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## Treatment of Adolescent Eating Disorders: Progress and Challenges

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### Abstract

**Objective**—Although eating disorders are common psychiatric disorders that usually onset during adolescence, few evidence-based treatments for this age group have been identified. A critical review of treatments used for Anorexia Nervosa (AN) and Bulimia Nervosa (BN) and related conditions (EDNOS) is provided that summarizes the rationale for the treatments, evidence of effectiveness available, and outcomes.

**Method**—Critical review of published randomized clinical trials (RCTs).

**Results**—There are only seven published RCTs of psychotherapy for AN in adolescents with a total of 480 subjects. There are only two published RCTs for outpatient psychotherapy for adolescent BN with a total of 165 subjects. There are no published RCTs examining medications for adolescent AN or BN. For adolescent AN, Family-Based Treatment (FBT) is the treatment with the most evidence supporting its use. Three RCTs suggest that FBT is superior to individual therapy at the end of treatment; however, at follow-up differences between individual and family approaches are generally reduced. For adolescent BN, one study found no differences between Cognitive Behavioral Therapy and FBT at the end of treatment or follow-up, while the other found FBT superior to individual therapy.

**Conclusions**—Although the evidence remains limited, FBT appears to be the first line treatment for adolescent AN. There is little evidence to support a specific treatment for adolescent BN. There is a need for additional studies of treatment of child and adolescent eating disorders. New treatments studies may build on current evidence as well as examine new approaches based on novel findings in the neurosciences about cognitive and emotional processes in eating disorders.

### Keywords

Anorexia Nervosa; Bulimia Nervosa; Treatment; Review; Adolescents

### Introduction

Both of the classic eating disorders (Anorexia Nervosa and Bulimia Nervosa) onset during the adolescent years. Anorexia Nervosa (AN) has an incidence rate of 0.48–0.7% among adolescent females between 15–19 years of age with almost all cases beginning before the age of 25 (Hoek and Hoeken, 2003; van Son et al., 2006). Bulimia Nervosa (BN) has an incidence of 1–2% in the adolescent population while clinically significant bulimic behaviors occur in an additional 2–3%. Binge eating and purging behaviors usually begin during middle adolescence (Stice and Agras, 1998). Many cases of AN and BN in children and adolescents are diagnosed as Eating Disorder Not Otherwise Specified (EDNOS)

because DSM criteria are not developmentally sensitive and based on more chronic adult presentations of these disorders (Workgroup, 2007).

AN is characterized by a restrictive eating pattern resulting in severe weight loss, amenorrhea, and distorted perceptions of body weight and shape (APA, 1994). Associated psychopathology includes high levels of anxiety and depression, low self-esteem, and interpersonal and familial difficulties. Physical health is also severely compromised due to malnutrition. AN is arguably one of the most severe psychiatric disorders as measured by mortality and morbidity rates—the crude mortality rate is between 4 and 5%, higher than any other mental disorder with the possible exception of substance abuse (Crow et al., 2009). Costs for AN treatment, mostly because of hospitalization treatment rivals that of schizophrenia (Streigel-Moore et al., 2000).

BN is characterized by overvalued ideas concerning body weight and shape, dieting and disinhibited eating patterns consisting of binge eating and purging. The physical complications of bulimic behaviors include hypokalemia, esophageal tears, gastric disturbances, dehydration, orthostasis, cardiac arrhythmias, and death. Psychiatric complications include depression, personality disorders, anxiety disorders, and substance abuse disorders. Although considerable advances have been made in understanding the etiology and treatment of BN in adults, little treatment research has been conducted in adolescents with the disorder (Mitchell et al., 2007). BN is apparently less medically concerning than AN, though recent data suggest that mortality rates can still be significant with this disorder (Crow et al., 2009). There has been a comparative neglect of specific medical implications of the disorder and current medical criteria for emergency medical intervention are primarily designed to identify and treat the deleterious physical effects of malnutrition (Golden et al., 2003).

The majority (about 60%) of children and adolescents with eating disorders are diagnosed as EDNOS using current DSM criteria. While it also true that most adults with eating disorders fall into the EDNOS category, the reasons for this differ between the age groups (Fairburn and Bohn, 2005). For many children and adolescents, the main reasons for not meeting diagnostic criteria are failure to meet recommended physical thresholds, lower frequency of eating disordered behaviors or not clearly reporting specific eating related thoughts and beliefs, (Workgroup, 2007) while in adults, the issue appears more often related to symptomatic migration and overlap between disorders over time, where about 30% of patients change from AN to BN (Fairburn and Bohn, 2005). In addition to these issues, binge eating disorder (BED)—episodes of binge eating without efforts to purge--still falls in the EDNOS category. Prevalence rates of BED in adults are between 0.7 and 4% (Hudson et al., 2007). Although some studies suggest BED symptoms often start in children and adolescents, prevalence rates are not well characterized in younger populations (Marcus and Kalarchian, 2003). This review focuses on treatment of AN and BN and subthreshold cases of these disorders rather than other atypical eating disorders of childhood and adolescence. A recent review provides an excellent overview of these less common eating problems in young patients (Bryant-Waugh et al., 2010, published on line ahead of print).

## Treatments for Anorexia Nervosa

Although family therapy is commonly clinically employed for adolescents with AN, only one form of family therapy has been systematically tested to date in RCTs--that initially developed by the Maudsley group at the Institute of Psychiatry in London (Dare and Eisler, 1997) and manualized as Family Based Treatment (FBT) (Lock et al., 2001). The approach is theoretically agnostic as to the etiology of AN, but the rationale for the approach is based on the idea that families make accommodations in feeding their child that initially appear

useful in combating AN, but these ultimately become maladaptive, disrupting both the development of the adolescent with AN, and perpetuating the behaviors that maintain the disorder (Eisler, 2005). Treatment aims to identify and help the family modify these accommodations. FBT or the Maudsley Approach has been tested in 6 randomized clinical trials with adolescents and 2 randomized clinical trials with adults with AN (Dare et al., 2001; Eisler et al., 2000; Le Grange et al., 1992; Lock et al., 2005; Russell et al., 1987). Outcomes using the approach suggest it is effective for adolescents in the short term with 80–90% of patients with good to excellent progress and that treatment effects are maintained at longer term follow-up (Eisler et al., 1997; Eisler et al., 2007; Le Grange and Lock, 2005; Lock et al., 2006a). In three studies comparing FBT to other treatments, FBT was found to be superior to comparison treatments (Lock et al., in press-b; Robin et al., 1999; Russell et al., 1987). It is noteworthy, however, that some differences favoring FBT diminish at longer term follow-up, suggesting that adolescents treated using other methods could often “catch up” to those treated with FBT (Eisler et al., 1997; Robin et al., 1999). A further study documents that FBT is as effective in a 6 month/ten session dose as a 12 month/20 session dose, suggesting that FBT can be a highly efficient treatment for most adolescent patients (Lock et al., 2005; Lock et al., 2006a).

Despite the larger evidence base for FBT, probably the most commonly used therapy for adolescent AN is an individually-based approach that is psychodynamically informed and developmentally tailored. The rationale for the approach is that AN is a maladaptive strategy to manage the developmental challenges of adolescence through avoidance of emotion, a concrete focus on maintaining a pre-pubescent body, and ambivalence about separation and individuation from parents. Treatment includes encouraging the patient to gain weight and to eat normally as a way for increasing self-control and mastery. This approach maps well onto many theoretical ideas that adolescents with AN develop symptoms because they feel out of control and/or are over controlled and prevented from developing into normal adolescents by their parents. The approach was initially called Ego-Oriented Individual Therapy (EOIT), but has been described in more clinical detail in a published brief manualized form called Adolescent Focused Therapy (AFT) (Fitzpatrick et al., in press; Robin et al., 1999). Evidence about the usefulness EOIT/AFT is limited at this time to two RCTs that compared this treatment to either FBT or a treatment closely modeled FBT (Behavioral Family Systems Therapy). (Robin, 2003; Robin et al., 1999) In the first study, participants did well in both treatments, though weight and menstrual return was greater in FBT. EOIT/AFT was also compared to FBT in a larger RCT with 121 adolescents with AN (Lock et al., in press-b) with results similar to those found in the Robin et al study (1999) suggesting that AFT was effective and helpful to patients.

Cognitive Behavioral Therapy (CBT) is suggested to be useful for adolescent AN (Cooper and Stewart, 2008). The rationale for the approach is that the patient with AN has distorted thoughts about shape and weight and an over valuation of thinness (Pike et al., 2004). These lead in turn to severe dieting and over exercise to lose weight. CBT for AN addresses these behavioral and distorted thoughts through normalizing eating patterns, monitoring food intake through food logs, collaborative problem solving, behavioral experiments, and cognitive restructuring. Adaptations of CBT for adolescents include involvement of parents, use of real time monitoring, and attention to interpersonal dilemmas within an expanded model of CBT (Cooper and Stewart, 2008). While some evidence support CBT for adolescents with BN only one RCT study has examined CBT in adolescents with AN (Gowers et al., 2007). This study compared CBT to hospital treatment and usual care. The sample included 167 adolescent females, and no differences were found between the three groups at end of treatment or follow-up, except that CBT was the most cost-effective (Byford et al., 2007).

Nutritional advice and counseling is often recommended in the treatment of eating disorders. However, evidence of the usefulness of this approach is not available for adolescents. In adults, one study of 30 AN patients, those that those that received nutritional counseling gained more weight than those in psychological treatment, while those who received psychological treatment improved more on measures of psychological change (Hall and Crisp, 1987). In the other published study, CBT was compared to nutritional counseling. Patients randomized to CBT recovered at significantly greater rates (17%) compared to nutritional therapy (0%) (Pike et al., 2004). Despite the limited support for dietary advice, it is commonly used and may be useful for some adolescents with AN. However, there are also concerns that some types of dietary counseling may be deleterious in younger patients because diet plans and dietary regimens can sometimes worsen eating and weight preoccupations and obsessions. In addition, these types of plans can also undermine parental authority when using an approach where parents are expected to make dietary decisions (e.g. FBT).

Treatment for AN often includes treatment in inpatient, residential, or day programs. However, studies of the effectiveness of such treatment programs for AN are limited. The available data suggest that hospital treatment for adolescent AN is not more effective on average than outpatient treatment. In a recent study examining this issue, an adolescent population was randomized to hospital treatment, CBT, or treatment as usual (TAU). Those treated in hospital received an average of 15.2 weeks of hospital treatment on a specialized eating disorder service (Gowers et al., 2007). Outcomes at the end of treatment and follow-up suggested that hospitalized patients did no better than those who received outpatient care. Other forms of treatment, residential care, day programs, and other intensive professional treatment programs have not been systematically studied. Thus, the usefulness of hospitalization for the majority of adolescents with AN is doubtful especially as such treatment may lead to unnecessary separation from family and friends and exposure to more intractable patients with AN. It remains unclear for whom and when these intensive type programs should be utilized.

Medication studies for adolescents with AN are limited and results to date are not promising (Couturier and Lock, 2007; Crow et al., 2008). Although medications in most psychotropic medication classes have been studied in small case series or trials in adults, none of them consistently demonstrate systematic effectiveness. There was enthusiasm for the potential for SSRIs (e.g., fluoxetine) as possibly useful to prevent weight loss after acute weight restoration, but a large study now suggests that this is not likely (Walsh et al., 2006). Also, atypical antipsychotics, because of their propensity to lead to weight gain as well as their anxiolytic properties, have been considered potentially useful. Data from a few small adult studies of adults with AN using Olanzapine are inconsistent as to the benefits of this medications on weight gain or related psychosocial variables with some suggesting benefit, while others do not (Bissada et al., 2008; Brambilla et al., 2007). Smaller case series studies in adolescent samples reach a similar conclusion, though systemic studies are pending. (Broachie et al., 2003) A recent report examining risperidone (mean dose 3mg for a median duration of 9 weeks) in 41 adolescents with AN being treated in a milieu based treatment program found no specific benefit to this adding medication in adolescent AN on any measure of weight or psychological variables (Hagman et al., 2009). Using medications for co-morbid conditions (anxiety disorder, depression) appears to be useful in some cases, though waiting until moderate weight regain has been accomplished makes both treatment targets and treatment effects more specific and effective.

## Bulimia Nervosa

CBT is considered the first line treatment for BN in adults. Treatment targets normalizing eating patterns through the use of food diaries and behavioral experiment and supports cognitive change through problem solving and cognitive restructuring. In adults with BN, CBT has been the subject of many RCTs and has been shown to be superior to all treatments to which it has been compared at the end of treatment. CBT been adapted for adolescents and manualized then subsequently used in a case series of adolescents with BN which found abstinence rates (30–40%) similar to those in adult studies (Lock, 2005). Only one RCT compared guided self-help CBT to FBT for BN in adolescents and found outcomes at the end of treatment and follow-up similar for both groups, but CBT was more cost-effective (Schmidt et al., 2007). A small case series from the Maudsley group suggested that FBT might be useful for adolescent BN (Dodge et al., 1995). One RCT examining FBT-BN compared it to a non-specific individual supportive psychotherapy (SPT) (Le Grange et al., 2007). FBT was superior to SPT in terms of abstinence rates of binge eating and/or purging at the end of treatment and at follow-up. Overall improvement was similar to that reported in adults treated with CBT with abstinence rates at 6 month follow-up about 30%.

Medications are sometimes recommended for treating BN. Antidepressants in particular have been examined in variety of adult studies in BN (Mitchell et al., 2007). Antidepressants are useful and effective for adult BN, though doses were generally higher than usually prescribed for depression and the effect appears to be related to suppressing binge episodes rather than through altering mood. Only one small case series has demonstrated the acceptability and possible benefit of antidepressants (fluoxetine) for adolescent BN, but that was in the context of an inpatient multidisciplinary treatment program (Kotler et al., 2003).

Treatment for those children and adolescents who are diagnosed with EDNOS but who do not meet some of the frequency, duration, or self-report weight and shape concerns for AN and BN, should likely be treated using approaches with evidence of effectiveness for the full-syndrome (Le Grange et al., in press; Lock et al., 2006b). Some of the RCTs evaluating treatments for AN and BN in adolescents included sub-threshold participants lending support to the idea that these treatments will be effective for this EDNOS group (Le Grange et al., 2007; Lock et al., 2005). In addition, some data suggest that family treatment (FBT) is useful for patients with AN symptoms that are present in patients under the age of 12 years (Lock et al., 2006b). A range of treatments have been shown to be useful for adults with Binge Eating Disorder (BED) (currently an EDNOS diagnosis in DSM IV), including CBT, Interpersonal Psychotherapy, and medications for decreasing binge eating, but these treatments had little effect on obesity associated with BED (Grilo et al., 2005; McElroy et al., 2003; Peterson et al., 2009; Safer et al., in press; Wilfley et al., 2002).

## New Treatment Directions Based on Translating Findings from the Neurosciences

Although some progress has been made in the last decade generating systematic evidence about effective treatments for AN and BN in adolescents, many patients do not respond completely to these treatments. New directions in treatment research are being organized around new findings from the neurosciences and other clinical paradigms. For example, in the area of neuropsychology, studies of cognitive process in eating disorders suggest treatment of these processes might be a useful adjunctive treatment (Treasure, 2007). Studies of adults with AN have identified two common neurocognitive processing inefficiencies in the population: cognitive inflexibility (set-shifting) and weak central coherence (Roberts et al., 2005). Recent studies also suggest that similar cognitive flexibility difficulties and weak central coherence problems are present in adolescents with acute AN.



(Fitzpatrick et al., 2009). Further, neuroimaging studies suggest that a biological substrate may underlie this inflexible cognitive style (Zastrow et al., 2009). Weak central coherence—an overly detailed focus to the neglect of the big picture (Lopez et al., 2008a; Lopez et al., 2008b) is found in other psychiatric populations, including OCD and autism spectrum disorders, disorders which sometimes occur co-morbidly with AN. An over focus on detail could support many of the obsessive preoccupation common to AN including calorie counting, weight and body checking, dietary content detail, and related behaviors and obsessive thoughts (Treasure, 2007).

Treatment of inefficient cognitive processes through cognitive remediation therapy (CRT) has been used in brain injury, schizophrenia, and OCD and found to be useful in improving cognitive processes (Buhlman, 2006; Lindenmayer et al., 2008; Wykes and Reader, 2005). Limited data suggest that the same may be true treating cognitive inefficiencies in adult AN (Tchanturia et al., 2007). CRT consists of cognitive exercises that enhance cognitive flexibility including variation on “switching” tasks (i.e., Stroop, Simon task, illusion) and central coherence tasks which challenge the patient to succinctly describe the “main idea” of a piece of writing or provide an outline of the topics in a longer piece. These tasks are deliberately not focused on eating or weight, but are an opportunity to explore how thinking more flexibly and seeing the bigger picture apply to the general life circumstances of the patient. The use of CRT in the context of eating disorders, is seen as an adjunctive treatment—either to increase motivation, increase the ability to use other treatments, or to enhance maintenance of learning from other treatments—not as a stand alone treatment. In the context of adolescents with eating disorders, the idea of addressing cognitive process is particularly compelling, because adolescent brains are more flexible, undergoing major change anatomical and functional development, and therefore early intervention to improve cognitive processes may have life long benefits that could help prevent relapse, decrease the development of related psychiatric disorders, and improve cognitive functioning overall.

Emotion regulation studies may also provide an avenue for treatment development for eating disorders. Increasing evidence has targeted difficulties in self-regulatory behaviors, (Marsh et al., 2009b) broadly defined, and emotion regulation skills, in particular (Steiger and Bruce, 2007; Whiteside et al., 2007) as risk factors in the development of BN. Self-regulatory skills are linked to frontal-lobe development during adolescence and young adulthood, consistent with age of onset of BN symptomology (Meyer et al., in press; Steiger and Bruce, 2007; Steiger et al., 2001; Whiteside et al., 2007). Recent fMRI studies suggest that both adult and adolescent BN subjects display difficulties in cognitive inhibition tasks (i.e., they are more impulsive) (Lock et al., submitted-a; Marsh et al., 2009a; Marsh et al., 2009b). Dialectical Behavioral Therapy (DBT) might be useful for treating such dysregulation as it relates to binge eating and purging. DBT has shown some usefulness in adult BED and BN (Safer et al., 2007).

Although current psychopharmacologic interventions for eating disorders are not particularly encouraging, converging evidence from and neurotransmitter and imaging studies confirms abnormalities in both seronergic and dopaminergic neurotransmitter systems for which future medications may be useful. In addition, while data about the usefulness of medications for core symptoms of AN and BN may be less impressive, medications targeting other symptoms, including depression, anxiety, and OCD may improve eating related outcomes.

There is considerable recent interest in developing and evaluating a broader and more comprehensive approach to CBT called CBT-E (enhanced) for eating disorders because many patients with other psychological problems in addition to BN do not respond to the focused version of CBT initially studied. Fairburn has recently published a version of this

CBT-E that is expanded to include modules to address perfectionism, mood, interpersonal problems and low self-esteem that may be applicable to patients with all types of eating disorders (Fairburn et al., 2008). A recent RCT for adult BN patients suggests that for the subset that experiences these additional problems, CBT-E is more effective than standard CBT (Fairburn et al., 2009). It is possible this broader focus might be helpful for younger patients who often present with similar related psychological and interpersonal concerns.

## Research limitations and challenges

As this review highlights, evidence for effective treatments for adolescents with AN and BN is limited. There are few studies, most are small in scale, and many problems with design are present. Studies also utilize a range of different measures of outcome, and are under controlled. Among the major problems that impede progress is the limited base of clinical researchers in the field of child and adolescent eating disorders. Although AN and BN are disorders that onset in the adolescent years, most research to date has taken place with adult populations often with chronic disorders. There are few research centers or primary investigators that focus on this population who are child focused. As a result, diagnostic criteria, studies, treatments, assessment, and outcomes are focused on an older population. Although funding for eating disorder research is a stated priority of the US National Institute of Health, few studies focus on children and adolescents, and few laboratories are supported sufficiently to train investigators with an interest in this younger population.

Nonetheless, there are a number of current studies that may provide important new evidence to guide clinical practice. A large multi-site study comparing FBT to Systemic Family Therapy (SFT) (Pote, 2003) for adolescent AN is underway with the aim of recruiting 160 subjects from 6 intervention sites. This study should help clarify what specific role families play in treating adolescent AN. Another study, based at Westmead Children's Hospital in Australia is evaluating the role of FBT in decreasing the need for inpatient weight restoration by comparing treatment response using FBT after a brief medical hospitalization compared to FBT after full weight restoration. A study examining the benefits of FBT in subsyndromal AN (ENDOS) is underway at Mount Sinai in New York; while examination of FBT compared to family education groups is being conducted at Duke University. Other formats of FBT, including a multi-family group (MFG) model for adolescent AN is being completed in the UK. MFG may be particularly useful for more treatment resistant patients by providing support to parents who are stymied in their efforts to promote weight gain (Dare and Eisler, 2000). A clinical trial evaluating the usefulness of CRT in older adolescents and adults with AN is also currently recruiting subjects at Stanford University. In addition, data from Fairburn et al on the usefulness of CBT-E for AN patients may be available soon.

For adolescent BN, a study is now underway comparing CBT, FBT, and Supportive Individual Therapy at the University of Chicago and Stanford University. This is the first study to compare a standard form CBT adapted for adolescents to FBT for this age group and only the third treatment study focused on adolescents with BN. Other studies addressing the benefit of other types of psychotherapy and the role of medications in adolescent BN are needed.

In addition to addressing the substantial gaps in our knowledge base about effective treatments, training and dissemination of effective treatments for eating disorders is limited. Few programs offer focused training for treating this population and fewer still provide training in any evidenced based interventions. As a result, mental health providers often feel under skilled in treating this population and refer to the specialty centers with inpatient and day hospital programs rather than treat them in their own practices. The interventions

currently available require training and psychotherapy skills, but the ability to evaluate and treat these common adolescent mental health problems need to be more readily available in local communities.

## References

- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Fourth Edition edition. Washington, D.C: American Psychiatric Association; 1994.
- Bissada H, Tasca G, Barber A, Bradwejn J. Olanzapine in the treatment of low body weight and obsessive thinking in women with anorexia nervosa: a randomized, double-blind, placebo controlled trial. *Am J Psychiatry*. 2008; 165:1281–1288. [PubMed: 18558642]
- Brambilla F, Garcia C, Fassino S, Daga G, Favaro A, Santonastaso P, Ramacotti C, Bondi E, Mellado C, Borriello R, Monteleone P. Olanzapine therapy in anorexia nervosa: psychobiological effects. *Int Clin Psychopharmacol*. 2007; 22:197–204. [PubMed: 17519642]
- Broachie A, Goldfield G, Spettigue W. Olanzapine use as an adjunctive treatment for hospitalized children with anorexia nervosa: case reports. *Int J Eat Disord*. 2003; 33:98–103. [PubMed: 12474205]
- Bryant-Waugh R, Markham L, Kreipe R, Walsh BT. Feeding and eating disorders in childhood. *IJED*. (2010, published on line ahead of print) online.
- Buhlman J. Cognitive retraining for organizational impairment in obsessive compulsive disorder. *Psychiatry Research*. 2006; 144:109–116. [PubMed: 17007938]
- Byford S, Barrett B, Roberts C, Clark A, Edwards V, Smethhurst N, Gowers S. Economic evaluation of a randomised controlled trial for anorexia nervosa in adolescents. *Br J Psychiatry*. 2007; 191:436–440. [PubMed: 17978324]
- Cooper, Z.; Stewart, A. CBT-E and the younger patient. In: Faiburn, C., editor. *Cognitive behavioral therapy and eating disorders*. New York: Guilford; 2008. p. 221-230.
- Couturier J, Lock J. Review of Medication Use for Children and Adolescents with Eating Disorders. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*. 2007; 16:173–176. [PubMed: 18392170]
- Crow S, Mitchell J, Roerig J, Steffen K. What potential role is there for medication treatment in anorexia nervosa. *Int J Eat Disord*. 2008; 42:1–8. [PubMed: 18683884]
- Crow S, Peterson C, Swanson S, Raymond N, Specker S, Eckert ED, Mitchell J. Increased mortality in bulimia nervosa and other eating disorders. *Am J Psychiatry*. 2009; 166:1342–1346. [PubMed: 19833789]
- Dare, C.; Eisler, I. Family therapy for anorexia nervosa. In: Garner, DM.; Garfinkel, P., editors. *Handbook of Treatment for Eating Disorders*. New York: Guilford Press; 1997. p. 307-324.
- Dare C, Eisler I. A multi-family group day treatment programme for adolescent eating disorders. *European Eating Disorders Review*. 2000; 8:4–18.
- Dare C, Eisler I, Russell G, Treasure JL, Dodge E. Psychological therapies for adults with anorexia nervosa: Randomized controlled trial of outpatient treatments. *Br J Psychiatry*. 2001; 178:216–221. [PubMed: 11230031]
- Dodge E, Hodes M, Eisler I, Dare C. Family therapy for bulimia nervosa in adolescents: an exploratory study. *Journal of Family Therapy*. 1995; 17:59–77.
- Eisler I. The empirical and theoretical base of family therapy and multiple family day therapy for adolescent anorexia nervosa. *Journal of Family Therapy*. 2005; 27:104–131.
- Eisler I, Dare C, Hodes M, Russell G, Dodge E, Le Grange D. Family therapy for adolescent anorexia nervosa: the results of a controlled comparison of two family interventions. *J Child Psychol Psychiatry*. 2000; 41:727–736. [PubMed: 11039685]
- Eisler I, Dare C, Russell G, Szmukler GI, Le Grange D, Dodge E. Family and individual therapy in anorexia nervosa: A five-year follow-up. *Archives of General Psychiatry*. 1997; 54:1025–1030. [PubMed: 9366659]
- Eisler I, Simic M, Russell G, Dare C. A randomized controlled treatment trial of two forms of family therapy in adolescent anorexia nervosa: a five-year follow-up. *J Child Psychol Psychiatry*. 2007; 48:552–560. [PubMed: 17537071]



- Fairburn C, Bohn K. Eating disorder NOS (EDNOS): An example of the troublesome eating disorder not otherwise specified(NOS) category in DSM-IV. *Behav Res Ther.* 2005; 43:691–701. [PubMed: 15890163]
- Fairburn C, Cooper Z, Doll H, O'Connor M, Bohn K, Hawker D, Wales J, Palmer R. Transdiagnostic Cognitive-Behavioral Therapy for Patients With Eating Disorders: A Two-Site Trial With 60-Week Follow-Up. *Am J Psychiatry.* 2009; 166:311–319. [PubMed: 19074978]
- Fairburn, CG.; Cooper, Z.; Shafron, R. Enhanced cognitive behavioral therapy for eating disorders ("CBT-E"): An overview. In: Fairburn, CG., editor. *Cognitive Behavioral Therapy and Eating Disorders.* New York: Guilford; 2008.
- Fitzpatrick, K.; Lock, J.; Darcy, A.; Colburn, D.; Gudorf, C. American Academy of Child and Adolescent Psychiatry. Honolulu, HI: pp Poster Session; 2009. Neurocognitive processes in adolescent anorexia nervosa.
- Fitzpatrick K, Moye A, Hostee R, Le Grange D, Lock J. Adolescent Focused Therapy for Adolescent Anorexia Nervosa. *Journal of Contemporary Psychotherapy.* (in press).
- Golden N, Katzman D, Kreipe R, Stevens S, Sawyer S, Rees J, Nicholls D, Rome E. Eating disorders in adolescents: position paper of the Society for Adolescent Medicine: Medical Indications for Hospitalization in an Adolescent with an Eating Disorder. *J Adolesc Health.* 2003; 33:496–503. [PubMed: 14642712]
- Gowers S, Clark A, Roberts C, Griffiths A, Edwards V, Bryan C, Smethhurst N, Byford S, Barrett B. Clinical effectiveness of treatments for anorexia nervosa in adolescents. *Br J Psychiatry.* 2007; 191:427–435. [PubMed: 17978323]
- Grilo C, Masheb R, Salant S. Cognitive behavioral therapy guided self-help and orlistat for the treatment of binge eating disorder: a randomized, double-blind, placebo-controlled trial. *Biol Psychiatry.* 2005; 57:1193–1201. [PubMed: 15866560]
- Hagman, J.; Gralla, J.; Dodge, M.; Eller, S.; Gardner, R.; Wamboldt, M. American Academy of Child and Adolescent Psychiatry. Honolulu, HI: 2009. A double-blind placebo controlled study of risperidone for anorexia nervosa.
- Hall A, Crisp AH. Brief psychotherapy in the treatment of anorexia nervosa: Outcome at one year. *Br J Psychiatry.* 1987; 151:185–191. [PubMed: 3690108]
- Hoek H, Hoeken Dv. Review of prevalence and incidence of eating disorders. *Int J Eat Disord.* 2003; 34:383–396. [PubMed: 14566926]
- Hudson JI, Hiripi E, Pope HG, Kessler RC. The prevalence and correlates of eating disorders in the national comorbidity survey replication. *Biological Psychiatry.* 2007; 61:348–358. [PubMed: 16815322]
- Kotler L, Devlin B, Davies M, Walsh BT. An open trial of fluoxetine in adolescents with bulimia nervosa. *Journal of Child and Adolescent Psychopharmacology.* 2003; 13:329–325. [PubMed: 14642021]
- Le Grange D, Binford R, Peterson C, Crow S, Crosby R, Klein M, Bardone-Cone A, Joiner T, Mitchell J, Wonderlich S. DSM-IV Threshold versus Sub-Threshold Bulimia Nervosa. *Int J Eat Disord.* (in press).
- Le Grange D, Crosby R, Rathouz P, Leventhal B. A randomized controlled comparison of family-based treatment and supportive psychotherapy for adolescent bulimia nervosa. *Archives of General Psychiatry.* 2007; 64:1049–1056. [PubMed: 17768270]
- Le Grange D, Eisler I, Dare C, Russell G. Evaluation of family treatments in adolescent anorexia nervosa: a pilot study. *Int J Eat Disord.* 1992; 12:347–357.
- Le Grange D, Lock J. The dearth of psychological treatment studies for anorexia nervosa. *International Journal of Eating Disorders.* 2005; 37:79–81. [PubMed: 15732072]
- Lindenmayer J, McGurk S, Khan A, Wance D, Hoffman L, Wolfe R, Xie H. A randomized controlled trial of cognitive remediation among inpatients with persistent mental illness. *Psychiatric Services.* 2008; 59:241–247. [PubMed: 18308903]
- Lock J. Adjusting Cognitive Behavioral Therapy for Adolescent Bulimia Nervosa: Results of a Case Series. *American Journal of Psychotherapy.* 2005; 59:267–281. [PubMed: 16370133]

- Lock J, Agras WS, Bryson S, Kraemer H. A comparison of short- and long-term family therapy for adolescent anorexia nervosa. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2005; 44:632–639. [PubMed: 15968231]
- Lock J, Couturier J, Agras WS. Comparison of long term outcomes in adolescents with anorexia nervosa treated with family therapy. *American Journal of Child and Adolescent Psychiatry*. 2006a; 45:666–672.
- Lock J, Garrett A, Beenhaker J, Reiss A. Aberrant Brain Activation during a Response Inhibition Task in Adolescent Eating Disorder Subtypes. *Am J Psychiatry*. (submitted-a).
- Lock J, Le Grange D, Agras WS, Bryson S, Jo B. A randomized clinical trial comparing family based treatment to adolescent focused individual therapy for adolescents with anorexia nervosa. *Archives of General Psychiatry*. (in press-b).
- Lock, J.; Le Grange, D.; Agras, WS.; Dare, C. *Treatment manual for anorexia nervosa: A family-based approach*. New York: Guilford Publications, Inc.; 2001.
- Lock J, Le Grange D, Forsberg S, Hewell K. Is family therapy effective for children with anorexia nervosa? *American Journal of Child and Adolescent Psychiatry*. 2006b
- Lopez C, Tchanturia K, Stahl D, Booth R, Holliday J, Treasure J. An examination of the concept of central coherence in women with anorexia nervosa. *Int J Eat Disord*. 2008a; 41:143–152. [PubMed: 17937420]
- Lopez C, Tchanturia K, Stahl D, Treasure J. Central coherence in women with bulimia nervosa. *Int J Eat Disord*. 2008b; 41:340–354. [PubMed: 18306347]
- Marcus M, Kalarchian M. Binge eating in children and adolescents. *Int J Eat Disord*. 2003; 34 Suppl:S47–S57. [PubMed: 12900986]
- Marsh R, Maia T, Peterson B. Functional disturbances within frontostriatal circuits across multiple childhood psychopathologies. *Am J Psychiatry*. 2009a in press.
- Marsh R, Steinglass J, Gerber A, O-Leary G, Wang Z, Murphy D, Walsh BT, Peterson B. Deficient activity in the neural systems that mediate self-regulatory control in bulimia nervosa. *Arch Gen Psychiatry*. 2009b; 66:51–63. [PubMed: 19124688]
- McElroy SL, Arnold L, Shapira N, Keck PE, Rosenthal N, Karim M, Capece J, Fazzino I, Hudson JI. Topiramate in the treatment of binge eating associated with obesity: a randomized, placebo-controlled trial. *Am J Psychiatry*. 2003; 160:255–261. [PubMed: 12562571]
- Meyer C, Leung N, L B, DeFreo D. Emotion and Eating Psychopathology: Links with attitudes toward emotional expression among young women. *Int J Eat Disord*. (in press).
- Minuchin, S.; Rosman, B.; Baker, I. *Psychosomatic Families: Anorexia Nervosa in Context*. Cambridge, MA: Harvard University Press; 1978.
- Mitchell J, Agras WS, Wonderlich S. Treatment of bulimia nervosa: Where are we and where are we going? *Int J Eat Disord*. 2007; 40:95–101. [PubMed: 17080448]
- Peterson C, Mitchell J, SJ C, Crosby R, Wonderlich S. The efficacy of self-help group treatment and therapist-led group treatment for binge eating disorder. *Am J Psychiatry*. 2009; 166:1347–1354. [PubMed: 19884223]
- Pike K, Walsh BT, Vitousek K, Wilson GT, Bauer J. Cognitive-Behavioral Therapy in the Posthospitalization Treatment of Anorexia Nervosa. *American Journal of Psychiatry*. 2004; 160:2046–2049. [PubMed: 14594754]
- Pote H, Stratton P, Cottrell D, Shapiro D, Boston P. Systemic family therapy can be manualized: research process and findings. *Journal of Family Therapy*. 2003; 25:236–262.
- Roberts M, Tchanturia K, Stahl D, Southgate L, Treasure J. A systematic review and meta-analysis of set-shifting ability in eating disorders. *Psychol Med*. 2005; 37:1075–1084. [PubMed: 17261218]
- Robin, A. Behavioral family systems therapy for adolescents with anorexia nervosa. In: Kazdin, A.; Weisz, J., editors. *Evidence-based psychotherapies for children and adolescents*. New York: Guilford Press; 2003. p. 358-373.
- Robin A, Siegal P, Moye A, Gilroy M, Dennis A, Sikand A. A controlled comparison of family versus individual therapy for adolescents with anorexia nervosa. *J Am Acad Child Adolesc Psychiatry*. 1999; 38:1482–1489. [PubMed: 10596247]
- Russell GF, Szmukler GI, Dare C, Eisler I. An evaluation of family therapy in anorexia nervosa and bulimia nervosa. *Arch Gen Psychiatry*. 1987; 44:1047–1056. [PubMed: 3318754]

- Safer D, Couturier J, Lock J. Dialectical Behavior Therapy modified for adolescent binge eating disorders: a case report. *Cognitive Behavioral Practice*. 2007; 14:157–167.
- Safer DL, Robinson AH, Jo B. Outcome from a Randomized Controlled Trial of Group Therapy for Binge Eating Disorder: Comparing Dialectical Behavior Therapy Adapted for Binge Eating to an Active Comparison Group Therapy. *Behavior Therapy*. (in press).
- Schapman A, Lock J. Cognitive-Behavioral Therapy for Adolescent Bulimia. *Int J Eat Disord*. 2006; 39:252–255. [PubMed: 16511836]
- Schmidt U, Lee S, Beecham J, Perkins S, Treasure JL, Yi I, Winn S, Robinson P, Murphy R, Keville S, Johnson-Sabine E, Jenkins M, Frost S, Berelowitz M, Eisler I. A randomized controlled trial of family therapy and cognitive behavior therapy guided self-care for adolescents with bulimia nervosa and related conditions. *Am J Psychiatry*. 2007; 164:591–598. [PubMed: 17403972]
- Steiger H, Bruce K. Phenotypes, endophenotypes and genotypes in bulimia spectrum eating disorders. *La revue canadienne de psychiatrie*. 2007; 52:220–227.
- Steiger H, Gauvin L, Israel M, Koerner N, Ng Ying Kin N, Paris J, Young S. Association of serotonin and cortisol indices with childhood abuse in bulimia nervosa. *Arch Gen Psychiatry*. 2001; 58:837–843. [PubMed: 11545666]
- Stice E, Agras WS. Predicting onset and cessation of bulimic behaviors during adolescence. *Behavior Therapy*. 1998; 29:257–276.
- Streigel-Moore R, Leslie D, Petrill SA, Garvin V, Rosenheck RA. One-year use and cost of inpatient and outpatient services among female and male patients with an eating disorder: Evidence from a national database of health insurance claims. *International Journal of Eating Disorders*. 2000; 27:381–389. [PubMed: 10744844]
- Tchanturia K, Davies H, Campbell I. Cognitive Remediation for patients with Anorexia Nervosa: preliminary findings. *Annals of General Psychiatry*. 2007; 14:1–6.
- Treasure J. Getting beneath the phenotype of anorexia nervosa: the search for viable endophenotypes and genotypes. *La revue de psychiatrie*. 2007; 52:212–219.
- van Son G, van hoeken D, Aad I, Bartelds A, van Furth E, Hoek H. Time trends in the incidence of eating disorders: a primary care study in the Netherlands. *Int J Eat Disord*. 2006; 39:565–569. [PubMed: 16791852]
- Walsh BT, Kaplan AS, Attia E, Olmsted M, Parides M, Carter J, Pike K, Devlin MJ, Woodside B, Roberto L, Rockert W. Fluoxetine after weight restoration in anorexia nervosa: a randomized clinical trial. *JAMA*. 2006; 295:2605–2612. [PubMed: 16772623]
- Whiteside U, Chen E, Neighbors C, Hunter D, Lo T, Larimer M. Difficulties regulating emotions: Do binge eaters have fewer strategies to modulate and tolerate negative affect. *Eating Behaviors*. 2007; 8:162–169. [PubMed: 17336786]
- Wilfley D, Welch R, Stein R, Spurrell E, Cohen L, Saelens B, Douchis J, Frank M, Wiseman C, Matt G. A randomized clinical comparison of group cognitive behavioral therapy and group interpersonal therapy for the treatment of overweight individuals with binge-eating disorder. *Arch Gen Psychiatry*. 2002:713–721. [PubMed: 12150647]
- Workgroup for the Classification of Child and Adolescent Eating Disorders. Classification of child and adolescent eating disturbances. *Int J Eat Disord*. 2007:40.
- Wykes, T.; Reader, C. *Cognitive remediation therapy for schizophrenia: an introduction*. London, UK: Brunner Routledge; 2005.
- Zastrow A, Kaiser S, Stippich C, Walther S, Herzog W, Tchanturia K, Belger A, Weisbrod M, Treasure J, Friederich H. Neural correlates of impaired cognitive-behavioral flexibility in anorexia nervosa. *Am J Psychiatry*. 2009; 166:608–616. [PubMed: 19223435]

**Table 1**  
Treatment Trials for Adolescent Eating Disorders Comparing Different Treatments

STUDY	Eating Disorder	TYPE TREATMENT	N	AGE (Mean)	OUTCOMES (Morgan-Russell Modified Outcome Groups (Intermediate or Good Outcome by Weight > 85% IBW)
Russell et al., (Russell et al., 1987)	AN	FBT vs Supportive therapy	21	15.3	FBT=90% Supportive therapy=18% p<.02
Robin et al., (Robin et al., 1999)	AN	Family therapy or Individual therapy (EOIT)	37	13.9	Family therapy=94% EOIT=65% p<.05
Gowers et al (Gowers et al., 2007)	AN	TAU, CBT, Inpatient	167	14.1	Hospital = 18% CBT = 22% TAU = 31% NS
Schmidt et al (Schmidt et al., 2007)	BN	FBT vs Guided Self-Help CBT	85	16.1	FBT = 36% CBT =42% NS
Le Grange et al (Le Grange et al., 2007)	BN	FBT vs Supportive Individual Therapy	80	17.9	FBT = 40% SIT = 19% P = .049

**Table 2**

Summary of Evidence Base for Outpatient Treatment in Children and Adolescents With Anorexia Nervosa and Bulimia Nervosa

Treatment Type	Eating Disorder	Studies	Level of Evidence	Recommendation
Family-Based Treatments	AN	5 RCTs(Eisler et al., 2000; Le Grange et al., 1992; Lock et al., 2005; Lock et al., in press-b; Robin et al., 1999; Russell et al., 1987)	+++	A good first line treatment
	BN	2RCTs, case series	++	A reasonable treatment option
Other Family Therapies(Minuchin et al., 1978)	AN	Case series data	+	A possible treatment option
	BN	None	0	Unknown usefulness
Adolescent Focused Therapy(Lock et al., submitted-b; Robin et al., 1999)	AN	2 RCTs	++	A reasonable treatment option
	BN	None	0	Unknown usefulness
Cognitive Behavioral Therapy(Gowers et al., 2007; Lock, 2005; Schapman and Lock, 2006; Schmidt et al., 2007)	AN	1 RCT	+	A possible treatment option
	BN	1 RCT, case series	+	A possible treatment option
Antidepressants(Kotler et al., 2003)	AN	No RCT	0	Unknown usefulness
	BN	No RCT; one case series	+	A possible treatment option
Atypical Antipsychotics(Broachie et al., 2003; Hagman et al., 2009)	AN	1 RCT; case series	++	Evidence suggests no benefit
	BN	None	0	Unknown usefulness
Nutritional Advice/Counseling(Hall and Crisp, 1987; Pike et al., 2004)	AN	2 RCTs in adults, none in adolescents	+	Limited evidence suggests little specific benefit
	BN	None	0	Unknown Usefulness

+++ a minimum of two RCTs demonstrating differences in efficacy over another treatment or placebo

++ a minimum of one RCT demonstrating differences in efficacy over another treatment or placebo

+ case series data

0 no data