

Family-based treatment with cognitive behavioural therapy for anorexia

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Key words

adolescent, anorexia nervosa (AN), cognitive behavioural therapy (CBT), family based treatment (FBT), perfectionism.

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Abstract

Objective: To evaluate symptom change among adolescents with anorexia nervosa (AN) receiving a novel program of family based treatment (FBT) combined with a cognitive behavioural therapy (CBT) module on perfectionism (FBT + CBT-P).

Methods: A cohort study was conducted with 21 adolescents with AN who entered FBT + CBT-P; 19 adolescents completed treatment (an average of 32 sessions). Participants completed four repeated assessments over 1 year, which included measures of eating disorder symptoms and perfectionism, self-orientated perfectionism, and socially prescribed perfectionism (SPP).

Results: Using intent-to-treat analyses, group means showed significant increases in weight, and decreases in symptoms and perfectionism (except SPP) at the third assessment (following CBT) and at the end of FBT + CBT-P treatment, relative to pre-treatment. Of the completing participants, more than half improved on all measures (except SPP), and all participants improved in weight.

Discussion: FBT + CBT-P was associated with average declines in adolescents' eating disorder symptoms and perfectionism, and improvements in perfectionism were associated with improvements in eating disorder symptoms. A randomised controlled trial should be conducted to compare the efficacy of FBT to FBT + CBT-P, including follow-up to assess length and rate of symptom remittance or time to relapse.

Key Points

- 1 Family based treatment (FBT), commonly used to treat adolescents with AN, could be enhanced with the addition of cognitive behavioural therapy (CBT) to address cognitive distortions, such as rigid perfectionism (CBT-P).
- 2 A series of 21 adolescents diagnosed with AN were treated with a 1-year FBT + CBT-P intervention.
- 3 The FBT + CBT-P intervention was associated with significant improvements in eating disorder symptoms, weight and perfectionism after the addition of

the CBT-P module and at the end of treatment, relative to pre-treatment.

Introduction

Despite research that shows family-based treatment (FBT) for adolescent anorexia nervosa (AN) is efficacious, only approximately 50% of sufferers experience full remission of symptoms as an outcome of treatment (Madden et al., 2015). In one recent meta-analysis of FBT studies, it was concluded that, "there is insufficient evidence to be able to determine whether family therapy offers any advantage over other types of psychological interventions, or whether one type of family therapy is

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more effective than another" (Fisher, Hetrick, & Rushford, 2010, p. 23). In a second and more recently published meta-analysis, Couturier, Kimber, and Szatmari (2013) investigated the efficacy of family therapy (including FBT) compared with individual treatment when provided to adolescents with an eating disorder (AN, bulimia nervosa, and eating disorder-not otherwise specified). The outcome measure was remission rate, defined as the absence of DSM-IV-TR criteria, attainment of certain % ideal body weight and abstinence from binge eating and purging. Couturier et al. also concluded that there was insufficient evidence to suggest that FBT (and family therapy variants) is superior to other psychological therapies when assessed directly post-treatment.

Despite the conclusions of these two meta-analyses (Couturier et al., 2013; Fisher et al., 2010), there was evidence that FBT was superior to individual therapy at 6- or 12-month follow up. Given this, Couturier et al. (2013) proposed that young people within the FBT group probably have continued support from their parents after treatment ends, with parents acting as proxy therapists. They argued that this continued support assists adolescents with further recovery, compared to when individual therapy is the only intervention. Given that there was no difference in FBT and individual therapy directly post-treatment in these meta-analyses (Couturier et al., 2013; Fisher et al., 2010) but that FBT was found to be superior to individual treatment when follow-up was conducted months after the end of treatment, FBT combined with individual treatment may be a direction forward to possibly elevate the remission rate and increase maintenance of treatment outcome. The aim of this study was to conduct a pilot case series and a feasibility study of such a treatment, which augmented FBT with cognitive behavioural therapy (CBT) focused on perfectionism (FBT + CBT-P).

FBT is designed to involve the family in the supervision of the adolescents' eating behaviour, eventually giving back eating control to the adolescent, as weight is closer to restored and there is a decline in symptoms. Given that FBT is focused on the management of eating behaviour and family interactions, it does not directly address adolescents' maladaptive ways of thinking (cognitions) and emotional responses. It is these maladaptive patterns that are thought to directly reinforce and maintain adolescents' eating disorders, perhaps resulting in poor treatment response or relapse (Hurst & Zimmer-Gembeck, 2015; Lock, 2010). The cognitive, affective and behavioural patterns expected to have adverse consequences for AN recovery include obsessional thoughts, inflexibility, and low tolerance to distress, as well as perfectionism, black-and-white thinking, and excessive fear

of mistakes or failure. Of these cognitive patterns, perfectionism, in particular, has been described as a transdiagnostic process that is either a risk or a maintaining mechanism for many forms of psychopathology, including AN (Egan, Wade, & Shafran, 2011).

Perfectionism has been defined in many different ways, with early research defining it as unidimensional and inherently maladaptive and dysfunctional (Burns, 1980). However, over the past two decades it has been described as multidimensional (e.g., Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt, Flett, Turnbull-Donovan, & Mikail, 1991). Egan et al. (2011) described the cognitive behavioural model of clinical perfectionism as involving a range of factors including "the role that performance related behaviour, including performance checking (e.g., constantly comparing performance to others), avoidance, procrastination, and counterproductive behaviours (e.g., being over-thorough, checking) has in maintaining the cycle of clinical perfectionism" (p. 203; see also Shafran, Cooper, & Fairburn, 2002; Shafran, Egan, & Wade, 2010). In another description of perfectionism, Hewitt et al. (1991) identified self-oriented perfectionism as divergent from socially prescribed perfectionism. Self-oriented perfectionism was defined as setting high personal standards and harshly evaluating progress or achievement through self-criticism and self-punishment. Self-oriented perfectionism is associated with a motivational component of striving to attain perfection, in addition to striving to evade failure. In contrast, socially prescribed perfectionism is more interpersonal in orientation and incorporates the perception that significant others impose unrealistic standards on the individual, expecting perfection in behaviour and outcomes. Individuals high in socially prescribed perfectionism strive to avoid the disapproval of others and have an excessive fear of negative evaluation by others.

Perfectionism is believed to reinforce persistent engagement in AN behaviours, such as unrelenting dietary restriction and incessant striving for a "perfect" weight or shape, and a continued perception of personal failure and negative evaluation by others (Bardone-Cone et al., 2007; Fairburn, Cooper, & Shafran, 2003). In a pilot study of adolescents ($n = 40$; aged 14–17 years) who received specialist inpatient treatment for eating disorders, Vall and Wade (2016) investigated predictors, moderators, and mediators of outcome and readmission. They concluded that perfectionism was important in predicting several outcomes (e.g., weight, eating pathology, quality of life, and readmission). Specifically, they stated that "perfectionism may be harmful if left unchecked" and "one potentially useful approach would be to target perfectionism in an effort to neutralise its harmful side

effects in the maintenance of ongoing psychopathology while redirecting the desire to achieve high standards away from AN and towards achievable standards in other life domains that have been sidelined by illness" (p. 7).

CBT is one approach that has been found to be successful at addressing cognitive distortions, such as rigid perfectionism (Shafran et al., 2002). In one meta-analysis (Lloyd, Schmidt, Khondoker, & Tchanturia, 2014), it was concluded that reducing adults' perfectionism through CBT is possible even in short interventions across a range of psychiatric diagnoses. Further, such findings were described as consistent with theory implicating biased cognitive processes in the development and maintenance of perfectionism. This review included studies involving participants with a range of psychiatric diagnoses, with evidence not only for reductions in perfectionism but also symptoms of anxiety, depression, and eating disorders. It was suggested that, "these findings build upon evidence concerning the transdiagnostic nature of perfectionism (Egan et al., 2011) and support theory suggesting that, targeting perfectionism may be effective in reducing symptoms across a range of disorders (Bieling, Israeli, & Antony, 2004; Shafran et al., 2002)" (Lloyd et al., 2014, p. 726). Based on such research, it has been hypothesised that reducing perfectionism would improve eating disorder symptoms and rates of recovery (Hurst & Zimmer-Gembeck, 2015).

Unfortunately, as highlighted, there is inconsistent evidence for the effectiveness of psychological therapies for AN. In a recent systematic review of 16 studies, the effectiveness of CBT for AN was synthesised and appraised (Galsworthy-Francis, 2014). The evidence suggested that "CBT demonstrated effectiveness as a means of improving treatment adherence and minimising drop-out amongst patients with AN. While CBT appeared to demonstrate some improvements in key outcomes (body mass index, eating-disorder symptoms, broader psychopathology), it was not consistently superior to other treatments (including dietary counselling, non-specific supportive management, interpersonal therapy, behavioural family therapy)" (Galsworthy-Francis, 2014, p. 55).

With the aim of improving treatment outcomes and long-term recovery rate, some therapeutic approaches for adolescents with eating disorders are beginning to incorporate strategies to address potential maintaining mechanisms, such as perfectionism. For example, in a series of studies of enhanced CBT (CBT-E; Dalle Grave, Calugi, Doll, & Fairburn, 2013; Dalle Grave, Calugi, El Ghoch, Conti, & Fairburn, 2014; Dalle Grave, Calugi, Sartirana, & Fairburn, 2015), CBT-E had demonstrated effectiveness for adolescents with AN. In CBT-E, the

psychological and behavioural mechanisms that underlie and maintain the eating disorder were targeted by (1) addressing the core psychopathology of the over-evaluation of shape and weight; (2) improving coping mechanisms to deal with events and moods which affect eating; (3) if indicated, addressing core maintaining mechanism of clinical perfectionism, core low self-esteem, or interpersonal difficulties; and (4) integrating relapse prevention and ongoing treatment planning. In the first of this series of studies (Dalle Grave et al., 2013), 49 adolescent patients ($M_{\text{age}} = 15.5$ years, $SD = 1.3$) received CBT-E at a community based eating disorder clinic over a 40-week period. At the conclusion of treatment, two-thirds of patients had a substantial increase in weight and a marked decrease in eating disorder psychopathology. At follow-up, results were maintained. It was concluded that CBT-E showed its greatest effect in those adolescents that were presenting with maintaining mechanisms, such as perfectionism, as the treatment directly targeted them. In another study (Dalle Grave et al., 2014), 27 adolescents (range 13–17 years) admitted to an inpatient hospital received a 20-week CBT-E treatment program. Patients were assessed pre, post and at 6- and 12-month follow-up. Results indicated there was a substantial improvement in weight, eating disorder features, and general psychopathology, with improvements maintained at 12-month follow-up.

One study has directly measured perfectionism as an outcome of AN treatment, reporting that perfectionism (assessed with multiple measures) declined in a case series of three adolescents with AN receiving FBT with added CBT perfectionism modules (FBT + CBT-P) (Hurst & Zimmer-Gembeck, 2015). In this intervention, CBT-P was implemented after the completion of FBT phase one and in parallel to the implementation of FBT phase two. It was at this point in FBT that adolescents with AN were making progress in weight restoration, which should assist with improvements in rational thinking because the brain has the required nourishment. These improvements in symptoms and cognitive capacity with adolescents, coupled with the main task of FBT phase two (i.e., to assist the parents to hand over control of eating to their child in an age appropriate way and for parents to support their child to meet this challenge), makes FBT phase two the ideal time during FBT to implement a CBT treatment component.

In the present novel prospective cohort study, the feasibility and changes in perfectionism and eating disorder symptoms were evaluated in adolescent females with AN who received FBT with a CBT module added to address perfectionism (FBT + CBT-P). CBT-P was implemented after FBT Phase one and reductions in symptoms and perfectionism in adolescents with AN were expected

after completion of the CBT-P modules (Time 3) and by the end of treatment (Time 4).

Method

Participants and Procedure

Participants were 21 Australian female adolescents aged 12–17 years ($M_{\text{age}} = 14.9$ years, $SD = 1.2$ years) from an urban area. Adolescents were consecutively referred to a specialist outpatient child and adolescent eating disorder service and diagnosed with AN according to Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (American Psychiatric Association, 2000). All had an illness duration of less than 3 years. Two adolescents entered the study, but dropped out early in treatment and did not complete all phases; one required multiple lengthy admissions to hospital then withdrew and the other withdrew opting for an alternative individual treatment modality. Nineteen required a medical admission prior to commencing outpatient treatment, and three were readmitted to hospital during treatment. A consort flow diagram is shown in Fig. 1.

Informed signed parental consent to participate in the study was required and the study was approved by the university and state government Human Ethics Review Boards. All individuals attending the health service are asked to complete a standard suite of intake measures.

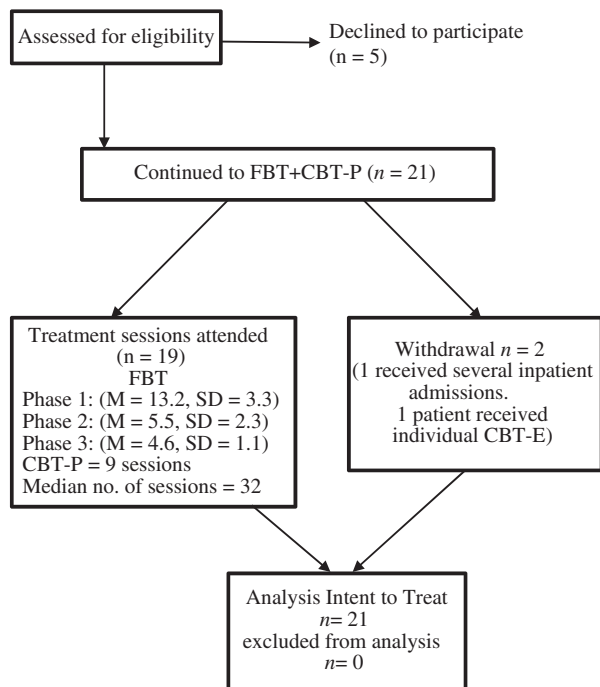


Figure 1 Consort flow diagram.

Information about the study, consent forms and additional measures for this study were added to this packet and delivered in the same way as other measures. Thus, information sheets and research consent forms were added to this packet so that all participants were informed that the data were being collected for research purposes, that their information would be de-identified for entry into the study (with a code used to link data across time points) and that all findings would be reported at the group level (i.e., no individual reporting of data would occur). Participants were also informed that they could withdraw from the study at any time without harming their treatment opportunity or their relationship with the therapists of the health service. Individuals were provided with hard copy questionnaires to complete at the clinic (usually in the waiting area), these were administered at pre and post intervention, and these were collected by the administration staff once completed. These surveys were de-identified by administration staff (and assigned codes for matching across time points) and given to the first named author for data entry, scoring, and analysis. The second named researcher checked the data and repeated all analyses.

Treatments

Therapists

Two registered psychologists with more than 10 years of experience who were trained in FBT and CBT delivered the treatments. The first named researcher had a dual role of a therapist and a researcher. To ensure treatment fidelity, an independent therapist reviewed sessions and both therapists received regular supervision. Five percent of sessions were randomly reviewed. The review assessed that the phase and session number were consistent with what the FBT or CBT-P manual stipulated. Both therapists were accredited through the FBT Training Institute for Child and Adolescent Eating Disorders. In addition, both therapists received regular (weekly peer, monthly, and four full-day supervision sessions from an experienced FBT therapist).

FBT

FBT is a manualised intensive outpatient treatment involving the whole family, with caregivers assuming leadership in refeeding (Lock & Le Grange, 2013). FBT consists of approximately 20 × 60-min sessions that take place over a year, separated into three phases. Phase one (usually 10 sessions) targets weight restoration and normal eating with caregivers taking an active role. Phase two (approximately six sessions) begins when weight gain is steady and the adolescent is eating without

conflict under caregiver supervision. One aim is for parents to promote age-appropriate activities and eating behaviours for the adolescent. Phase three (approximately four sessions) focuses on remaining adolescent concerns and cements positive changes in family roles that occurred during treatment.

CBT

“Perfectionism in Perspective” modules (Fursland, Raykos, & Steele, 2009, <http://www.cci.health.wa.gov.au>) developed from the perfectionism model of Shafran et al. (2002) were used. These modules included: What is Perfectionism, Costs and Benefits; Development of Perfectionism; Managing and Reducing Perfectionist Behaviours; What Maintains Perfectionism, Challenging Perfectionist Thinking, Adjusting Unhelpful Rules and Assumptions; Re-Evaluating the Importance of Achievement and Self-Worth; and Developing an Adaptive Model of Appropriate Self-Standards. The nine modules included information, worksheets, and suggested exercises or activities to be completed in session and/or at home and were delivered via individual weekly sessions to the adolescent after the completion of FBT phase one and in parallel to the implementation of FBT phase two.

Design

The design was a single group, prospective cohort study with four repeated assessments. Measures were administered at FBT phase one commencement (T1), FBT phase two and CBT commencement (T2), after completion of CBT (T3), and after FBT + CBT-P completion (T4). On average, participants received 23 FBT sessions and 32 sessions total ($SD = 4.7$) (all participants completed all 9 CBT-P sessions).

Measures

Eating disorder symptoms and eating disorder perfectionism

At each of the four times of assessment, adolescents completed the 91-item Eating Disorder Inventory (EDI-3; Garner, Olmstead, & Polivy, 1983) and the 22-item Child and Adolescent Perfectionism Scale (CAPS; Flett, Hewitt, Doucher, Davidson, & Munro, 1997). Also, percentage Expected Body Weight (%EBW) was evaluated at each time of assessment. The EDI-3 is a 91-item self-report measure used to evaluate symptomatology associated with eating disorders. The EDI-3 assessed eating disorder symptomatology across six areas, and contains three subscales (total symptoms (R), and two aspects of perfectionism: overcontrol (O) and perfectionism (P)).

At T1, the Cronbach's α for the EDI-3 (R) was .88, whereas it was .90 for the EDI-3 (O) and .89 for the EDI-3 (P) .89, and all subscales had Cronbach's α s of .80 or above at other time points.

In addition, the 36-item Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) was administered at the end of treatment only to assess psychopathology of eating-disordered behaviour. Items are scored using a 7-point, forced-choice, rating scheme. It yields a Global score and four subscale scores: Restraint, Shape Concern, Weight Concern, and Eating Concern. The Global score is the average of the four subscale scores. Frequencies of binge eating and compensatory behaviours are assessed in terms of the number of episodes occurring during the rated period, these items do not contribute to subscale scores. In the present study, the Cronbach's α for the items on the subscales of the EDE ranged from .65 to .93.

Perfectionism

The CAPS (Flett et al., 1997) was used to assess self-oriented and socially prescribed perfectionism. The CAPS is a self-report measure of perfectionism modelled after the adult version, Multidimensional Perfectionism Scale (Hewitt et al., 1991), but uses terms more relevant to children and adolescents. The CAPS is a self-report questionnaire of 22 items consisting of 12 items measuring self-oriented perfectionism (e.g., *I try to be perfect in everything I do*) and 10 items measuring socially prescribed perfectionism (e.g., *There are people in my life who expect me to be perfect*). In the present study at T1, the Cronbach's α for items on the SOP and SPP subscales were .91 and .85, respectively, and Cronbach's α s were .93 or above for each subscale at all other time points.

Body weight

The %EBW was calculated using the Center for Disease Control growth charts for expected weight for gender age and height (Kuczmarski et al., 2002) ($\%EBW = \text{BMI}/50\text{th percentile BMI for gender age and height} \times 100$).

Symptom Remission and Clinical Significance

Couturier and Lock (2006) suggest that a combination of weight and psychological variables are most important in defining remission in adolescent AN. Therefore, an a priori definition of remission was used in this study based on these criteria (Couturier & Lock, 2006). Full Remission was defined as a combination of a minimum of 95% EBW for gender, age, and height (www.cdc.gov/growthcharts/percentile_data_files.htm) and scores within one SD of the global mean EDE published norms.

Partial Remission was defined as weight > 85% and <95% EBW, and or an elevated EDE score at the end of treatment.

Results

Overview of Analyses

Means and standard deviations of all measures at all four repeated times of assessment are reported in Table 1. Table 1 also summarises the results of general linear mixed models (GLMMs) and paired *t*-tests, which were used to determine if there were significant improvements in AN symptoms, weight, and perfectionism. GLMMs were used to test whether weight, eating disorder symptoms and perfectionism showed significant linear, quadratic or cubic change from T1 to T4. Paired *t*-tests were used to test the differences in scores at pre- (T1) to post-treatment (T4), pre- (T1) to prior to CBT-P (T2), and pre- (T1) to after CBT-P (T3). Means and SEs from the GLMMs were used to calculate effect sizes (Cohen's *d*). To maintain all 21 participants in the analyses, intention-to-treat (ITT) methods were used. "ITT analysis avoids overoptimistic estimates of the efficacy of an intervention resulting from the removal of non-compliers by accepting that noncompliance and protocol deviations are likely to occur in actual clinical practice" (Gupta, 2011, p. 109).

Pearson's correlations were used to examine the associations between change in symptoms and change in

perfectionism from T1 to T3 and T1 to T4. To assess change, difference scores (between T1 and T3 or between T1 and T4) were calculated so that higher scores indicated greater improvement. Finally, nine regression models were tested: three models with % EBW as the dependent variable (DV) with one of the three measures of perfectionism difference from pre-treatment to post-treatment (SOP, SPP and Eating Disorder Perfectionism) as the independent variable; three similar models for the dependent variable EDI Eating Disorder Risk at T3; and three similar models for the dependent variable EDI Eating Disorder Risk at T4. Thus, in each model, the pre-treatment version of the DV and a measure of perfectionism difference were the two independent (i.e., predictor) variables.

Symptom Remission and Clinical Significance

Eleven of the 19 (57%) adolescents who completed treatment attained full remission (> 95% of EBW and EDE global score within one *SD* of published norms). The remaining eight (43%) attained partial remission, and 50% (four) received further individual or family therapy intervention at the completion of the trial.

Change in Weight, Eating Disorder Symptoms and Perfectionism from T1 to T4

Mixed model results showed that there was a significant linear increase in %EBW, increasing from a mean of

Table 1 Descriptive statistics for all continuous measures, and comparisons of ED symptoms and perfectionism at pre-treatment (T1) to T2, T3, and post-treatment (T4) using intent-to-treat methods (*N* = 21)

Measure	Pre (T1)	Pre CBT-P (T2)	Post CBT-P (T3)	Post (T4)	GLMM, Linear change, <i>F</i> (1,20) ^a	Paired <i>t</i> -test Pre- (T1) vs. T2 (<i>d</i>)	Paired <i>t</i> -test Pre- (T1) vs. T3 (<i>d</i>)	Paired <i>t</i> -test Pre- (T1) vs. T4 (<i>d</i>)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)				
Weight and symptoms								
%Expected body weight	81.6 (5.4)	88.6 (5.8)	93.4 (5.9)	95.0 (6.0)	76.6**	-6.03** (-1.4)	-9.65** (-2.6)	-11.7** (-2.77)
EDI symptoms	56.2 (17.6)	50.0 (21.8)	41.7 (24.2)	36.1 (26.5)	13.8**	1.55 (0.31)	3.18** (0.69)	3.64** (0.90)
Perfectionism								
EDI perfectionism	14.3 (4.9)	14.0 (6.2)	11.0 (6.0)	10.2 (6.7)	11.7**	0.29 (0.05)	3.01** (0.60)	3.02** (0.70)
EDI overcontrol	29.3 (11.1)	28.6 (12.7)	23.7 (14.5)	21.0 (16.0)	8.6**	0.31 (0.06)	2.20* (0.43)	2.7* (0.60)
Self-oriented perfectionism	47.9 (8.5)	46.3 (9.8)	43.3 (11.4)	40.1 (12.0)	13.7**	0.99 (0.17)	2.61* (0.46)	3.3** (0.76)
Socially prescribed perfectionism	28.0 (8.3)	29.7 (8.4)	28.5 (9.5)	26.0 (10.4)	0.82	-1.06 (0.20)	-0.24 (0.06)	0.82 (0.21)

Notes: Measures were administered at the commencement of Phase one FBT (Pre T1), at the commencement of Phase two FBT and CBT-P (T2), at the end of the CBT-P (T3), and after Phase three FBT when treatment was completed (T4). EDI, Eating Disorder Inventory. *d* = Effect size, Cohen's *d*.

^a No quadratic or cubic repeated effect was significantly different from 0, except there were significant quadratic patterns found for %EBW $F(1, 20) = 13.4, p < .01$, and SPP with $F(1,20) = 5.6, p = .03$.

p* < .05. *p* < .01.

Table 2 Correlations between improvement in perfectionism (T1 to T3 and T1 to T4) and improvement in symptoms from T1 to T4 ($N = 19$)

Difference scores	1	2	3	4	5	6	7
1. %EBW, T1 to T4	–						
2. EDI total symptoms, T1 to T4	.33	–					
3. EDI P, T1 to T3	.27	.48*	–				
4. Self-oriented P, T1 to T3	.38	.65**	.67**	–			
5. Socially prescribed P, T1 to T3	.50*	.66**	.65**	.76**	–		
6. EDI P, T1 to T4	.31	.54*	.82**	.61**	.63**	–	
7. Self-oriented P, T1 to T4	.39	.63**	.69**	.72**	.69**	.76**	–
8. Socially prescribed P, T1 to T4	.39	.68**	.63**	.63**	.85**	.64**	.85**

Notes: P, perfectionism; T1, pre-treatment; T3, post-CBT-P; T4, post-treatment. Each difference score was calculated so that a higher value reflected more improvement. Correlations were re-estimated after estimating missing values for the two noncompleters using the Expectation–Maximisation algorithm in SPSS. Values in this table changed by at most .01 when these additional two participants were included in the analyses.

* $p < .05$. ** $p < .01$.

81.7% at T1 to 95.5% at T4 (see Table 1). Also, there was evidence of a significant quadratic change (inverted-U shape), with %EBW showing a steep rise from T1 to T3, and then levelling off between T3 and T4. When paired t -tests were used to compare %EBW, there was a significant difference at pre-treatment compared to T2, T3, and T4.

In the mixed models, there were significant linear declines in all EDI-3 subscales (total symptoms, perfectionism, and overcontrol) and in self-oriented perfectionism. When paired t -tests were conducted, there was a significant lower level of eating disorder total symptoms at T3 compared to pre-treatment, and at post-treatment (T4) compared to pre-treatment. There was no significant difference in eating disorder symptoms between T1 and T2. EDI-3 overcontrol, EDI-3 perfectionism, and self-oriented perfectionism were lower at T3 (following CBT-P) compared to pre-treatment, and at post-treatment (T4) compared to pre-treatment (d ranged from .60 to .76).

Finally, in a mixed model, there was no significant linear change in socially prescribed perfectionism, but there was evidence of quadratic change, with a very slight increase from T1 to T2 and then a decline after. However,

despite this pattern over time, paired t -tests revealed no significant difference in socially prescribed perfectionism between T1 and T2, T1 and T3, or T1 and T4.

Reliable Change

Reliable change indices were calculated for the 19 participants who completed FBT + CBT-P in order to determine whether the magnitude of change for a given participant was statistically reliable (using formulas described in Christensen & Mendoza, 1986; see Table 3). The %EBW reliable change criterion (RCrit) was 6.55, and all participants (100%) had a reliable increase. For EDI-3 measures, EDI total symptoms had an RCrit of 17.25, and 11 of the 19 participants (58%) had a reliable decline in symptoms, whereas one participant (5%) had a reliable increase. EDI-3 perfectionism had an RCrit of 4.44, with 11 of the 19 participants (58%) with a reliable decline in perfectionism, but two (11%) participants had a reliable increase. EDI-3 overcontrol had an RCrit of 9.97, with 10 of the 19 participants (53%) with a reliable decline in overcontrol and two participants (11%) with a reliable increase.

For self-oriented perfectionism, the RCrit was 7.03, and 10 of the 19 participants (53%) had a reliable decline in perfectionism and two participants (11%) had a reliable increase. Socially prescribed perfectionism had an RCrit of 8.82, with six of the 19 participants (32%) with a reliable decline in perfectionism and 2 (11%) with a reliable increase.

Table 3 Summary of reliable change ($N = 19$)

Measure	RCrit	% Reliable increase	% Reliable decrease
%EBW	6.55	100%	0%
EDI symptoms	17.25	5%	58%
EDI perfectionism	4.44	11%	58%
EDI overcontrol	9.97	11%	53%
Self-oriented perfectionism	7.03	11%	53%
Socially prescribed perfectionism	8.82	11%	32%

Correlations between Eating Disorder Symptoms and Perfectionism

As shown in Table 2, for the 19 participants who completed FBT + CBT-P, greater improvement in eating disorder symptom level was associated with greater

improvement on all three measures of perfectionism (r 's from .48 to .68, all $p < .05$). However, improvement in %EBW was only significantly correlated with improvement in socially prescribed perfectionism from T1 to T3. Correlations were re-estimated after using the expectation-maximum (EM) procedure in SPSS to estimate missing values for the two participants who did not complete FBT + CBT-P. Values in Table 2 changed by at most .01 when these additional two participants were included in the analyses.

Results of Regressing %EBW and Eating Disorder Symptom Level on Perfectionism Difference Scores

In each of the three models of %EBW, the perfectionism difference score (T1 to T3) was not significantly associated with %EBW at post-treatment (relative to %EBW at T1: pre-treatment), β ranged from $-.07$ to $-.34$, p ranged from .13 to .79. In each of the three models of EDI Eating Disorder Risk at T3, the perfectionism difference score (T1 to T3) was negatively associated with EDI Eating Disorder risk at T3 (relative to T1: pre-treatment), EDI Perfectionism $\beta = -.40$, $p < .05$, SOP $\beta = -.44$, $p < .05$, SPP $\beta = -.52$, $p < .01$. In each of the three models of EDI Eating Disorder Risk at T4, the findings were similar to those for EDI Eating Disorder Risk at T3; the perfectionism difference score (T1 to T3) was negatively associated with EDI Eating Disorder risk at T4 (relative to T1: pre-treatment), EDI Perfectionism $\beta = -.55$, $p < .01$, SOP $\beta = -.57$, $p < .01$, SPP $\beta = -.65$, $p < .01$. Thus, a greater decline in perfectionism from T1 to T3 was associated with less EDI Eating Disorder risk at T3 and T4.

Discussion

Drawing from literature that has reported positive associations between perfectionism and AN symptom level (Bardone-Cone et al., 2007), as well as theory that perfectionism may play a role in maintaining AN symptoms (Egan et al., 2011), CBT-P was added to FBT in the current study to directly address perfectionism. CBT-P was implemented in phase two of FBT because this is when the "immediate crisis" of re-nourishment was expected to have been partially addressed and adolescents were expected to have more capacity to attend to strategies for reflecting on and modifying their individual beliefs and biases. It was found that FBT + CBT-P was associated with declines in adolescents' perfectionism and eating disorder symptoms, and improvements in perfectionism were associated with improvements in eating disorder symptoms. More specifically, compared to pre-

treatment, significant improvements in eating disorder symptoms and a decrease in perfectionism occurred following CBT-P and by the end of treatment. All participants met the criteria for reliable change of increased weight, whereas 58% of adolescents met the criteria for a reliable change in eating disorder symptoms and 58% met the criteria for a reliable change in perfectionism.

Further, weight showed a reliable increase for all participants and most participants (57%) met criteria for full remission (Couturier & Lock, 2006) at the end of treatment, while the remaining participants experienced partial remission. These figures are higher than those reported for recent randomised controlled trials of FBT (Le Grange et al., 2016; Madden et al., 2015). Of particular note, a greater decline in perfectionism was associated with greater improvement in eating disorder symptoms, suggesting that CBT-P may have played a part in eating disorder symptom improvement. Overall, the findings support the feasibility of a short-term individual therapy approach (9 CBT sessions) added to standard FBT (about 20 sessions), showing that this approach has the potential to produce clinically significant changes in symptoms and various components of perfectionism in adolescents diagnosed with AN.

As in previous studies of adolescents diagnosed with AN (Castro-Fornieles et al., 2007), the majority of participants (78%) in the present study presented with self-oriented perfectionism above the normed mean ($M = 35$), suggesting a potential benefit of the CBT-P modules in this group. It was also notable that self-oriented perfectionism improved following the CBT-P component of the treatment, and this improvement was maintained by the end of treatment. In contrast to findings for self-oriented perfectionism, there was no significant decline in socially prescribed perfectionism (i.e., adolescents' perceptions that others, including parents, had very high expectations of them and fear of not meeting others' expectations). This may be in part due to the focus of FBT, whereby parents are charged with taking control of weight restoration and normalising eating, with control only handed back to the adolescent once the eating disorder behaviours have abated to an important degree. This source of tension between the two treatments suggests an area requiring further work in the integration of these two models of care.

This study has some limitations to mention. First, it was not possible to determine whether FBT + CBT-P produced greater improvements in eating disorder symptoms and perfectionism than FBT only, as there was no comparison group. A larger trial with a FBT only comparison group, preferably with random assignment, is warranted to more fully test the efficacy of the intervention. However, it must be highlighted that

perfectionism rarely resolves spontaneously and significant improvement in perfectionism was not found until after the CBT intervention occurred.

Another limitation was the small sample size, which has implications for study power and significance. Nevertheless, most analyses revealed significant changes in measures across treatment assessments, showing that the study had adequate power to detect the size of effects found here. Third, the CBT-P intervention itself may not have been the sole or only cause of changes in perfectionism, as weight restoration itself may have contributed to changes in cognitive or emotional processing. Fourth, the lack of additional follow-up measures prevented an exploration of whether observed gains were maintained longer term, though it is positive that improvements in perfectionism were maintained in this study from the third to the fourth assessments.

Finally, there may have been some risk of allegiance bias, which refers to results being contaminated or distorted by the investigators' theoretical or treatment preferences (Luborsky, Singer, & Luborsky, 1975). The primary researcher had a dual role of a therapist and a researcher. To ensure this bias was mitigated, therapy sessions were recorded and a random set of these was selected and viewed by another therapist to assess fidelity. There was also a standardised set of procedures that was followed in relation to the research and treatment, and data were collected by administrators and de-identified prior to entry and analyses. Both FBT and CBT-P were manualised treatments, also; the use of therapy manuals allows for enhanced control over the fidelity of treatment.

In addition to these limitations, it is important to note that two of the participants reported increases in perfectionism and eating disorder symptoms through the course of this study. This raises concern that FBT + CBT-P may not be an approach that is acceptable and effective for all adolescents with AN. It seems important to assess symptoms and emotional and cognitive responses throughout any treatment to determine if there are signs of adverse reactions to the treatment.

In summary, the inclusion of the CBT-P modules in FBT was associated with reduced AN symptoms and perfectionism when averaged across all participants and improvements were found for most adolescents in this study. Yet, a minority of participants did not seem to respond, and a very small group reported increased perfectionism and eating disorder symptoms by the end of treatment; some required further treatment after this intervention. This suggests there is still much work needed to find the right combination and dose of therapy to ensure positive outcomes for all adolescents with

AN. Nevertheless, the findings of this preliminary feasibility study suggest that FBT + CBT was associated with symptom improvement and reduced perfectionism for most adolescents with AN, providing promising treatment and future research directions.

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