

## An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa

Satya Kiran Vatti, MD<sup>1\*</sup>, Raja R. Vatti, Ph.D<sup>2</sup>

### ABSTRACT

Eating disorder (ED) is a serious global epidemic confronting adolescent females. If left untreated, they lead to many physical, psychiatric and social consequences. Their complications may lead to complaints such as insomnia, constipation, and fatigue. Dermatologic signs include alopecia, dermatitis, and lanugo. Postponement of treatment often leads to increased mortality in patients. Using DSM IV classification guidelines, Eating Disorders can be classified as Anorexia Nervosa (AN), Bulimia Nervosa (BN) or Eating Disorder Not Otherwise Specified (EDNOS). AN is prevalent in single adolescent females since they are often preoccupied with their body shape and weight. This self-perception bias eventually has an effect on personal relationships. No pharmacological treatments have been approved in the US, and as a consequence, psychiatrists have to rely on psychotherapies for treating anorexia nervosa.

Modified versions of Cognitive Behavioral Therapy (CBT) have become popular treatment modalities for inpatient and outpatient psychiatrists. However, there is not ample published clinical research to identify types of significant benefits of each treatment therapy to have a favorable effect on the outcome of the disease.

We collected and analyzed here several published randomized clinical studies to assess health gains that ensue from the treatment of cognitive behavioral therapy (CBT). The intention here is not to compare CBT with other psychotherapies, but only to establish the proven short-term and long-term benefits of CBT. We are also interested in investigating whether patients of Anorexia Nervosa who are treated with CBT can retain the gains that result from the treatment.

**Keywords:** *Anorexia Nervosa, Cognitive Behavioral Therapy, Eating Disorder, Evaluation, Psychotherapy.*

<sup>1</sup> Jamaica Hospital, Department of Psychiatry, 8900 Van Wyck Exp, Jamaica, NY 11418, East Williston, U.S.A.

<sup>2</sup> St John's University, Department of CIS/ DS, 8000 Utopia Parkway, Jamaica, NY 11439, East Williston, U.S.A.

[\\*Responding Author](#)

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## **An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa**

An Eating Disorder is a psychiatric illness that can cause serious physiological and psychological side effects. It was recently established that 16% of young 14-20 years aged patients presented to the Emergency Room were screened positive for Eating Disorders (20, 5). Eating disorders tend to have strong gender bias, which is illustrated by the fact that 90% of the patients who suffer from eating disorders are females (20). Individuals diagnosed with eating disorders tend to have other comorbid conditions. Depression is especially prevalent, with 50% of ED patients having concurrent depression. Suicidal tendencies were also present in 40% of adolescents with Eating Disorders (4, 20).

Eating disorders are characterized by severely deviant eating behavior which causes physical and psychosocial impairment. The DSM IV-TR classification scheme recognizes three types of ED diagnoses: Anorexia Nervosa(AN), Bulimia Nervosa(BN) and Eating Disorder Not Otherwise Specified (EDNOS). AN is characterized by remarkably low body weight and an intense fear of gaining weight (17). The patient restricts food intake and resorts to intentional vomiting, laxatives and diuretics. They also tend to exercise excessively. AN is the third most prevalent long term illness among adolescent females (17).

A study by Hoek estimated that the incidence of AN to be 8 cases per 100,000 people per year (6, 13). Cumulatively, 0.29% of adolescent females currently meet the criteria for AN. Although the incidence of AN has increased in recent years, it is the disease's mortality rate of 5 per 1000 (6, 1) that has alerted physicians to the necessity of educating their patients about the symptoms of AN.

BN patients are characterized by recurrent binge eating in some circumstances, and extreme weight control on other occasions. Patients diagnosed with EDNOS do not meet the criteria of AN or BN (17).

### **TRAITS ASSOCIATED WITH EATING DISORDERS**

#### ***Physical Traits***

Some noticeable physical signs of these disorders are weight reduction, cachexia, fatigue, and insomnia. Integumentary signs include alopecia, bluish discoloration of the fingernails indicating cyanosis, lanugo, and dermatitis .Other manifestations of AN include electrolyte and hematologic abnormalities, osteoporosis, amenorrhea and hypotension (15).

#### ***Behavioral Traits***

Some notable behavioral symptoms are excessive exercise, restriction of food intake, self induced emesis, and suppression of appetite. Mood abnormalities may include irritability, lack of sex-drive, depression and suicidal tendencies. Approximately 50% of patients being treated for eating disorders have comorbid mood disorders (19).

Individuals who are diagnosed with AN tend to be inflexible in terms of their behavior and their cognitive processes. This tendency to be cognitively inflexible is inherently more prevalent in patients with comorbid Obsessive Compulsive Disorder and Autism. These individuals are also notoriously difficult to treat and may not have a positive outcome after treatment (19).

### *Psychosocial Traits*

Patients diagnosed with eating disorders may also have difficulty maintaining viable interpersonal relationships and will experience social awkwardness with their peers (19). It may be plausible that abnormal eating habits may be a way of compensating for social rejection. In comparison to normal individuals, patients with eating disorders tend to interpret social situations that are equivocal as being unfavorable to them. This propensity to view others in a negative light contributes to social ineptness which indirectly supports destructive eating habits (19). This negativity in social situations is reduced in subjects who have been successfully treated, suggesting neurological changes associated with food restriction may be responsible for improvement.

Many clinical studies have shown that pessimistic emotions are linked to caloric restriction in patients with anorexia nervosa. A clinical study investigating the effect of consuming food on mood found that patients with anorexia had a pessimistic affect during meal consumption. Also, a meta-analysis clearly showed that an improved mood was positively correlated with increased meal intake. These findings elucidate the link between negative emotions and food intake (19).

### *Neurological Defects in Patients with Eating Disorders*

Defects in limbic system pathways are thought to cause many of the cognitive, social and emotional deviant behaviors exhibited by patients suffering from eating disorders. The pathways responsible for regulating these behaviors involve the medial prefrontal cortex, lateral prefrontal cortex, orbitofrontal cortex, striatum, nucleus accumbens and the insula (19). Neurotransmitter abnormalities such as a reduction of dopamine neurotransmission have been measured in the mesolimbic system in patients who have an abatement of symptoms (19).

## **COGNITIVE BEHAVIORAL THERAPY**

Cognitive Behavioral therapy (CBT) is finding increased acceptance in clinical psychiatry. There are two forms of CBT. One is the focused form CBT-ef which concentrates on the psychopathology of the disorder, and the other form is CBT-Eb which addresses external obstacles to change. There are two recommended durations for enhanced cognitive behavioral therapy (CBT-E). For those adolescents with a BMI below 17.5, the length of the treatment is usually prescribed to be at least 40 weeks. For adult patients with a BMI slightly above 17.5, the treatment period could be shortened to 20 weeks (17).

The treatment falls into four stages. Stage 1 includes formulating a plan for treatment with patient collaboration, establishing weekly weighing and regular eating (17). If feasible, significant others should be involved with the treatment plan. Stage 2 consists of eliminating deficiencies and ongoing review of progress. Stage 3 consists of the clinician helping to identify the patient's assumptions about weight and shape. The patient should determine the root cause of his or her inaccurate perceptions. The presence of toxic interpersonal relations and low self worth can also be addressed in clinical therapy sessions. The 4<sup>th</sup> stage of therapy

## **An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa**

is mainly concerned with establishing a protocol to minimize the risk of relapse after CBT (17).

### **CURRENT RESEARCH**

In the past, some clinical studies were conducted to establish the benefits and risks of various psychotherapies. Studies compared alternative treatments using quantifiable parameters of eating disorders. Past clinical trials were designed to investigate treatments for AN, BN and EDNOS. The analysis concentrated on determining the patient's prognosis using measures such as body weight, and psychopathology. Most importantly, the researchers were interested in the patient's ability to sustain the health benefits that resulted due to a therapy for months or weeks after treatment.

The objective of the current investigation is to evaluate the effectiveness of past clinical trials for treating AN using CBT. The key interest of the investigation is to assess whether CBT can successfully improve a patient's quality of life in terms of their weight, thinking and behavior.

The purpose of the paper is to show that CBT can motivate patients to make changes that restore normal health. Using statistical analysis, we want to identify statistically significant benefits of CBT from past clinical research. The intention is to use medically accepted measures to evaluate AN patient progress due to CBT. Body weight and body mass index, psychopathology scores in Eating Disorder Examination (EDE) concerns, Beck Depression index (BDI) and General Severity Index (GSI) scores would be observed both pre and post CBT treatment.

There was limited prior randomized clinical research on the treatment of AN using CBT. We have selected a sample of extensive studies to explore and assess the significant benefits of CBT in minimizing self-destructive behavior and the risk of relapse.

### **TREATMENT EFFECTIVENESS CRITERIA**

The GSI is derived from the SCL-90R questionnaire consisting of 90 items that cover 9 categories of psychiatric abnormalities such as somatization complaints, obsessive-compulsive tendencies, hostility towards others, stress induced by phobias, depressive symptoms, paranoia, and psychosis. The severity and frequency of each symptom is graded on a 5 point scale. Each subject rates the intensity of the symptom they experienced for the previous several days (11).

The EDE score is based on a questionnaire that is primarily concerned with cognitive symptoms exhibited during the previous 28 day period. Certain queries may cover symptomatology experienced for a prior three month period. Question responses are rated on a 0-6 scale, with 0 being complete absence of symptoms, and 6 being experiencing the symptom daily. Subcategories include restraint, eating concern, shape concern, and weight

## **An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa**

concern. The restraint subcategory quantifies the patient's inability to moderate food intake, while the eating concern category measures the subject's level of infatuation with food (8).

The Eating Disorder Inventory 2 (EDI-2) was formulated to quantify the symptomatology of patients afflicted with eating disorders. The EDI-2 consists of 91 questions that measure responses on a 6 point scale. Eleven subcategories measure items such as the patient's drive for weight reduction, the presence of bulimic features, self image, drive for perfection, social distrust, interoceptive awareness IA(EDI), impulse regulation and social insecurity. Each score is converted to a 0-3 scale (3).

The BDI uses 21 items that record responses on a 0-3 scale. The highest cumulative score can be 63. A score close to 0 indicates a lack of depressive symptoms.

The Global Assessment of Functioning (GAF) is a scale that quantifies the ability of a person to function normally and perform activities of daily life. A higher score indicates a superior level of functioning.

The Anorexia Nervosa Stages of Change Questionnaire (ANSOCQ) is a questionnaire with 20 items, each of which is evaluated on a 1-5 scale. It is designed to detect any abnormalities in personal views of body shape and weight, eating habits, weight control techniques, and emotional and social inadequacies. A higher score demonstrates the patient's compliance to the treatment plan (12).

The medical outcomes study Short Form 12 (SF-12) consists of 12 questions organized into two categories, the physical component summary (PCS) and the Mental Component Summary (MCS). A high score indicates a lack of active pathology (16). PCS assesses the role of the patient's health status in interfering with daily physical activity and work. MCS measures how the patient's emotional health interferes with social and work functioning.

The Eating Disorder Quality Of Life (EDQOL) scale is based on a questionnaire that has 25 questions. The answers are recorded on a 5 point scale. The higher the cumulative score, the poorer the quality of life is (16).

### **SOME CLINICAL RESULTS WITH CBT**

#### ***Fairburn et al (7)***

31 subjects in the UK and 32 subjects in Italy completed 40 weeks of CBT-E, followed by a 60 week follow up period for assessment (7). The total sample of 63 patients consisted of predominantly single females with a mean age < 25 and a mean BMI  $\leq$  17.5. All participants had undergone outpatient CBT-E therapy for anorexia nervosa.

After CBT-E was administered for 40 weeks, the mean body weight and BMI increased significantly ( $p < .001$ ). The mean increases in body weight and BMI were 7.5 kg and 2.6 respectively. Improvements in mean body weight and BMI were maintained with minor change through the time of the 60 week follow-up.

## **An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa**

The psychopathology of patients also improved significantly and the improvements were maintained during the 60 week follow-up without significant deterioration. The significant mean decrease after treatment was 1.89 for EDE-Q, 2.23 for dietary restraint, 1.57 for shape concern and 1.73 for weight concern. The mean reduction in the GSI score was 0.78, which was also significant. See table 1.

There was some evidence to suggest that there is an inverse relationship between the percentage of subjects who complete the treatment and the severity of their psychopathology. In other words, the higher the severity of the psychopathology is, the lower the probability is for a patient to complete the treatment.

### **Grave et al (9)**

This was a controlled trial with inpatients which randomly assigned 80 AN patients to two treatments, CBT-Ef and CBT-Eb (9). The patients were primarily single females between the ages of 14 and 65. The twenty week treatment period was followed by 6 and 12 month follow ups. 72 patients completed (37 for CBT-Ef and 35 CBT-Eb) the treatment course, while 69 patients participated in the 6 month follow up, and 68 subjects remained in the study for the 12 month follow up.

There was no significant difference between the CBT-Ef and CBT-Eb modes of therapy when we compare body measures before and after treatment with CBT. There was significant improvement in body weight and BMI at the end of treatment with both modalities of CBT. See table 2. The mean increase in body weight was 12.7 kg ( $p < .05$ ) and the mean increase in BMI was 4.9 ( $p < .05$ ).

The treatment resulted in significant decreases in psychopathological measures such as the EDE-eating concern, EDE-weight concern, EDE-shape concern and GSI scores. The mean decreases after treatment were 2.2 for the EDE-eating concern score, 1.5 for the EDE-weight concern score, 0.9 for the EDE-shape concern score, and 1.0 for the GSI score.

The patients were able to maintain most of the achieved gains through the 6 and 12 month follow up periods. The mean body weights were 46.8 kg and 46.7 kg at the 6 and 12 month follow ups respectively. The mean EDE-weight concern sub scores were 1.7 and 1.5 at the 6 and 12 month follow ups respectively, which were significant reductions over the sub scores observed before CBT treatment was administered.

### **Grave et al (10)**

46 adolescent single white females, with a mean age of 15, completed 40 weeks of outpatient CBT-E (10). The post treatment follow up period was 60 weeks. AN patients treated with CBT-E showed significant improvement in body weight, BMI and psychopathology measures. The mean gain in body weight was 8.6 kg after treatment, while the mean EDE-Q eating concern, EDE-Q shape concern, EDE-Q weight concern and GSI scores showed significant mean declines of 2.01, 1.95, 2.19 and 0.67 respectively ( $p < .001$ ). See table 3.

## **An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa**

The mean body weight gain achieved after the treatment of CBT-E was maintained through the 60 week follow up period. The immediate post-treatment mean weight was measured to be 49.6 kg, while the mean weight after the 60 week follow up period was found to be 50.9 kg. The difference between the measures of mean weight for the immediate post treatment and 60 week follow up period was insignificant.

### **Ball and Mitchell (2)**

Ball and Mitchell utilized a randomized controlled clinical trial design to study 25 AN female patients between the ages of 13 and 28 years (2). The main objective was to establish the effectiveness of CBT. CBT was administered for a treatment period of 12 consecutive months, followed by a 6 month follow up period to determine whether the improvement due to the therapy could be sustained for a significant period of time after the conclusion of treatment.

When the evaluation criteria were examined before and after CBT, significant improvements in BMI, EDE, Interoceptive Awareness IA( EDI) and the BDI-cognitive score were observed. See table 4. The mean EDE decreased from 4.25 pre-treatment to 2.37 post treatment, while the mean IA (EDI) declined from a value of 15.33 before treatment to 5.44 after treatment. The mean BDI was reduced from 20.56 before therapy, to 9.78 after CBT. Moreover, mean BMI increased from a pre-CBT value of 15.86 to 18.73 post CBT. All these changes were statistically significant.

The most important clinically relevant question pertaining to CBT treatment is whether the benefits achieved at the conclusion of treatment can be retained without significant changes in the criteria levels. By examining the benchmarks of criteria during the six month follow up period in table 4, it is evident that CBT treated patients can retain a significant portion of gains achieved.

### **McIntosh et al (14)**

McIntosh et al(14) selected a randomized controlled trial to compare the effectiveness of CBT, Interpersonal psychotherapy (IPT) and nonspecific supportive clinical management respectively in the treatment of females aged between 17 and 40 years who were diagnosed as having anorexia nervosa according to the DSM-IV TR criteria (14). 19 patients were given the CBT treatment for duration of 20 weeks, and there was no follow up period for observing post treatment changes.

After the completion of CBT treatment, GAF scores and EDE-restraint scores showed significant improvement. The mean GAF score was elevated from 48.8 pre-treatment to 53.2 post-treatment. The mean EDE-restraint score declined from 3.9 before therapy to 2.8 after therapy. See table 5.

### **Touyz et al (18)**

This randomized controlled study focused on chronic adult female patients with intractable AN who had presented with complications for at least seven years (18). The clinical study

## **An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa**

had to engage patients who were very non-compliant due to their chronic debilitating eating disorder. Therefore, the primary focus of the clinical investigators in this study was to improve quality of life for the patients, rather than increased weight gain. The central goal of the trial was to increase compliance and patient participation in treatment plans. This would help in eliminating their self-destructive tendencies for an extended period of time. CBT was one of several treatment modalities that were administered for an 8 month period. There were two follow up periods, one at the end of six months and another at the end of 12 months, to assess long term outcomes of the treatment.

Quality of life measures such as EDQOL and SF-12 MCS exhibited significant improvement after the CBT treatment. The mean EDQOL total decreased from 1.7 at baseline to 1.2 after CBT. The mean SF-12 MCS rose from 34.2 at baseline to 40.2 at the end of treatment. After CBT therapy, the Mean BDI declined from 22.6 pre-therapy to 14.1 post-therapy, which is quite significant. Patients showed increased motivation to recover at the termination of CBT treatment. This improvement was evident from the mean ANSOCQ score of 2.5 at baseline and a score of 3.2 post CBT therapy. Also, mean EDE which measures the severity of psychopathology of anorexia showed a statistically significant decline from 3.0 pre-therapy to 1.7 after therapy. Mean BMI also improved, but the gain was insignificant since it was not substantial enough to eliminate the diagnosis of eating disorder. See table 6.

If we observe the last two columns of table 6, we can see that the gains achieved at the end of CBT treatment in EDQOL, SF-12 MCS, BDI, EDE and ANSOCQ were all retained with minor changes during the 6 and 12 month follow ups.

### **DISCUSSION**

AN is a debilitating eating disorder striking mainly adolescent females who show concern with their shape and weight. In the US, the treatments for this illness are mainly psychotherapies, and the clinical studies examined in this article attempted to assess the benefits of CBT in the treatment of AN. The current study is an evaluation of recent clinical trials using various forms of CBT to establish the benefits that result from therapy.

The clinical trials considered have analyzed several physical, psychopathological, and behavioral attributes of the patients and the magnitude of improvements in these criteria after CBT treatment.

The studies evaluated here show that the increases in the mean body mass and weight gains of AN patients at the end of CBT treatment were significant. Fairburn et al (7) observed a mean weight gain of 7.5 kg, which was a 17% increase, while Grave et al (9) noted that the mean weight gain after CBT was 12.7 kg, a 33% increase. Similarly, BMI gains were reported as 16% in one study and 34% in another study. In another study, 62% of AN patients achieved a post-treatment mean BMI  $\geq 18.5$ , which is in contrast to 0 patients achieving the same BMI levels before therapy.

## **An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa**

An evaluation of the examined studies also revealed that psychopathology scores were reduced quite significantly after CBT treatment. In one study, EDE weight concern declined from 2.91 units before treatment to 0.72 units after treatment, which was a 75% decline. Similarly, EDE shape concern and EDE eating concern also decreased significantly. A 60% decline in mean shape concern was reported in one of the clinical studies. It decreased from a mean of 3.22 to a mean of 1.27. The GSI was also impacted favorably by CBT. In one randomized clinical trial GSI declined from 1.8 before CBT to 0.8 after CBT, which was a 56% improvement.

Depression is one of the main adverse consequences of eating disorders. From the evidence reported, it appears that CBT has a positive impact on BDI. In one clinical report, the mean BDI cognitive score decreased from 20.56 before treatment to 9.78 after treatment. This is a clear indication that CBT can be helpful in improving the attitudes and moods of AN patients. CBT also seems to exert favorable influence on EDQOL and ANSOCQ scores as well. Touyz et al (18) observed from their clinical study of 31 AN patients that at the end of CBT treatment, mean EDQOL experienced a decline from 1.7 at pretreatment to a mean of 1.2 at post treatment. ANSOCQ was found to be elevated from an initial mean of 2.5 to a mean of 3.2 after CBT.

The results of CBT treatment studies show significant evidence that CBT treated patients were able to retain the attained gains for several months after treatment. Thus from the analysis of clinical studies that used CBT for treating AN, there is statistically significant evidence to show its promise as a treatment for adolescent female patients.

When we combined the results of all studies analyzed here, and when we calculated the weighted mean effect size for each evaluation criterion, it is clearly evident that CBT therapy has a significant and lasting impact on Anorexia Nervosa patients. From Table 7, one can see that average effect sizes on body weight and BMI are +1.81 and +2.33 respectively. Mean effect size changes in eating, shape, and weight concern as well as GSI were in the negative direction as anticipated and were proven to be significant.

### **CONCLUSIONS**

CBT-E appears to be a viable psychotherapy for treating AN patients. The patients who received CBT seem to be compliant with treatment guidelines and they seem to appreciate the improvement in quality of life that is achieved. The patients' willingness to adhere to therapy guidelines allowed them to hold onto the gains achieved for a longer period of time.

Since there are other psychotherapies that are administered to treat AN, it is important to compare the treatment outcome of CBT with those of other treatments to determine the relative effectiveness of CBT. Since a majority of AN patients are adolescent females, family therapy is another treatment alternative with which CBT should be compared. Therefore, a comparative study of alternative therapies would be a worthwhile future investigation.

## An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa

The results of some of the studies were based on relatively smaller sample sizes, and therefore it is very valuable to look at larger sample size studies to validate the results achieved in past research.

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## An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa

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**Table 1**  
**Fairburn et al.(7) The UK-Italy Study**

<b>Variable</b>	<b>Before CBT Treatment Mean(SD)</b>	<b>After 40 wks of CBT-E Mean(SD)</b>	<b>Before vs. After CBT Standardized Effect</b>	<b>60 wk follow-up Mean(SD)</b>
<b>Body Weight (Kg)</b>	43.7(5.7)	57.2(6.1)	1.32***	50.4(6.6)
<b>Body Mass Index(kg/m<sup>2</sup>)</b>	16.0(1.2)	18.8(1.3)	2.17***	18.7(1.5)
<b>% with BMI &gt;18.5</b>	0%	62%	+62%***	55%
<b>Psychopathology</b>				
<b>EDE-Q</b>	3.19(1.5)	1.30(1.3)	-1.26***	1.46(1.4)
<b>Dietary Restraint</b>	3.32(1.8)	1.09(1.4)	-1.24***	1.39(1.7)
<b>Shape Concern</b>	3.40(1.7)	1.83(1.7)	-0.92***	1.36(1.6)
<b>Weight Concern</b>	2.95(1.7)	1.22(1.4)	-1.02***	1.67(1.5)
<b>General Psychiatric</b>				
<b>GSI</b>	1.45(0.8)	0.67(0.6)	-0.98***	0.70(0.6)

\*\*\* significant (p<0.001)

## An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa

**Table 2**  
**Grave et al (9)**

Variable	Before Treatment Mean(SD)	After 20 wks CBT Treatment Mean(SD)	Before vs. After CBT Standardized Effect	6 month follow up Mean(SD)	12 month follow up Mean(SD)
<b>Body Weight(kg)</b>	37.4(5.4)	50.1(5.1)	+2.35*	46.8(7.2)	46.7(7.0)
<b>BMI</b>	14.3(1.8)	19.2(1.3)	+2.72*	17.9(2.3)	17.8(2.3)
<b>EDE- Eating Concern</b>	3.4(1.3)	1.2(1.1)	-1.69*	1.6(1.5)	1.4(1.4)
<b>EDE- Wt Concern</b>	3.6(1.6)	2.1(1.4)	-0.94*	1.7(1.4)	1.5(1.4)
<b>EDE Shape Concern</b>	3.7(1.5)	2.8(1.6)	-0.6*	2.2(1.6)	2.2(1.6)
<b>GSI</b>	1.8(0.8)	0.8(0.6)	-1.25*	1.0(0.8)	0.9(0.7)

\*significant (p<.05)

**Table 3**  
**Grave et al.(10)**

Variable	Before Treatment Mean(SD)	After CBT-E treatment Mean(SD)	Before vs. After CBT Standardized Effect	60 Wk Follow Up Mean(SD)
<b>Body Weight</b>	41.0(5.3)	49.6(4.3)	+1.62***	50.9(5.5)
<b>BMI Centile</b>	3.36(3.73)	30.3(16.7)	+26.94***	35.1(26.0)
<b>EDE-Q Eating Concern</b>	2.67(1.5)	0.66(0.9)	-1.34***	1.32(1.6)
<b>EDE-Q Shape Concern</b>	3.22(1.6)	1.27(1.3)	-1.22***	0.83(1.3)
<b>EDE-Q Weight Concern</b>	2.91(1.6)	0.72(1.1)	-1.37***	1.05(1.4)
<b>GSI</b>	1.18(0.6)	0.51(0.4)	-1.12***	0.48(0.4)

\*\*\*significant (p<.001)

**Table 4**  
**Ball and Mitchell(2)**

Variable	Before CBT treatment Mean(SD)	After CBT (12 mo) Mean(SD)	Before vs. After CBT Standardized Effect	6 month follow up
<b>BMI</b>	15.86(1.77)	18.73(1.72)	+1.62*	18.55(1.78)
<b>EDE</b>	4.25(2.05)	2.37(1.38)	-0.92*	2.41(.97)
<b>IA(EDI)</b>	15.33(7.43)	5.44(5.25)	-1.33*	8.33(6.80)
<b>BDI Cognitive</b>	20.56(9.75)	9.78(11.58)	-1.11*	11.44(9.07)

\*significant (p<.05)

## An Evaluation of Cognitive Behavioral Therapy for the Treatment of Anorexia Nervosa

**Table 5**  
**McIntosh et al.(14)**

Variable	Before treatment n=56 Mean(SD)	After CBT treatment Mean(SD)	Before vs. After CBT Standardized Effect
EDE Restraint	3.9(1.3)	2.8(1.7)	-0.85*
GAF	48.8(5.6)	53.2(9.5)	+0.79*

\*: significant (p<.05)

**Table 6**  
**Touyz et al.(18)**

Variable	Before CBT Treatment Mean(SD)	After CBT treatment Mean(SD)	Before vs. After CBT Standardized Effect	6 month follow up Mean(SD)	12 month follow up Mean(SD)
EDQ oL total	1.7(1.7)	1.2(0.80)	0.73***	1.1(0.5)	1.2(0.7)
SF-12 MCS	34.2(13.2)	40.2(11.1)	0.46*	39.9(8.7)	37.8(9.8)
BDI total	22.6(13.6)	14.1(12.2)	0.62**	13.1(7.9)	14.9(11.3)
WSAS total	16.0(10.4)	12.4(9.9)	0.34	9.3(4.9)	11.7(7.4)
BMI	16.3(1.3)	16.8(1.5)	0.42*	16.6(1.4)	17.0(1.7)
EDE Global	3.0(1.4)	1.7(1.1)	0.85***	1.7(1.1)	1.5(1.1)
ANSOCQ total	2.5(1.6)	3.2(0.8)	1.09***	3.2(0.8)	3.5(0.7)

\*significant ( p<.05), \*\* significant( p<.01), \*\*\* significant (p <.001)

**Table 7: Pooling of Studies**

Variable	Before vs. After CBT Average Effect Size
Body Weight (Kg)	+1.81*
BMI (m/kg <sup>2</sup> )	+2.33*
EDE-Eating Concern	-1.39*
EDE-Shape Concern	-0.81*
EDE-Weight Concern	-1.08*
GSI	-1.12*

\*significant at P<.05

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