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When eating disorder attitudes and cognitions persist after weight restoration: An exploratory examination of non-cognitive responders to family-based treatment for adolescent anorexia nervosa

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Abstract

Objective: Family-based Treatment (FBT) is a well-established intervention for adolescent anorexia nervosa. Although FBT is efficacious in promoting weight gain and improvements in psychological symptoms, for some adolescents, cognitive/attitudinal recovery lags behind weight gain. This study conducted an exploratory post-hoc analysis of outcomes of adolescents who achieved weight gain by the end of FBT but continued to experience elevated psychological symptoms post-treatment.

Methods: Data were drawn from two randomized controlled trials testing two forms of FBT (conjoint/whole family and parent-focused). Descriptive statistics and generalized estimating equations were used to examine differences in treatment outcomes between non-cognitive responders (those who regained weight but continued to experience psychological symptoms) and

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Data are available from the authors upon reasonable request

full responders (those who achieved both weight and cognitive restoration by the end of treatment) ($n = 80$; 83.7% female, $Age_{mean} [SD] = 14.66 [1.73]$).

Results: By 12 months post-treatment, there were no differences in weight between non-cognitive responders and full responders. However, non-cognitive responders had a slower trajectory of weight gain than full responders and continued to have elevated levels of psychological symptoms throughout the follow-up period.

Conclusions: A subset of adolescents appear to continue to experience clinically significant levels of eating pathology up to 12 months after FBT even when weight restoration is achieved.

Keywords

anorexia nervosa; family-based treatment; weight gain; cognitive recovery; full response; psychological symptoms

Introduction

Family-based Treatment (FBT) is currently considered a first-line treatment for adolescent anorexia nervosa (AN) and can be delivered with the whole family present (FBT) or with the parents only while the adolescent is monitored by a nurse for medical and psychiatric stability (Parent Focused Therapy-PFT) (Couturier et al., 2020; Hilbert et al., 2017; Lock & Le Grange, 2019). The central aim of FBT in both these delivery formats is to support the parents/caregivers in their efforts to facilitate weight restoration and normalization of eating (Lock & Le Grange, 2015). Randomized controlled trials (RCTs) testing the efficacy of FBT indicate that approximately 40% of adolescents who undergo FBT reach full remission from AN (defined as the achievement of 95% of expected body weight (EBW) and a decrease in eating disorder (ED) cognitions such that they fall less than 1 *SD* above published norms) by the end of treatment (EOT), while approximately 75% achieve weight restoration of at least 85% EBW (Le Grange et al., 2016; Lock et al., 2010). However, since partial remission has historically been defined by weight restoration and not by a reduction in ED cognitions/attitudes, it is unclear how many individuals who achieve at least 85% EBW at EOT continue to have elevated ED cognitions and whether this impacts longer-term outcomes.

Although FBT first targets weight restoration in order to facilitate cognitive recovery (Lock & Le Grange, 2015), both families and therapists describe significant challenges in striving for weight restoration in the context of high adolescent distress related to weight gain and normalization of eating (Sibeoni et al., 2017). Sibeoni and colleagues (2017) found that although clinicians were more likely to cite treatment goals focused on weight gain and behavior change, parents and adolescents were also concerned with immediate psychological and social functioning, including ED cognitions. These complementary yet distinct goals may explain why some clinicians might feel somewhat hesitant delivering FBT (Aradas et al., 2019). However, the prioritization of weight restoration, which is enhanced by parental self-efficacy, may be a pivotal part of the overall efficacy of the treatment (Hughes et al., 2019).

Empirically, FBT outperforms other more generalized treatments in facilitating weight restoration by EOT but does not demonstrate a clear advantage over other treatments in facilitating cognitive recovery (c.f. Murray et al., 2019). Indeed, survival analyses indicate that during FBT, cognitive recovery may take twice as long as weight restoration (22.6 months vs. 11.3 months after beginning treatment, respectively) (Couturier & Lock, 2006a). However, the topic of cognitive change after weight restoration in FBT and related family therapies, such as PFT, deserves additional study. Thus, the purpose of the current exploratory study was to assess the occurrence of “non-cognitive” response to family-based treatment (i.e., achievement of at least 85% EBW by EOT but persistent elevated levels of ED cognitions/attitudes), and to evaluate whether cognitive recovery at the end of family therapy was predictive of longer-term outcomes by 12 months post-EOT.

Method

Participants and procedure

We conducted secondary analysis of original data from two RCTs of evidence-based treatment for AN in the United States (US) and Australia (AU); full descriptions of the study samples and procedures can be found in the main outcome reports (c.f., Le Grange et al., 2016; Lock et al., 2010). Participants aged 12–18 who met DSM-IV or DSM-5 criteria for AN (American Psychiatric Association, 2000, 2013) were randomized to one of three active treatment types: conjoint FBT, Parent Focused Therapy (PFT); or Adolescent Focused Therapy (AFT). Australian participants received either FBT or PFT for 18 sessions over a six-month period and U.S. participants received FBT for 24 sessions over a 12-month period. The rationale for including participants from these two studies despite these differences in format and dose is that there is no evidence that treatment efficacy for FBT differs based on whether it is delivered in a six- or 12-month format (Lock et al., 2005), and PFT uses the same interventions as conjoint FBT. In addition, the RCT comparing conjoint FBT and PFT, while reporting differences at EOT, found no differences in outcome during the follow-up period (Le Grange et al., 2016). From here on, we use the term FBT to denote participants who received either conjoint FBT or PFT. We did not include those who received AFT in our analyses given that it is an individual therapy rather than a family-based approach. Our initial dataset at baseline comprised 167 adolescents stratified by treatment type and country, as follows: US FBT ($n = 61$); AU FBT ($n = 55$); AU PFT ($n = 51$). US participants were 74% White, 12% Asian, 10% Hispanic and 5% Other. AU participants were categorized as Australian born (92.5%) or born outside Australia (7.5%).

Diagnoses and ED symptom report were determined by Eating Disorder Examination (EDE; Cooper & Fairburn, 1987) interview. Percent expected body weight (%EBW) was calculated in reference to the 50th body mass index percentile based on the adolescent’s age, height, weight, and sex. Institutional review boards at the respective participating institutions approved the original study protocols, and all parents/caregivers and adolescents provided informed consent and assent, respectively.

Statistical Analysis

Of the initial 167 participants at baseline, 149 (89%) completed assessment at EOT. See Table 1 for a breakdown of all participants grouped by their EDE global score and %EBW at EOT. A subset of individuals was classified as non-cognitive responders, (NCR; $n = 25$), who met established weight criteria for partial remission by EOT (i.e., 85% EBW) but continued to have elevated EDE global scores 1 *SD* above published norms (i.e., > 1.59). To explore whether NCR differed from adolescents who experienced both weight and cognitive restoration, the final analytic sample ($n = 80$, 83.7% female, $Age_{mean} [SD] = 14.66 [1.73]$) was defined by individuals meeting criteria at EOT for the following two groups; (i) NCR and (ii) full responders (FR; $n = 55$), who met full criteria for remission by EOT (i.e., 95% EBW, and EDE global < 1.59). Individuals who achieved $< 85\%$ EBW by EOT ($n = 30$) or who achieved between 85–95% EBW but had an EDE global score < 1.59 ($n = 39$) were not included in the analyses. Descriptive statistics were calculated using *t*- and chi-square tests to evaluate between-group (NCR v. FR) differences in clinical and demographic features at EOT, and between-group differences in %EBW and EDE Global scores at EOT, six and 12 months post-EOT. To examine whether participants received additional treatment after FBT, follow-up treatment was categorically coded (1 = yes, 0 = no) for report of engaging in any of the following treatment modalities between EOT and 12 months after the end of family therapy: hospitalization; individual, group, family or couples' therapy; nutritional counseling.

Separate generalized estimating equations (GEEs) were estimated to examine the trajectories of changes in %EBW and EDE global for NCR during the follow-up period. We also explored the extent to which these changes differed by whether individuals were classified as NCR or FR. Each GEE included effects of Group status at EOT (NCR v. FR), Time (months since EOT), and their interaction (Group X Time) as predictors of [for Model 1]: %EBW (measured at EOT, six and 12 months post-EOT), and [for Model 2]: EDE global scores (measured at EOT, six and 12 months post-EOT). To capture potential non-linear changes in %EBW and EDE global, GEEs included both linear and quadratic terms of time and their interactions with Group. Each GEE specified an AR1 serial autocorrelation to account for the dependence within the nested data; a linear function was used to model changes in %EBW, while a gamma link function was used to model changes in EDE global scores given the skewed distribution of this outcome. Given significant between-group (NCR v. FR) differences at EOT, gender and receipt of additional treatment between EOT and 12 months (yes/no) were included as covariates in both models. Analyses were conducted with SPSS version 27. Due to the exploratory nature of the study, all *p*-values should be interpreted as guidelines for associations that warrant further attention, and not as they would in a hypothesis-testing study.

Results

Non-cognitive responders ($n = 25$) comprised approximately 17% of the total available EOT sample ($n = 149$). Sixty-four percent of NCR achieved 95% EBW by EOT ($n = 16$), but with an average EDE global score of 2.89, $SD = 1.00$, they fell short of meeting criteria for full remission (defined as an EDE global score < 1.59).

There were no significant differences between NCR and FR in length of treatment (six months v. 12 months), type of treatment (FBT v. PFT), age, illness duration, or presence of a comorbid psychiatric diagnosis, ($p > .05$). There was a greater proportion of girls in the NCR vs. FR group (100% v. 76.4%, respectively; $p = .008$). Participants in the NCR group were more likely to have received follow-up treatment compared to those in the FR group (80.0% vs. 43.6%, respectively; $p = .002$). Descriptive characteristics are shown in Table 2.

Body Weight

GEE results indicated that although NCR achieved clinically significant weight gain by EOT (%EBW_{mean} [SD] = 95.65 [5.85]), they demonstrated lower %EBW than those in the FR group across time (Table 3, Model 1). However, by 12 months post-EOT, there were no significant between group differences between NCR and FR. There were no other significant main or interaction effects observed for weight outcomes.

Eating Disorder Symptoms

GEE results for Model 2 showed significant main effects for Group, Time (linear component), and interactions between Group and Time (both linear and quadratic components). Those who were in the NCR group showed consistent improvement, with decreases in EDE global scores over time, whereas the FR group initially showed an increase in EDE global scores, followed by a decrease by 12 months post-EOT. However, NCR continued to have significantly higher EDE global scores than FR throughout the follow-up period ($p < .001$ at all time points), which never fell below the threshold of 1.59. There was also a significant main effect of sex as a covariate, with girls reporting higher EDE global scores over time relative to boys. Follow-up treatment was not significantly associated with change in EDE global scores.

Discussion

The current study examined outcomes of adolescents with AN who completed FBT in two RCTs and achieved at least partial weight remission but continued to have high levels of ED cognitions and attitudes (i.e., NCR), with the goal of empirically examining their cognitive and weight-related outcomes by 12 months post-EOT. Our results indicated that while NCR showed consistent improvements in ED symptom severity scores over time, their scores remained greater than 1 *SD* above published norms. This pattern was evidenced despite a high proportion of NCR having additional treatment during the 12 months following FBT.

First, this study confirms the existence of NCR, as one-fourth of individuals in partial remission and 17% of the total EOT sample met criteria for this category. Although the results of this study suggest that, in general, NCR continued to experience improvements in ED cognitions as time progressed, these youth scored more than 1 *SD* above community norms on the EDE (Couturier & Lock, 2006b; Lock et al., 2010) even when, on average, 85–95% EBW had been sustained for 12 months post-EOT. Thus, it is unsurprising that NCR were more likely than FR to obtain additional treatment after FBT had ended. Nevertheless, we found no association between additional treatment and EDE improvement. Although most youth do not appear to need FBT longer than 12 months, and many benefit from an

even shorter course of treatment (Lock et al., 2005), those who do not achieve cognitive remission by EOT may experience some cognitive improvement post-treatment but do not, on average, achieve normalization according to EDE norms even after sustained weight restoration. Indeed, the majority of NCR met the 95% EBW criteria at EOT and at each follow-up point and were excluded from FR status exclusively because of their high EDE global scores. This is consistent with caregiver report that cognitive remission may take an average of 3.9 years from the onset of the eating disorder (Accurso et al., 2020), and longer follow-up periods may be required to capture cognitive recovery. The results of the present study also indicate that even for youth who struggle with persistent ED cognitions and attitudes, FBT can be successful at achieving sustained weight restoration.

The limitations of this exploratory study include its use of a modest sample which restricts interpretation of p -values and includes data drawn from two RCTs taking place in different countries and treatment environments. As such, although some of our findings suggest between-group differences, the p -values presented should be considered for informational purposes and intended to inspire future research rather than being confirmatory. Other limitations include the lack of racial/ethnic diversity in the sample, the modest sample size, and the follow-up period of only 12 months. Additionally, given the low representation of male participants in this sample, these findings should be replicated in studies that include more gender diversity. In this regard, the outcomes on the EDE specifically should be interpreted with caution as this measure may not reflect ED cognitions for males as well as it does for females (Nagata et al., 2020).

Future research is needed to determine baseline predictors of NCR status as well as to determine whether, like early weight gain predictors, there is a cut point within the context of treatment by which EDE improvement must be observed and, if not, treatment intensified to avoid NCR status at end of treatment. It would also be beneficial to conduct mixture modeling analysis (e.g., latent class analysis) to identify distinct trajectories of recovery after FBT without being bound by specific threshold scores of %EBW or EDE. This approach would suggest new avenues to develop more personalized approaches to treatment with the goal of improving efficacy. Additionally, given that NCR did not differ with regard to weight by 12 months post-EOT, future studies should examine the clinical significance of NCR with longer-term follow up to assess whether it is associated with a higher likelihood of remission, lower quality of life, or other psychiatric comorbidities. This should include qualitative research to investigate the experiences of NCR and their views on treatment. Finally, a large proportion of NCR and over 40% of FR obtained additional treatment post-FBT, but the nature and purpose of that treatment are unclear, which warrants future exploration.

In conclusion, the present study demonstrates that a significant minority of youth receiving FBT achieve weight restoration but continue to have high levels of ED cognitions. Although these individuals experience decreases in ED cognitions and attitudes post-FBT, that decrease is slow and may take an extended period of time to reach non-clinical levels. Additional, targeted treatment for these individuals may improve outcomes, but it remains unclear what form this treatment should take. Additional FBT intervention is unlikely to change this parameter. One option is to consider adding CBT-E after FBT for these young

persons as some studies suggest it might be useful (Dalle Grave et al., 2019; Le Grange et al., 2020).

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Highlights

- Family-based treatment (FBT) for adolescent anorexia nervosa is efficacious in promoting weight gain and improvements in psychological symptoms, but for some adolescents, cognitive/attitudinal recovery does not accompany weight gain.
- Seventeen percent of participants in two randomized controlled trials of FBT achieved weight restoration by the end of family-based treatment but continued to experience elevated psychological symptoms.
- These “non-cognitive responders” to FBT had a slow trajectory of weight gain and continued to have elevated levels of psychological symptoms up to 12 months after finishing FBT.

Table 1.

Rates of Response to Family-Based Treatment by Remission Group

Timepoint	Full Responders	Partial Remission		No Remission	Total <i>n</i>
		Non-Cognitive Responders	Non-Weight Responders		
<i>n</i> (% of Total)					
EOT	55 (36.91)	25 (16.78)	39 (26.17)	30 (20.14)	149
6-mo	52 (36.62)	23 (16.20)	39 (27.46)	28 (19.72)	142
12-mo	51 (41.46)	19 (15.45)	30 (24.39)	23 (18.70)	123

Note: FR = Full responder (< 95% EBW and EDE global score < 1.59); NCR = Non-cognitive responder (< 85% EBW and EDE global score > 1.59); NWR = Non-weight responder (85–95% EBW and EDE global score < 1.59); NR = No remission (< 85% EBW)

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Table 2.

Descriptive Characteristics for Non-cognitive Responders and Full Responders

	<i>M (SD)</i>		<i>P</i>	<i>Cohen's D</i>	95% CI
	NCR (<i>n</i> = 25)	FR (<i>n</i> = 55)			
Age	15.11 (1.69)	14.46 (1.72)	.12	1.71	- 0.86, 0.10
Duration of Illness (months)	10.76 (7.06)	10.33 (8.10)	.82	7.79	-0.53, 0.42
Treatment group <i>n</i> (%FBT)	19/25 (76.0)	33/55 (60.0)	.16		
Country of origin <i>n</i> (%US)	7/25 (28.0)	21/55 (38.0)	.38		
Gender <i>n</i> (% female)	25/25 (100)	42/55 (76.4)	.008		
Follow-up treatment <i>n</i> (% yes)	20/25 (80.0)	24/55 (43.6)	.002		
	<i>M (SD)</i>		<i>P</i>	<i>Cohen's D</i>	95% CI
%EBW					
EOT	<i>NCR (n = 25)</i>	<i>FR (n = 55)</i>			
	95.65 (5.85)	100.73 (5.64)	< .001	5.71	0.40, 1.38
6-m	<i>NCR (n = 23)</i>	<i>FR (n = 52)</i>			
	94.68 (11.04)	99.63 (9.05)	.045	9.69	0.01, 1.01
12-m	<i>NCR (n = 19)</i>	<i>FR (n = 51)</i>			
	96.33 (10.97)	98.31 (98.43)	.39	9.12	- 0.30, 0.76
EDE Global Score					
EOT	<i>NCR (n = 25)</i>	<i>FR (n = 55)</i>			
	2.89 (1.00)	.24 (.31)	< .001	0.61	-5.15, -3.50
6-m	<i>NCR (n = 18)</i>	<i>FR (n = 48)</i>			
	2.13 (1.41)	.34 (.61)	< .001	0.89	-2.64, -1.35
12-m	<i>NCR (n = 15)</i>	<i>FR (n = 47)</i>			
	2.19 (1.50)	.29 (.46)	< .001	0.83	-3.01, -1.58

Note: %EBW = percent estimated body weight; EDE = Eating Disorder Examination; NCR = non-cognitive responders, i.e., those who were 85% EBW, and EDE Global score > 1.59 at EOT; FR = full-responders, i.e., those who were 95% EBW, and EDE Global < 1.59 at EOT; US = United States; FBT = family-based treatment; EOT = end-of-treatment

Table 3.

Generalized estimating equations predicting %EBW and EDE Global scores

Variable	<i>B</i>	<i>SE</i>	95% CI	Wald χ^2	<i>p</i>
Model 1: %EBW					
Intercept	102.44	1.86	98.80, 106.08	3044.14	< .001
Group	- 3.67	1.71	- 7.01, - .32	4.62	.03
Time					
Time	- 0.17	0.28	- 0.72, 0.37	0.39	.53
Time ²	0.003	0.02	- 0.03, 0.40	0.03	.87
Group x Time					
Group x Time	- 0.23	0.49	- 1.19, 0.74	0.22	.64
Group x Time ²	0.02	0.04	- 0.05, 0.09	0.30	.58
Gender	- 1.09	1.88	- 4.77, 2.60	0.33	.56
Follow-up treatment	- 2.29	1.80	- 5.81, 1.23	1.62	.20
Model 2: EDE Global					
Intercept	- 2.46	0.34	- 3.12, - 1.79	52.83	< .001
Group	2.26	0.22	1.82, 2.69	104.18	< .001
Time					
Time	0.12	0.06	0.006, 0.24	4.21	.04
Time ²	- 0.009	0.005	- 0.12, 0.001	3.26	.07
Group x Time					
Group x Time	- 0.20	0.07	- 0.33, - 0.06	8.40	.004
Group x Time ²	0.01	0.006	0.002, 0.02	5.67	.02
Gender	1.04	0.40	0.25, 1.82	6.71	.01
Follow-up treatment	0.32	0.26	- 0.20, 0.84	1.49	.22

Note: %EBW = percent estimated body weight; EDE = Eating Disorder Examination. Group refers to those who were considered either fully remitted at end-of-treatment (i.e., those who were 95% EBW, and EDE Global < 1.59, versus non-cognitive responders (i.e., those who were 85% EBW, and EDE Global score > 1.59). For GEE analyses, those who were fully remitted were considered the reference group.