retained in treatment studies involving FBT as compared with adults in treatment studies for AN, with retention rates of >80% in adolescent studies compared to barely 50% in adult studies (Halmi et al., 2005). In addition, adolescents appear to be more responsive to FBT compared to any treatments proposed for adults both at the end of treatment and at follow-up (Le Grange and Lock, 2005).

It has been suggested that adolescents with AN are easier to treat than adults with the disorder, and this is likely true for several reasons. They are not chronically ill, they have parents to help them, and they are more easily compelled to receive treatment because they are dependent minors. At the same time, however, it should not be assumed that

adolescents with AN are easy to treat or remit spontaneously in most cases. Instead, the findings of this study as well as previous studies suggest that adolescents with AN require treatment, including hospitalization for medical problems at alarming frequency, and that even for those who do remit, many take a full year or longer to reach normal body weights, and a substantial proportion have long-standing psychiatric disorders other than AN that will likely complicate their long-term prognosis in terms of overall mental health. What differentiates less responsive subjects from those who do improve unfortunately remains elusive. Thus, although there is some reason for optimism about treating adolescents with nonchronic AN using FBT, this must be tempered with the reality of the illness and its potential for long-term devastating effects in a significant subset.

For the clinician, there are also additional implications to consider. For example, although in FBT little focus is placed on treating the putative psychological etiology of AN, benefits of the treatment appeared to be stable at follow-up. This suggests that a treatment that primarily focuses on symptom management can lead to lasting improvements in terms of the primary problems associated with AN. Thus, the concern that by not examining possible psychological meanings of the symptoms of AN, lasting benefits of treatment cannot be expected, seems unwarranted. This is underscored by the fact that in the shorter-term treatment group, most sessions focused on refeeding and weight gain. At the same time, although the psychosocial functioning of the subjects appeared to be high at follow-up, there was nevertheless considerable ongoing psychological and psychiatric difficulty in a significant subset of subjects (40%) unrelated to AN. This finding of longer-term psychological and psychiatric problems, especially depression and anxiety disorders, in subjects recovered from AN is consistent with the longer-term follow-up data from other studies (Herzog et al., 1996). The overall results of this study add additional important evidence about the effectiveness of FBT for adolescent AN and support the further examination of this approach in future studies (Agras et al., 2004).

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