

INDICATORS OF SEVERITY IN EATING DISORDERS IN  
ADOLESCENTS AND THE EFFECTS ON RAPIDITY OF  
WEIGHT GAIN DURING HOSPITALIZATION

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by

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Eating disorders are a very complex and serious psychiatric condition that require an ongoing commitment to a comprehensive treatment plan involving both medical and psychological intervention. Increases in the prevalence of this disorder, the high cost of hospitalization and the mounting rates of relapse have lead to increased pressure to identify and to understand predictive indicators of recovery. Though predictive variables have been identified in multiple studies,

results are inconsistent and continue to focus on psychological measures; meanwhile disease-related variables are less frequently explored with regard to weight gain and more consistently reviewed in connection with long-term outcome. The primary aim of this study was to explore whether measures of severity at admission predicted rapidity of weight gain, or, more specifically, the length of time for a patient to achieve 85 percent of his or her ideal body weight. The sample consisted of 59 patients who were hospitalized for an eating disorder and who were admitted below 85 percent of their ideal body weight. Upon admission, patients completed self-report measures to assess depression and eating disorder symptomatology. Additionally, archival data concerning other measures of severity were gathered from patient medical charts. The study's results suggest that the patient-reported intensity of eating disordered symptoms at admission are a significant predictor of length of time to reach 85 percent of ideal body weight. In future studies, researchers should utilize alternative measures of psychological functioning and eating disorder symptomatology, in addition to self-reports, to obtain more accurate predictors of severity.

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## LIST OF ABBREVIATIONS

AN – Anorexia Nervosa

BMI – Body Mass Index

BN – Bulimia Nervosa

ED – Eating Disorder

EDNOS – Eating Disorder Not Otherwise Specified

EDDS – Eating Disorder Diagnostic Scale

IBW – Ideal Body Weight

PHQ-9 – Patient Health Questionnaire

## **CHAPTER ONE**

### **Introduction**

#### **STATEMENT OF THE PROBLEM**

Anorexia nervosa is one of the most frustrating and intractable forms of psychopathology and is generally characterized as a disorder in which levels of motivation for recovery are noticeably deficient (Rieger et al., 2000). Prevalence of anorexia nervosa in adolescent and young adult women ranges from one percent to four percent, and, while prevalence of the disorder in children is lower, many experts agree that there has been a steady increase of cases in prepubescent children (American Psychiatric Association, 2000; Colton & Pistrang, 2004). Females aged 15-19 years have the highest incidence of anorexia, comprising 40 percent of all identified cases, yet incidence rates among younger females aged 10-14 continues to rise rapidly (Hoek & van Hoeken, 2003). While prevalence rates among males are difficult to determine given the social stigma created by the perception that anorexia is a female disease, males typically comprise between 10% and 15% of the eating disordered population (Keel, Klump, Leon, & Fulkerson, 1998).

Anorexia severely hinders emotional and cognitive functioning and is considered one of the most fatal psychopathologic disorders. With mortality rates near five percent, loss of life associated with anorexia is more than 12 times greater than the annual death rate due to all causes of death for females 15-24

years old (Sullivan, 1995). Anorexia is a very complex and serious psychiatric condition that requires an ongoing commitment to a comprehensive treatment plan involving both medical and psychological intervention. Although there are a variety of treatment philosophies and opportunities available for individuals suffering from anorexia nervosa, the primary goal is the same: “nutritional rehabilitation and restoration of normal eating patterns to correct the biological and psychological sequelae of malnutrition that may perpetuate eating-disordered behavior” (American Psychiatric Association, 1993, p. 214).

Admission to inpatient treatment facilities is the most common form of treatment for adults and children with anorexia, but determining whether admission is appropriate for children and adolescents is often challenging (Colton & Pistrang, 2004). Studies have shown that hospitalization, while often necessary and effective, is extremely expensive, can pose risks to the psychosocial and cognitive development of young children, and boasts high relapse rates when controlling for levels of weight loss, resulting in poorer psychosocial outcomes in comparison to alternative outpatient treatment interventions (Colton & Pistrang, 2004). While these studies have largely focused on females, there are few, if any reasons to suspect a differential or worse outcome from treatment for males (Anderson & Holman, 1997). A variety of studies have found that men appear to have the same rate of response to treatment as women, as well as a similar long-term prognosis (Eliot & Baker, 2001; Woodside, 2005), but further research

is needed to look at differences of treatment response among boys and girls, A comprehensive understanding and identification of the variables associated with poor outcome and relapse are thus important, as they will help to inform, improve and to standardize treatment in inpatient facilities, so as to decrease length of stay and to increase likelihood for recovery.

Patients with eating disorders are notoriously resistant to treatment and typically exhibit a lack of motivation to change (Vitousek, Watson, & Wilson 1998). Despite its seriousness, many individuals diagnosed with anorexia rarely seek treatment voluntarily, but are instead brought into treatment centers and hospitals by alarmed relatives and friends. Individuals suffering from this disorder, which is characterized by secrecy and shame, often resist treatment because recovery could mean letting go of the very purposes the eating disorder serves: seeking attention from others, maintaining a sense of control or security and providing a sense of identity (Pike, 1998; Slade, 1982). However, due to the high rates of mortality and medical complications associated with this disorder, intervention is vital in order to improve both medical and psychological outcomes. Increases in the prevalence of this disorder, the high cost of hospitalization, and the mounting rates of relapse have led to increased pressure to identify and to understand predictive indicators of recovery.

Current research reveals discrepant findings on treatment outcomes in individuals suffering from anorexia nervosa; furthermore, little research exists on

rapidity of weight gain among adolescents, especially in acute hospital settings. While some research indicates rapid weight gain may actually lead to higher readmission rates and lengthier stays in inpatient treatment units, other research suggests the opposite. Though predictive variables have been identified in multiple studies, results are inconsistent and continue to focus on psychological measures (Kaplan, Olmsted, Carter, & Woodside, 2001; Steinhausen, 2002). Disease-related variables, such as age of onset, duration of illness, previous treatment, and comorbid psychopathology, though more readily accessible indicators of severity, are less frequently explored with regard to weight gain and more consistently reviewed in connection with long-term outcome.

While a variety of studies (Hartmann, Wirth, & Zeeck, 2007) have found chronicity, age of onset, psychiatric comorbidity, and low weight as predictors of poor outcome, these variables' relationships to measures of severity and rapidity of weight gain remain unclear. Research results on how demographic variables affect the severity of illness (i.e., rapidity of weight gain or length of stay in an inpatient psychiatry unit), are also mixed. In the short term, inpatient treatment is successful in restoring patients' weight and eliminating the imminent physical danger of anorexia; however, relapse rates remain high, and some evidence suggests that such treatment programs are unsuccessful in the long term (Colton and Pistrang, 2004).



Although many of the programs demonstrate similarities in structure, there remains a lack of empirical evidence concerning the most effective treatment strategies due to the difficulty of conducting field research. While weight gain continues to be the primary focus of treatment, most patients remain resistant to treatment. Although the number of studies on eating disorders has increased drastically over the last few decades, few studies have established prognostic factors that affect outcome. Over the years, studies of anorexia have generally demonstrated that approximately 50% of individuals have good outcome, 25% have an intermediary outcome, and 25% have a poor outcome. Among those 50% with a good outcome, approximately one-third recover within three years, one-third within six years, and one-third within 12 years. Mortality rates observed among these studies range from 0% to 18% (Yates, 1990).

The primary aim of this study is to identify indicators of severity in eating disorders and to determine which demographic variables predict rapidity of weight gain, or, more specifically, the length of time it takes to reach 85 percent of ideal body weight during inpatient treatment for eating disorders. Identifying specific indicators of severity may be helpful in assessing prognosis at the onset of treatment, informing treatment programs of patient needs more explicitly, thereby reducing length of stay and preventing relapse.

## **CHAPTER TWO** **Review of the Literature**

### **SIGNIFICANCE AND BACKGROUND**

#### **Diagnosing Anorexia Nervosa**

The Diagnostic and Statistical Manual of Mental Disorders – 4<sup>th</sup> Edition Text Revision (DSM-IV-TR: American Psychiatric Association, 2000) lists the following criteria for a diagnosis of anorexia nervosa: 1) refusal to maintain body weight at or above a minimum normal weight for age and height (less than 85% of expected), 2) a strong fear of gaining weight or becoming fat despite being severely underweight, 3) body image disturbance, excessive influence of body weight on self-assessment, or denial of the seriousness of low weight, and 4) the absence of three successive menstrual cycles in postmenarcheal females. The presentation of anorexia is specified and coded in the DSM-IV-TR as either “restricting type” or “binge-eating/purging type.”

Determination of expected body weight should take into account a combination of previous height and weight percentiles, anticipated growth and average weights of healthy adolescents of the same sex, height, and sexual maturity rating. Furthermore, if anorexia develops during puberty and prevents sexual maturation, premenarcheal females may not meet the standard criteria of amenorrhea (Fisher et al., 1995). Adolescents who do not meet full DSM-IV-TR criteria for anorexia, yet have symptoms of disordered eating and are in need of

intervention, will formally fall within the category of Eating Disorder Not Otherwise Specified (EDNOS; Robin, Gilroy, & Dennis, 1998).

### **Prevalence and Incidence**

Among young females aged 10-19 years, incidence rates for anorexia have steadily increased over the last fifty years; with a reported prevalence of 0.48%, anorexia has become the third most common chronic condition among adolescent females following asthma and obesity (Robin et al., 1998). Furthermore, anorexia nervosa is not limited to Caucasian upper and middle class families. One study found a wide range of demographic characteristics among young patients, noting that the disease can occur among children of various cultural, ethnic, and socioeconomic backgrounds (Robin et al., 1998).

### **Etiology and Risk Factors**

As the volume of research on eating disorders increases, a number of models and theories have emerged in an attempt to explain the complicated etiology of anorexia nervosa. Risk and etiology factors of anorexia have been proposed from a variety of theoretical perspectives including biological, cognitive behavioral and psychodynamic and explore such factors as biological, developmental, social and psychological causes. Fairburn and colleagues (Fairburn, Cowen, & Harrison, 1999) posit that many of the

psychological risk factors for eating disorders ultimately may be a reflection of genetic predisposition and gene-environment interactions. While it remains unclear whether genetic or environmental factors are the primary cause, researchers have discovered that there is an increased risk of developing an eating disorder if a family member also has the illness. In their research of families with eating disordered individuals, Minuchin and colleagues (1978) found several commonalities, including the presence of dysfunctional qualities such as enmeshment, intrusiveness, and hostility between family members.

In a society increasingly consumed with the perception of thinness and beauty espoused by the media, the prevalence of eating disorder symptomatology has increased markedly. Researchers suggest that excessive concerns about weight and body image among adolescents, which often arise with normative changes during puberty, may be a pathway to the development of eating disorders (May, Kim, McHale, & Crouter, 2006). According to one study of 341 adolescent females, 41% reported viewing themselves as overweight while only 17% of them were actually considered overweight. Furthermore, 73% of the girls reported dieting in the past, and of those girls, 61% reported using unhealthy weight loss methods such as vomiting or skipping meals (Neumark-Sztainer, Palti, & Butler, 1995).

As incidence rates for anorexia nervosa continue to rise among children and adolescents, identifying risk factors in eating disorders has become a vital

part of prevention. Risk factors for anorexia include low self-esteem, perfectionism (Fairburn, Cooper, Doll, & Welch, 1999), increased concern about body shape and weight, negative self-evaluation, sexual abuse and eating difficulties in early childhood (Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004). In addition to these risk factors, researchers have also implicated certain personality characteristics as risks for developing eating disordered behavior: perfectionism, obsessiveness, anxiety and compulsiveness (Group, 2001; Klump et al., 2000). Furthermore, the presence of intense fear of weight gain and disturbances in body image may depend upon such factors as cognitive development and the ability to engage in abstract reasoning (Robin et. al., 1998). However, these fears and distortions only develop during adolescence and thus children may not readily verbalize them. One study of 5 to 11 year-old children with atypical eating disorders (Jaffe & Singer, 1989) found that, while the children displayed such behaviors as slow eating, food rituals and hiding food, none of them expressed a fear of fatness or distorted body image (Robin et al., 1998). There are several sub-populations of adolescent males that present with heightened risk factors for developing an eating disorder. Adolescent males more at risk include those involved in athletic activities, those struggling with sexual identity conflict, those diagnosed with co-morbid mental disorders, those with a family history of eating disorders, or those living in a chaotic home environment (Reijonen, Pratt, Patel, & Greydanus, 2003).

Knowledge regarding the heightened risk factors for this population proves important, especially since early identification of eating disorders has been found to improve treatment outcomes (Reijonen et al., 2003). Despite growing research, identifying risk factors for eating disorders for both males and females remains a work in progress.

### **INDICATORS OF SEVERITY**

The severity of an eating disorder can be captured by a number of important indicators, and, while such indicators include severe weight loss and cessation of menses, this particular study will focus primarily on age of onset of the eating disorder, duration of symptoms, number of symptoms endorsed, psychiatric comorbidity and previous treatments.

#### **Age of Onset and Duration of Symptoms**

Age of onset of anorexia remains a critical component of prognosis, but its effects on outcome are still uncertain. While early onset of illness for most psychiatric illnesses leads to a poor prognosis (Fennig & Carlson, 1995), researchers are unsure if this holds true for anorexia. Given onset of the disease before the age of 11, many researchers found evidence supporting a worse outcome, including continued eating difficulties, medical complications and further medical and psychological treatments (Bryant-Waugh, Knibbs, Fosson, Kaminski, & Lask, 1988; Lesser, Ashenden, Debuskey, & Eisenberg, 1960). On the other hand, researchers present

evidence concluding that later onset predicts unfavorable outcome (Hsu, Crisp, & Harding, 1979; Morgan & Russell, 1975). Still other investigators, such as Casper and Jabine (Fichter & Quadflieg, 1999), found age of onset of anorexia has no impact on prognosis.

### **Number of Symptoms Endorsed**

As previously stated, a large number of adolescents with disordered eating do not meet DSM-IV-TR criteria for anorexia nervosa but present with abnormal behaviors and attitudes about eating and present with symptoms of EDNOS. The number of symptoms that an individual endorses may be one indication of the severity of the disorder. Symptoms may be obtained directly from the patient, or, because at intake there may be concern about the validity of self-report, symptoms may be obtained from observers (e.g., the patient's parents). The clinician conducting intake use data from both the adolescent and the parent(s). Due to the concern of legitimacy surrounding self-report at the time of intake, though, it is important to ensure that the number of symptoms an individual presents with is accurate. Thus, it is essential to also take into consideration the symptoms endorsed as determined by the clinician at admission. In evaluating symptom endorsement, it is problematic to compare clinician and patient self-reporting as the clinician intake forms and the Eating Disorder Diagnostic Scale (EDDS) are not equivalent to one another, and inconsistent reporting among the clinicians is common. Consequently, rather than assess for specific symptoms of

anorexia at the time of intake, a measure of severity of the illness will be obtained for all patients.

### **Psychiatric Comorbidity**

As mentioned previously, anorexia nervosa has the highest mortality rate of any psychiatric disorder (Sullivan, 1995), with rates reported to be approximately 5% in anorectic individuals. In a large sample of women currently suffering from an eating disorder, Spindler and Milos (2007) found the association between eating disorder symptom severity and Axis I and II comorbidity to be high, with rates at 73% and 68% respectively. The lifetime prevalence of MDD in anorectic patients has been estimated to be between 9.5% - 64.7%, a disorder that is four times more likely than expected to occur within this population. Research is inconclusive as to whether anorexia is the sole cause of depression or if starvation-related changes make one more vulnerable to develop the disorder (Herzog, Nussbaum, & Marmor, 1996). Furthermore, there is a well-documented link between anorexia nervosa and anxiety disorders; Halmi and colleagues (1991) found a lifetime incidence of 65% for any anxiety disorder, with social phobia and obsessive-compulsive disorder (OCD) being the most prevalent.

Research has shown that depression, anxiety, and personality disorders are frequently diagnosed in eating disorder patients and can significantly complicate treatment. Psychiatric comorbidity associated with eating disorders has been



limited to adults and rarely has been explored with regards to children and adolescents, despite its typical onset during adolescence (Salbach-Andrae et al., 2008). It is felt that a greater understanding of the psychiatric comorbidity associated with eating disorders will potentially enable the development of more efficient and effective treatment methods. Comorbid psychiatric disorders may impact the severity, chronicity, and resistance to treatment of the eating disorder (Salbach-Andrae et al., 2008). Psychiatric comorbidities adversely impact prognosis, worsening treatment outcomes and reducing rapidity of weight gain.

### **Previous treatment**

Eating disorders often develop into a long and chronic course and individuals with a long duration tend to have complex treatment histories. In various studies on eating disorders (e.g., Zerbe, Marsh, & Coyne, 1993), researchers found that nearly 50% of inpatients previously received some form of psychiatric treatment, whether inpatient or outpatient, for eating disorders. Controlled studies on eating disorder treatment outcomes indicate high relapse rates ranging from 30% - 50% within the first year of discharge

## **CHAPTER THREE**

### **Rationale, Aims, and Hypotheses**

#### **RATIONALE AND AIMS**

The primary purpose of this study is to determine how patient characteristics related to severity of illness predict rapidity of weight gain during inpatient hospitalization. The ability to identify the length of time to reach 85 percent of ideal body weight would be helpful in estimating the patient's length of stay in inpatient treatment, informing treatment programs, and decreasing the likelihood of relapse. The primary aim of this study, then, is to explore whether measures of severity predict the length of time it takes for a patient to achieve 85 percent of ideal body weight. Indicators of severity include the age of onset of the eating disorder, the duration of illness, the patient-reported intensity and frequency of eating disordered symptoms as endorsed on the Eating Disorder Diagnostic Scale, psychiatric comorbidity, the eating disorder symptom severity as determined by clinician reports, the patient-reported severity of depression and frequency of depressive symptoms as assessed by the PHQ-9, as well as the history of previous treatments.

#### **HYPOTHESIS**

##### **Hypothesis**

Patients will take longer time to achieve 85 percent of ideal body weight if they have an earlier age of onset, longer duration of illness, history of previous

treatments, greater severity of illness and comorbid psychopathology as determined by the clinician, and greater intensity and frequency of eating disorder and depressive symptoms.

## **CHAPTER FOUR**

### **Methodology**

#### **Participants**

The proposed study consisted of 59 participants, both male and female, who were admitted to the inpatient or partial hospitalization program for treatment of Anorexia Nervosa, Bulimia Nervosa, or Eating Disorder Not Otherwise Specified at Children's Medical Center of Dallas between the dates of November 2005 and July 2008. Participants were between the ages of 10 and 19 years of age at the time of admission and had a primary DSM-IV-TV diagnosis of Anorexia Nervosa, Bulimia Nervosa or Eating Disorder Not Otherwise Specified. Furthermore, included patients had to weigh less than 85 percent of their ideal body weight upon admission. Patients with a diagnosis of psychotic disorder or Somatoform disorder, along with individuals with borderline intellectual functioning (IQ of below 80 based on a report from their primary caregiver, observations, and formal intellectual testing), were excluded.

#### **Design and Procedure**

Archival data were gathered from patient medical charts from the Center for Pediatric Eating Disorders at Children's Medical Center. Participants for this study were admitted between November 2005 and July 2008 and it was expected that at least 75 individuals would meet the criteria to participate. The patient's weight, along with other indicators of severity, was obtained from the medical

record. Patient's weight was recorded by the dietitian, while information regarding the age of onset, duration of symptoms, and previous treatment was gathered by the physician during formal intake interviews at admission. Data concerning the number of symptoms endorsed as well as severity of depression were gathered both through self-report measures and physician assessment completed at admission. As with the other indicators of severity, this information was obtained from the patient medical record.

Patient-reported intensity and frequency of eating disorder symptoms and depressive symptoms were assessed by self-report measures and obtained at intake. While 59 patients met criteria to participate in the study, only 42 of these participants completed both self-report measures due to multiple circumstances. Seventeen participants were unable to complete the EDDS and PHQ-9 due to matters such as reading difficulties attributable to a young age or cultural and language barriers attributable to a large Spanish speaking population.

### **Setting**

The psychiatric unit at Children's Medical Center is a medical psychiatric unit treating a variety of psychiatric disorders, but this particular unit is also the site for the Center for Pediatric Eating Disorders. This unit has specific treatment protocols for eating disorder patients and their families, which include five levels of care

necessary to meet the medical and psychological needs of each patient: outpatient, intensive outpatient, day treatment, partial hospitalization, and inpatient hospitalization. For purposes of this study, only individuals admitted to the inpatient or partial hospitalization programs were included. The general goals of the eating disorder program include gradual weight restoration and monitoring, nutrition education, and addressing abnormal eating attitudes and behaviors. The present information was obtained from Children's Medical Center as well as a previous study, which utilized a sample from the same population of eating disordered patients (Phillips, 2008).

The program is based on a point and level system where patients are given three individualized treatment goals, one of which consists of a personalized meal plan. Caloric needs and treatment goals are set by the multidisciplinary treatment team, which includes a psychiatrist, a psychologist, a family therapist, a nurse, and a dietitian. Caloric needs and treatment goals during admission are based on the patient's caloric intake prior to admission, weight goals, and medical status. Caloric intake typically increases daily by 100-200 kcal, while meal plans are modified based on the patient's needs. Patients' daily caloric requirements are divided into "blocks" which include three meals and three snacks each day.

Patients are weighed on a daily basis each morning and can choose whether or not to be informed of their weight. The dietitian then makes recommendations to the multidisciplinary team regarding patients' "healthy

weight range,” taking into consideration their age, height, and highest weight attained during their eating disorder, with the lower end of the healthy weight range set at 93 percent of their ideal body weight. While on the unit, patients are not given a numeric goal weight because of the potential to become fixed on a particular number, which can lead to further psychological and emotional distress.

Patients engage in numerous therapeutic activities throughout the week including process-oriented and didactic groups, values clarification group, recreational therapy, music therapy, pet therapy, art therapy, and multi-family group. Treatment teams, consisting of a dietitian, psychiatry fellow, nurse, milieu therapist and patient meet two to three times weekly to evaluate the patient’s progress and discuss specific areas and goals of treatment. Family participation is vital to the patient’s treatment and includes family therapy, meal education, nutrition education, parent support groups, multi-family groups, and parent participation in treatment team meetings at the partial hospitalization level of care. Patients also participate in individual psychotherapy twice weekly with a clinical psychologist, psychology or post-doctoral fellow, or psychology predoctoral intern in which cognitive behavioral and interpersonal strategies are employed to examine cognitive distortions, maladaptive behaviors, negative feelings, and unproductive thinking.

## Measures

### *Indicators of Severity*

Age of onset of the eating disorder refers to the age, defined in years, in which the patient first developed symptoms of the disorder. The age of onset was found in the medical record and was most often reported by parents at intake.

Duration of illness indicates the number of months since an individual has presented with symptoms and, in most instances, was also reported by the parents.

The next two indicators, the patient-reported intensity of eating disordered symptoms, and frequency of eating disorder symptoms were acquired at intake as assessed by the Eating Disorder Diagnostic Scale (see below). A subsequent severity indicator was a measure of severity of the eating disorder and was determined by the clinician at admission. It was defined categorically and ranged from 1 (normal, not ill) to 7 (extremely ill). With regard to psychiatric comorbidity for this study, each patient was classified as having either no comorbid psychiatric disorder (rated as 0), a depressive disorder or an anxiety disorder (rated as 1), or both (rated as 2). Information about diagnosis was obtained from the physician assessment at admission. Two additional severity indicators acquired at intake include the patient-reported severity of depression and patient-reported frequency of depressive symptoms as assessed by the Patient Health Questionnaire. Lastly, relating to previous treatment, this indicator of severity was defined categorically where there was no information regarding



previous treatment (coded as missing data), or the patient has either had no previous treatment (=0), outpatient treatment only (=1), inpatient treatment (=2), or multiple inpatient treatments (=3). The number of treatments an individual has undergone was obtained from his or her medical record as reported in the medical history.

#### *The Eating Disorder Diagnostic Scale (EDDS)*

The Eating Disorder Diagnostic Scale (EDDS: Stice, Telch, & Rizvi, 2000) is a self-report measure developed to diagnose anorexia nervosa, bulimia nervosa, and binge-eating disorder. The EDDS consists of 22 items that assess DSM-IV symptoms for all three eating disorders and were adapted from two validated structured psychiatric interviews: the Eating Disorder Examination (EDE: Fairburn & Cooper, 1993) and the eating disorder module of the Structured Clinical Interview for DSM (SCID: Spitzer, Williams, Gibbon, & First, 1990). The EDDS generates diagnoses for all three DSM-IV eating disorders as well as a continuous eating disorder symptom composite. Because there have been no changes in diagnostic criteria in the most current diagnostic manual, the EDDS also generates eating disorder diagnoses for the DSM-IV-TR. Sample items include: “Has your weight influenced how you think about (judge) yourself as a person?” and “Over the past 3 months, how many menstrual periods have you missed?” (Stice, Fisher, Martinez, 2004). According to Stice and colleagues, “a diagnosis of DSM-IV anorexia nervosa is made if an individual

reports (a) height and weight data on EDDS items 19 and 20 that result in a body mass index of less than 17.5; (b) a fear of weight gain or becoming fat as indexed by a score of 4 or greater on EDDS item two; (c) undue influence of body weight or shape on self-evaluation as indexed by a score of 4 or greater on either EDDS item three or four; or (d) amenorrhea in postmenarcheal females as indexed by 3 on EDDS item 21.

A diagnosis of DSM-IV bulimia nervosa is made if an individual reports (a) regular eating binges marked by a perceived loss of control and the consumption of a large amount of food as indexed by a response of *yes* to EDDS item 5, a *yes* to EDDS item 6, and a response of greater than 2 on EDDS item 8; (b) regular use of compensatory behaviors as indexed by a response of 8 or greater on the sum of EDDS items 15, 16, 17, and 18; and (c) undue influence of body weight or shape on self-evaluation as indexed by a score of 4 or greater on either EDDS item 3 or 4.

A diagnosis of DSM-IV binge-eating disorder is made if an individual reports (a) regular eating binges marked by a perceived loss of control, and the consumption of a large amount of food as indexed by a response of *yes* to EDDS item 5, a *yes* to EDDS item 6, and a response of greater than 2 on EDDS item 7; (b) an endorsement of at least three features that may be associated with binge eating as indexed by a *yes* response to at least three of the features described in EDDS items 9, 10, 11, 12, and 13; (c) marked distress regarding binge eating as

indexed by a *yes* response to EDDS item 14; and (d) the absence of any compensatory behaviors as reflected by a 0 response to EDDS items 15, 16, 17, and 18” (Stice, Fisher, Martinez, 2004). For the purpose of this study, the symptoms of binge eating disorder were used to diagnose EDNOS.

The EDDS demonstrated high internal consistency (Cronbach’s alpha = 0.91), good test-retest reliability (Kappa coefficient = 0.95) for anorexia nervosa diagnoses, and satisfactory convergent and criterion validity (Stice et al., 2000). Furthermore, a follow-up study conducted by Stice, Fisher, and Martinez in 2004 demonstrated similar results among an adolescent population, which suggests that this scale can be used with younger females in addition to older women. Among non-eating disorder controls, Stice and colleagues (2000) reported the following statistics on measures of eating disturbances: restraint - mean = 1.84, SD = 1.60; eating concern - mean = .99, SD = 1.28; weight concern - mean = 2.48, SD = 1.53; shape concern - mean = 2.56, SD = 1.50. The EDDS has many benefits as it can be completed quickly and easily and assesses for eating disorders in environments where structured psychiatric interviews are less feasible. In this study, EDDS scores were used to compile the variable intensity and frequency of eating disorder symptoms.

Patient-reported frequency of eating disorder symptoms was computed based on responses on the EDDS. This scale asks for information on a total of 10 possible symptoms present over the last three-month period (4 for anorexia

nervosa, 3 for bulimia nervosa, and 3 for binge eating disorder). Each symptom is endorsed on a scale of 0 = not present to 5 = always present and scores of 3 (present more than once/week) or above were scored as present. The presence of symptoms was then summed regardless of the ED diagnosis such that symptoms of one eating disorder were treated separately from symptoms of another.

However, each symptom was counted only once. Patient-reported intensity of eating disorder symptoms was also computed based on responses to the EDDS.

This scale asks for information on a total of 22 questions concerning eating disorder symptoms present over a three-month period. In order to obtain a symptom composite score for the patient reported intensity of eating disordered symptoms, raw scores for EDDS questions one through 18 and 21 were converted into z-scores using the sample mean and standard deviation, and subsequently added together.

#### *The Patient Health Questionnaire - 9 (PHQ-9)*

The Patient Health Questionnaire - 9 (PHQ-9) is a 9-item self-report depression screening instrument based on the nine symptoms of DSM-IV Criterion A for a major depressive episode and is a valid measure of DSM-IV Major Depressive Disorder (MDD) (Kroenke, Spitzer, & Williams, 2001). These nine symptoms include depressed mood, anhedonia, appetite change, sleep disturbance, psychomotor agitation or retardation, loss of energy, feelings of worthlessness or guilt, diminished concentration, and suicidal thoughts or

attempts. Major depression is diagnosed if five or more of the nine depressive symptom criteria have been present at least “more than half of the days” in the past 2 weeks and one of the symptoms is depressed mood or anhedonia. As a severity measure, the PHQ-9 can range from 0-27 with each symptom ranging in severity from 0-3 (Kroenke et al., 2001).

The PHQ-9 demonstrated high internal consistency (Cronbach’s alpha = 0.89), good test-retest reliability, as well as exceptional construct and criterion validity (Kroenke et al., 2001). Depressive symptomatology is common among individuals suffering from anorexia and the PHQ-9 is a dual purpose instrument that can establish depressive disorder diagnoses as well as grade symptom severity. A study by Kroenke and researchers (2001), examined the validity of the PHQ-9 in accordance with Mental Health Professional Validation Interviews and reported corresponding scores for 580 individuals. In the 41 patients diagnosed with major depressive disorder, the mean PHQ-9 score was 17.9, while the mean score was 10.4 in the 65 patients diagnosed with mild depression. In the 474 patients who were without a depressive disorder, the mean PHQ-9 score was only 3.3. In this study, the PHQ-9 was used to compile the patient-reported number of depressive symptoms as a well as a patient-reported severity of depression. Patient-reported frequency of depressive symptoms and severity of depression were computed based on responses to the PHQ-9 which asks for information on a total of 10 possible symptoms (for the total number of symptoms

endorsed) and 9 possible depression symptoms (for patient-reported severity) present over the last two-week period. Patient-reported frequency of depressive symptoms was defined on a continuous scale ranging from 0 to 10. Each symptom was endorsed on a scale of 0 = not at all to 3 = nearly every day and scores of 1 (several days) or above were scored as present. Patient-reported severity of depression was defined continuously and ranged in score from 0 to 27. Based on Spitzer, Williams, and Kroenke's (1999) categorization of severity scores, scores of 0-4 equate to no depression; scores of 5-9 equate to mild depression; scores of 10-14 equate to moderate depression; scores of 15-19 equate to moderate to severe depression; and scores of 20-27 equate to severe depression.

### **Data Analysis**

A Cox regression survival analysis was run where indicators of severity served as the predictor variables and time to achieve 85 percent of ideal body weight served as the dependent or outcome variable. Percent of ideal body weight at time of admission functioned as a covariate. The analysis was run to determine which of the covariates were related to time to achieve 85 percent of ideal body weight. Possible predictor variables that were considered were age of onset of the eating disorder, duration of illness, patient reported intensity of eating disordered symptoms, psychiatric comorbidity, number of previous treatments, patient-reported frequency of eating disorder symptoms, clinician reported severity of the

eating disorder, patient-reported severity of depression, and patient-reported frequency of depressive symptoms.

Cox's proportional hazards model is analogous to a multiple regression model and enables the survival times of a particular group of patients to be assessed while adjusting for other factors. Survival time refers to a variable which measures the period of time from a particular starting time to a specific endpoint of interest. In this case, the starting point was admission into an inpatient psychiatric unit and the endpoint of interest was reaching 85 percent of ideal body weight.

In this model, the dependent variable was the 'hazard,' which is the probability of experiencing the event in question, which in this study was reaching 85 percent of ideal body weight given that the patients were not discharged prematurely. Moreover, the Cox regression model assumes that the hazard ratio is constant over time. When event occurrence is studied, there are usually some people in the sample that do not experience the target event during data collection; these people are labeled censored. Although an individual may not reach the target event, the Cox regression technique allows the collected data to still be used in the analysis.

## CHAPTER FIVE

### Results

#### Characteristics of the Sample

##### *Demographic Information*

Data for a total of 122 patients who were admitted consecutively into the Children's Medical Center Psychiatric Inpatient Unit between November 2005 and July 2008 were reviewed. Of these 122 patients, 59 individuals were admitted to the unit weighing more than 85 percent of their ideal body weight, one was transferred to the cardiology unit, one patient was diagnosed with a cognitive impairment, and two patients were diagnosed with a conversion disorder. Thus, 59 patients met criteria for the study and were included in hypothesis testing, though data is not available for all patients. A summary of demographic and descriptive variables (age at admission, weight at intake, weight at 85% of ideal body weight, and length of time to 85% IBW) is provided in Table 1. Tables 2-10 provide information regarding ethnicity, gender, eating disorder diagnosis, comorbid diagnosis, discharge location, if 85% IBW was attained, severity of illness per clinician rating, previous treatment, EDDS diagnosis, and PHQ-9 diagnosis.

##### *Assessment of Data*

A bivariate correlation matrix of all admission psychological measures revealed significant correlations among many of the variables (Table 11).



Overall, earlier age of onset correlated with longer duration of illness as well as greater psychiatric comorbidity. Longer duration of illness correlated with greater psychiatric comorbidity as well as a greater number of previous treatments that an individual had experienced. A greater number of previous treatments was also associated with greater patient-reported frequency of depressive symptoms as assessed by the PHQ-9. A greater intensity of patient-reported eating disorder symptoms, on the other hand, was associated with a greater frequency of eating disordered symptoms as assessed by the EDDS self-report measure as well as greater patient-reported severity of depression and patient-reported frequency of depression symptoms as assessed by the PHQ-9. Finally, greater patient-reported frequency of depressive symptoms as measured by the PHQ-9 correlated with a greater patient-reported severity of depression.

### **Hypothesis: Predicting Time to Reach 85% of Ideal Body Weight**

*Patients will take a longer time to achieve 85 percent of ideal body weight if they have an earlier age of onset, longer duration of illness, history of previous treatments, greater severity of illness and comorbid psychopathology as determined by the clinician, and greater intensity and frequency of eating disorder and depressive symptoms.*

A bivariate Cox regression survival analysis was run with each predictor as an independent variable and time to achieve 85 percent of ideal body weight as

the dependent variable, in separate analyses. In all analyses, percent of ideal body weight at admission was included as a control variable. Age of onset, duration of illness, previous treatments, clinician-reported severity of the eating disorder, psychiatric comorbidity, patient-reported intensity of eating disordered symptoms, patient-reported frequency of eating disorder symptoms based on the EDDS, patient-reported severity of depression, and patient-reported frequency of depressive symptoms based on the PHQ-9, all served as independent variables. As shown in Table 12, the intensity of eating disordered symptoms endorsed by the patient was found to significantly predict length of time to reach 85 percent of ideal body weight. Specifically, those individuals who reported a greater number of eating disorder symptoms at admission as measured by the EDDS reached 85 percent of ideal body weight more quickly.

Figure 1 plots the survival function and depicts the cumulative survival rates of all individuals included in the study. Patients were divided into two groups according to their symptom composite z-scores: those with scores above the mean and those with scores below the mean. As shown in Figure 1, those individuals with z-scores above the mean reached 85 percent of their ideal body weight in a shorter period of time in comparison to those with z-scores below the mean.

## EXPLORATORY ANALYSIS

In addition to the proposed hypotheses, exploratory analyses were conducted to further evaluate the data gathered from the study. One possibility to explain the absence of results is that the self-report measures were not valid, and the clinician measures were not systematically assigned and thus were subject to error. Additionally, though skewed distributions are common in clinical populations, they are problematic for the analyses used in this study as they can produce imprecise results. The following analyses evaluate the validity of self-report measures by assessing the relationship between PHQ-9 diagnoses of depression and clinician reports and assess for the effects of a skewed distributions on the results of the survival analyses performed in this study.

The PHQ-9 was created as a self-report measure used to establish a depressive disorder diagnosis, and in this study it was used to determine patient-reported number of depressive symptoms and subsequent depressive diagnoses. As a way to evaluate the validity of this self-report measure, an analysis was conducted to evaluate whether patient self-reports of depression, based on responses to the PHQ-9, and clinician diagnoses of depression are analogous with one another. A Pearson's Chi Square was conducted and findings imply that the PHQ-9 and clinician diagnoses were unrelated,  $\chi^2(1, N = 42) = 0.74, p > .05$ . For the purpose of this exploratory analysis, among those patients who received multiple diagnoses associated with depressive diagnoses or mood disorders, or

who received a rule out diagnosis for a depressive or mood disorder, they were ultimately classified as depressed by the clinician. Of the 42 patients who had completed the PHQ-9, 13 were given a diagnosis of depression or mood disorders based on clinician or self-report and were in agreement with one another. Sixteen of the 42 patients, on the other hand, were diagnosed solely on the basis of clinician findings and were not in agreement with self-report measures, while 4 patients were classified as having depression based on findings of the PHQ-9 only. Finally, 9 patients did not meet criteria for depression in accordance with both self-report and clinician classification.

Findings suggest that on self-report measures, patients may not have accurately reported their symptoms of depression, but, in fact, potentially underreported symptoms in comparison to clinicians who more often reported a depression diagnosis. While patients may not have accurately reported symptoms of depression, it is also possible that the children and adolescents lack the psychological insight necessary to complete the PHQ-9 in an accurate fashion. Moreover, due to impairments in cognitive development caused by health implications and malnutrition, typical complications of eating disorders, these self-report measures of depression may be ultimately be negligible. While these individuals may under-report the severity or frequency of symptoms in order to minimize their problems, this inevitably brings into question the validity of self-report measures in this setting. The diagnostic validity of the PHQ-9 was

established among patients 18 years and older and in primary care settings rather than inpatient psychiatric units, possibly affecting the validity of this analyses.

Data consisting of the nine severity indicators were converted into log<sub>10</sub> transformations and survival analyses were then repeated. As before, severity indicators served as independent variables and time to achieve 85 percent of ideal body weight served as the dependent variable. In all analyses, percent of ideal body weight at admission was included as a control variable. Findings revealed no differences in results and suggest that the skewed distribution did not affect the results of the analysis.

Moreover, analyses were performed to compare the sample of 42 individuals who completed self-report measures upon admission into the inpatient unit to the 17 individuals who did not complete the measures. An independent sample t-test was run utilizing continuous variables; results were not significant suggesting that there were no systematic differences between the two samples. Furthermore, a chi square test was run with all dichotomous variables and results were not significant, again suggesting that the two samples were not systematically different from one another and that the original hypothesis testing was thus not affected by the missing data points.

## **CHAPTER SIX**

### **Conclusions and Recommendations**

#### **OVERVIEW OF THE STUDY**

The purpose of this study was to evaluate how specific severity indicators within a sample of children and adolescents diagnosed with an eating disorder affect rapidity of weight gain within an inpatient treatment unit. While the majority of earlier research on eating disorders focused on psychological measures and their impact on weight gain rapidity, few studies evaluated the impact of demographic variables and patient- and clinician-reported severity indicators on weight gain rapidity. The data obtained from this study may allow treatment centers to more effectively tailor treatment to specific patients' needs, reduce length of stay and prevent relapse. The primary aim of this study was to examine the effects of severity indicators obtained at the time of patient admission on rapidity of weight gain and, more specifically, on the length of time it takes an individual to reach 85 percent of their ideal body weight.

#### **Length of Time to 85 Percent Ideal Body Weight**

This hypothesis stated that patients who have an earlier age of onset, a longer duration of illness, a history of previous treatments, a greater severity of illness as determined by clinician ratings, comorbid psychopathology, a greater severity of depression and frequency of depressive symptoms as assessed by the PHQ-9, as well as high intensity and frequency of eating disordered symptoms as

measured by the EDDS, would take a longer period of time to achieve 85 percent of ideal body weight. Of these severity indicators, only the patient-reported intensity of eating disordered symptoms as assessed by the EDDS significantly predicted time to reach 85 percent of ideal body weight. More specifically, individuals who reported a greater number of eating disorder symptoms at admission took less time to reach 85 percent of ideal body weight.

The results of the analysis were unexpected and disproved the hypothesis of a positive correlation between the number of symptoms endorsed by the patient and time to reach 85 percent of ideal body weight. The hypothesis presumed that those individuals who reported a greater number of symptoms would take longer to achieve the desired goal weight, as their illness would be considered more severe and thus more difficult to treat. In light of these unexpected results, one possible explanation is that the EDDS does not accurately predict length of time to reach 85 percent of ideal body weight. As a self-report measure, perhaps the EDDS is an invalid measure of intensity and frequency of eating disorder symptoms; in other words, patients may not accurately report their eating disordered behaviors and attitudes.

A second possible explanation is that patients are manipulating the treatment system by gaining weight quickly in order to leave the unit faster and to return to old patterns of behavior. Eating disorders are typically characterized as disorders of secrecy and shame, and consequently, it was unexpected to find

patients reporting elevated measures of intensity and frequency of symptoms at admission. As a result of the general nature of this particular disorder, then, it is unclear whether patients are gaining weight as a means to a faster discharge or if they are gaining weight because they have become psychologically healthier. However, such an explanation warrants further research.

A third possible explanation is that those individuals who are more likely to talk about and acknowledge their symptoms have greater insight into their disorder and its psychological drivers. Furthermore, they are more willing to engage in treatment and benefit from medical intervention by putting on weight at a more rapid rate.

While previous studies have concluded that age of onset, duration of illness, and history of previous treatments significantly affect duration of inpatient treatment and rapidity of weight gain (Nozoe, et al., 1995), the results of this study suggest that these, along with the other severity indicators, do not predict rapidity of weight gain. Although demographic and severity indicators did not predict weight gain, other studies have suggested that psychological variables predict rapidity of weight gain in inpatient treatment centers for eating disorders. In one such unpublished study (Phillips, 2008), patients who have lower self-esteem and self-efficacy and greater difficulties with emotion regulation took longer to reach 85 percent of ideal body weight. Individuals who have more self-efficacy appeared to display greater confidence in their ability to take advantage



of psychological strategies that would meet the desired goals of weight gain. Furthermore, Phillips concluded that these patients were more likely to consume the recommended amount of calories and to stop engaging in behaviors that led to weight loss. Moreover, “global self-esteem was predictive of weight gain response and suggested that an individual’s feelings of self-worth influence the behaviors that lead to weight gain” (Phillips, 2008). Lastly, this study found that many individuals with emotion regulation difficulties use their eating disorder as a means to cope with negative emotions. As a result, these patients are less likely to modify their behavior in order to gain weight, given that doing so will most likely produce more negative feelings.

### **METHODOLOGICAL CONSIDERATIONS**

Several limitations to this study affected the results and therefore warrant discussion. First, this study consisted of a small number of participants, and, because of its small sample size, results cannot be as reliably generalized to the entire inpatient population of eating disordered patients. Furthermore, given the small sample size, statistical power is considerably lessened. Among this small sample, all participants were female and Caucasian, and, as such, it is difficult to make any generalizations about the results of the study to males or ethnic minorities.

Moreover, there was little dispersion in this sample with regards to age, as the vast majority of participants were between the ages of 14 and 16. As it stands,

there are very few controlled treatment studies of children and pre-teens with eating disorders, and therefore, it is also difficult to generalize results to children of younger ages also suffering from these disorders. A number of fundamental differences in the expression of eating disordered symptoms in children would suggest that they may respond differently to treatment than adolescents and adults, which in turn may affect rapidity of weight gain in inpatient treatment centers (Fisher et al., 1995).

Furthermore, this study utilized several self-report measures with questionable integrity and may not adequately predict rapidity of weight gain. Patients may exaggerate symptoms as a cry for help and as a means to make their situation seem worse, or they may under-report the severity or frequency of symptoms in order to minimize their problems. Additionally, health implications and malnutrition may severely impact reporting of symptoms on self-report measures, further degrading the integrity of these measures.

For many inpatient units, the primary goal of treatment is medical and nutritional stabilization, including attainment of a healthy body weight (usually 85 percent of IBW), rather than complete psychiatric recovery (Robin et al., 1998). Many of the patients who participated in this study, however, were discharged from treatment before reaching 85 percent of their ideal body weight and were not able to meet this crucial goal of treatment. While there were 59 individuals in the study, 28 of the patients were discharged from intensive inpatient treatment before

reaching 85 percent of ideal body weight and only 31 total individuals were able to reach this goal while still on the inpatient unit. While the majority of these 28 individuals were discharged and admitted into intensive outpatient treatment, eight withdrew for unspecified reasons or due to insurance demands and pressure placed on them by insurance companies as explained in medical charts. Although it typically takes 4 to 6 weeks for an individual suffering from an eating disorder to begin to eat and to gain weight on a consistent and healthy basis and for their parents to be trained to take over their behavioral weight gain program, insurance companies often pressure treatment centers to discharge patients after only a few weeks (Robin et al., 1998). As a result, the lengths of stays are much shorter than medically necessary and weight gain is often insufficient (Robin et al., 1998). Given that some of the study's participants were discharged before 85 percent of ideal body weight could be achieved, it is difficult to determine the impact of severity indicators on speed of weight gain for these individuals.

An additional limitation of the study is the continuity and coding of terms and severity indicators, particularly as the coding of terms relates to gathering data regarding previous treatments. While patient medical records contained information regarding physician and psychologist interviews with the patient and his or her family upon admission to the inpatient unit, in some instances the families were unable to clearly explain their child's treatment history. Furthermore, trying to define treatment terms in order to accurately capture

treatment history added another layer of complexity to the interview process. While some patients had little experience with treatment prior to admission into the inpatient unit at CMC, only having seen a dietician or counselor one time, others might have participated in intensive outpatient or multiple inpatient therapies. Nevertheless, it is unclear whether patient medical records accurately captured the treatment history of the study's participants.

### **AREAS FOR FUTURE RESEARCH**

As previously stated, this study was made up of a relatively homogeneous sample of participants and therefore the findings cannot be readily generalized to the greater population of eating disordered patients. A multitude of studies over the last decade have indicated an increase in disordered eating behaviors, dieting, and concern about body shape and weight among elementary and middle school-aged boys and girls (Childress, Brewerton, Hodges, & Jarrell, 1993; Reijonen, Pratt, Patel, & Greydanus, 2003). With the continual expansion of the scope of research with eating disordered individuals, future studies should focus on how the severity indicators evaluated in this study affect rapidity of weight gain for males, minorities and younger children. Distinguishing between responses to treatment among different genders, ethnicities and age groups will help standardize inpatient treatment measures and ultimately decrease length of time to reach ideal body weight. Moreover, future studies should include more participants in their samples, increasing statistical power and resulting in a clearer

indication of the significance of a given severity indicator. While this study relied largely on self-report measures, future studies should instead utilize other measures of psychological functioning and eating disorder symptomatology to obtain more accurate predictors of severity, as self-report measures are inherently less accurate. While self-report measures should not be considered ineffectual, they should be used as a complement to more objective data. Furthermore, future research should consider evaluating the relationship between differing types of eating disorder diagnoses and whether differing diagnoses and presence of symptoms affect rapidity of weight gain. A more clear and comprehensive understanding of the course and outcome of each type of eating disorder diagnosis may contribute to the improvement and standardization of treatment protocols and may help prevent relapse.

### **CLINICAL IMPLICATIONS**

Results from this study indicate that there is not a statistically significant relationship between demographic variables or subjective measures of severity and time to reach 85 percent of ideal body weight. Clinicians should not base predictions of rapidity of weight gain on severity measures such as these, but rather, clinicians should utilize psychological and objective measures to predict rapidity of weight gain and treatment outcome. While this study may call into question the validity of self-report measures, previous studies highlight the

effectiveness of psychological measures in predicting weight gain and successful treatment outcomes; as a result, these measures continue to be an area of focus in eating disorder research. Future studies should continue to explore alternative measures and predictors of outcome.

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## Tables

Table 1

### *Demographic and Descriptive Characteristics of Sample*

| Variable                                 | n  | Mean  | SD    | Range      |
|--|----|-------|-------|------------|
| Age in Years at Admission                | 59 | 15.10 | 1.79  | 10-19      |
| Weight at Admission in kg                | 59 | 42.55 | 6.33  | 22.4-57.8  |
| Weight at 85% of IBW                     | 59 | 47.13 | 6.30  | 23.8-71.1  |
| Time to 85% of IBW in Days               | 31 | 26.56 | 19.05 | 2-71       |
| Intensity of ED Symptoms <sup>a</sup>    | 42 | .056  | .971  | -.131-2.61 |
| Frequency of ED Symptoms <sup>b</sup>    | 42 | 4.14  | 2.63  | 1-10       |
| PHQ-9 Frequency of Symptoms <sup>c</sup> | 42 | 5.26  | 2.46  | 0-9        |

Note. Stice's measures of eating disturbance: Restraint, mean = 1.84, SD = 1.60; Eating concern, mean = .99, SD = 1.28; Weight concern, mean = 2.48, SD = 1.53; Shape concern, mean = 2.56, SD = 1.50.

<sup>a</sup>. Intensity of ED symptoms was a patient report of eating disordered symptoms based on the EDDS and was acquired at intake. This scale asks for information on a total of 22 questions concerning eating disorder symptoms. In order to obtain a symptom composite score for the patient reported intensity of eating disordered symptoms, raw scores for EDDS questions one through 18 and 21 were converted into z-scores using the sample mean and standard deviation, and subsequently added together.

<sup>b</sup>. Frequency of ED symptoms asks for information on a total of 10 possible symptoms present over the last three-month period (4 for anorexia nervosa, 3 for bulimia nervosa, and 3 for binge eating disorder). Each symptom is endorsed on a scale of 0 = not present to 5 = always present and scores of 3 (present more than once/week) or above were scored as present. The presence of symptoms was then summed regardless of the ED diagnosis such that symptoms of one eating disorder were treated separately from symptoms of another; each symptom was counted only once.

<sup>c</sup>. PHQ-9 (Patient Health Questionnaire) frequency of depressive symptoms was defined on a continuous scale ranging from 0 to 10. Each symptom accounted for one and was endorsed on a scale of 0 = not at all to 3 = nearly every day; scores of 1 (several days) or above were scored as present.

Table 2

*Gender Frequency Table*

| Gender | Frequency | Percent |
|--------|-----------|---------|
| Male   | 5         | 8.5     |
| Female | 54        | 91.5    |
| Total  | 59        | 100.0   |

Table 3

*Ethnicity Frequency Table*

| Ethnicity        | Frequency | Percent |
|------------------|-----------|---------|
| African American | 1         | 1.7     |
| Caucasian        | 48        | 83.1    |
| Hispanic         | 7         | 11.9    |
| Other            | 3         | 5.1     |
| Total            | 59        | 100.0   |



Table 4

*DSM-IV-TR Eating Disorder Diagnosis*

| ED Diagnosis                     | Frequency | Percent |
|----------------------------------|-----------|---------|
| Anorexia Nervosa                 | 48        | 82.8    |
| Bulimia Nervosa                  | 5         | 8.6     |
| ED <sup>a</sup> NOS <sup>b</sup> | 5         | 8.6     |
| Total                            | 58        | 100.0   |

<sup>a</sup>. ED = Eating Disorder

<sup>b</sup>. NOS = Not Otherwise Specified

Table 5

*EDDS Eating Disorder Diagnosis*

| EDDS Diagnosis       | Frequency | Percent |
|----------------------|-----------|---------|
| No Diagnosis         | 4         | 9.5     |
| Full AN <sup>a</sup> | 35        | 83.3    |
| Full BN <sup>b</sup> | 0         | 0.0     |
| Full Binge           | 0         | 0.0     |
| Partial AN           | 3         | 7.1     |
| Partial BN           | 0         | 0.0     |
| Partial Binge        | 0         | 0.0     |
| Total                | 42        | 100.0   |

<sup>a</sup>. AN = Anorexia Nervosa

<sup>b</sup>. BN = Bulimia Nervosa

Table 6

*Comorbid DSM-IV-TR Mood/Anxiety Diagnoses*

| DSM-IV-TR Diagnoses     | Frequency | Percent |
|-------------------------|-----------|---------|
| No diagnoses            | 15        | 25.4    |
| Mood or Anxiety D/O     |           |         |
| Mood Disorder           | 36        | 61.0    |
| Anxiety Disorder        | 2         | 3.4     |
| Mood & Anxiety Disorder | 6         | 10.2    |
| Total                   | 59        | 100.0   |

Table 7

*PHQ-9 Depression Diagnosis*

| PHQ-9 Diagnosis  | Frequency | Percent |
|------------------|-----------|---------|
| No Depression    | 26        | 61.9    |
| Major Depression | 16        | 38.1    |
| Total            | 42        | 100.0   |

Table 8

*Number of Previous Treatments Prior to Current Hospitalization*

| Previous Tx                   | Frequency | Percent |
|-------------------------------|-----------|---------|
| No Information                | 1         | 1.7     |
| No Previous Treatment         | 13        | 22.0    |
| Outpatient Treatment          | 23        | 39.0    |
| Inpatient Treatment           | 1         | 1.7     |
| Multiple Inpatient Treatments | 21        | 35.6    |
| Total                         | 59        | 100     |

Table 9

*Severity of Illness at Admission per Clinician Report*

| Symptom Severity | Frequency | Percent |
|------------------|-----------|---------|
| Normal/Not Ill   | 0         | 0.0     |
| Borderline       | 0         | 0.0     |
| Mildly Ill       | 0         | 0.0     |
| Moderately Ill   | 4         | 8.9     |
| Markedly Ill     | 23        | 51.1    |
| Severely Ill     | 17        | 37.8    |
| Extremely Ill    | 1         | 2.2     |
| Total            | 45        | 100.0   |

Table 10

*Number of Patients that Reached 85% of IBW during Inpatient Hospitalization*

| Made 85% | Frequency | Percent |
|----------|-----------|---------|
| No       | 28        | 47.5    |
| Yes      | 31        | 52.5    |
| Total    | 59        | 100.0   |

Table 11

*Correlation Matrix of all Severity Indicators*

|  |         | 1.    | 2.    | 3.   | 4.   | 5.  | 6.    | 7.   | 8.   | 9.   | 10. |
|--|---------|-------|-------|------|------|-----|-------|------|------|------|-----|
| 1.   | Pearson | 1     |       |      |      |     |       |      |      |      |     |
| Age of Onset of ED <sup>a</sup>                      | Sig.    |       |       |      |      |     |       |      |      |      |     |
|  | N       | 58.0  |       |      |      |     |       |      |      |      |     |
| 2.   | Pearson | -.56* | 1     |      |      |     |       |      |      |      |     |
| Duration of Illness                                  | Sig.    | .00   |       |      |      |     |       |      |      |      |     |
|  | N       | 58    | 58    |      |      |     |       |      |      |      |     |
| 3.   | Pearson | -.21  | .34** | 1    |      |     |       |      |      |      |     |
| Previous Treatments <sup>c</sup>                     | Sig.    | ns    | .01   |      |      |     |       |      |      |      |     |
|  | N       | 58    | 58    | 59   |      |     |       |      |      |      |     |
| 4.   | Pearson | .09   | .06   | .15  | 1    |     |       |      |      |      |     |
| Clinician Rating of Severity of ED <sup>f</sup>      | Sig.    | ns    | ns    | ns   |      |     |       |      |      |      |     |
|  | N       | 45    | 45    | 45   | 45   |     |       |      |      |      |     |
| 5.   | Pearson | -.26* | .27*  | .25  | .09  | 1   |       |      |      |      |     |
| Psychiatric Comorbidity <sup>g</sup>                 | Sig.    | .05   | .04   | .06  | ns   |     |       |      |      |      |     |
|  | N       | 58    | 58    | 59   | 45   | 59  |       |      |      |      |     |
| 6.   | Pearson | .24   | -.01  | .12  | .02  | .12 | 1     |      |      |      |     |
| Intensity of EDDS <sup>b</sup> Symptoms <sup>h</sup> | Sig.    | ns    | ns    | ns   | ns   | ns  |       |      |      |      |     |
|  | N       | 42    | 42    | 42   | 39   | 42  | 42    |      |      |      |     |
| 7.   | Pearson | .24   | .04   | .19  | .08  | .09 | .85** | 1    |      |      |     |
| Frequency of EDDS Symptoms <sup>i</sup>              | Sig.    | .08   | ns    | ns   | ns   | ns  | .00   |      |      |      |     |
|  | N       | 42    | 42    | 42   | 39   | 42  | 42    | 42   |      |      |     |
| 8.   | Pearson | -.14  | .13   | .23  | -.08 | .15 | .52** | .32* | 1    |      |     |
| PHQ <sup>c</sup> Severity of Depression <sup>j</sup> | Sig.    | ns    | ns    | ns   | ns   | ns  | .00   | .04  |      |      |     |
|  | N       | 42    | 42    | 42   | 39   | 42  | 42    | 42   | 42   |      |     |
| 9.   | Pearson | -.29  | .22   | .37* | -.14 | .09 | .37   | .33  | .80* | 1    |     |
| PHQ Frequency of Symptoms <sup>k</sup>               | Sig.    | .06   | ns    | .02  | ns   | ns  | .01   | .26  | *    |      |     |
|  | N       | 42    | 42    | 42   | 39   | 42  | 42    | 42   | .00  | 16   |     |
|  |         |       |       |      |      |     |       |      | 42   |      |     |
| 10.  | Pearson | -.16  | .09   | .18  | .02  | .11 | -.28  | -.28 | -.10 | -.01 | 1   |
| Time to 85% of IBW <sup>d</sup>                      | Sig.    | ns    | ns    | ns   | ns   | ns  | .07   | .08  | ns   | ns   |     |
|  | N       | 57    | 57    | 58   | 44   | 58  | 42    | 42   | 42   | 42   | 58  |

Note correlation is nonsignificant (ns) when  $> 0.10$

\*\*Correlation is significant at the 0.01 level

\*Correlation is significant at the 0.05 level

<sup>a</sup>ED = Eating Disorder



<sup>b</sup>EDDS = Eating Disorder Diagnostic Scale

<sup>c</sup>PHQ = Patient Health Questionnaire

<sup>d</sup>IBW = Ideal Body Weight

<sup>e</sup>. History of previous treatments was defined categorically where there was either no information regarding previous treatment (rated as 0), the patient has had no previous treatment (rated as 1), outpatient treatment only (rated as 2), inpatient treatment (rated as 3), or multiple inpatient treatments (rated as 4).

<sup>f</sup>. Clinician rating of severity of the ED was determined by the clinician at admission and was defined categorically; it ranges from 1 (normal/not ill) to 7 (extremely ill).

<sup>g</sup>. Psychiatric comorbidity was defined categorically where each patient was classified as having no comorbid psychiatric disorder (rated as 0), a depressive or anxiety disorder (rated as 1), or both (rated as 2) as diagnosed by the physician at admission.

<sup>h</sup>. Intensity of ED symptoms was a patient report of eating disordered symptoms based on the EDDS and was acquired at intake. This scale asks for information on a total of 22 questions concerning eating disorder symptoms. In order to obtain a symptom composite score for the patient reported intensity of eating disordered symptoms, raw scores for EDDS questions one through 18 and 21 were converted into z-scores using the sample mean and standard deviation, and subsequently added together.

<sup>i</sup>. Frequency of ED symptoms asks for information on a total of 10 possible symptoms present over the last three-month period (4 for anorexia nervosa, 3 for bulimia nervosa, and 3 for binge eating disorder). Each symptom is endorsed on a scale of 0 = not present to 5 = always present and scores of 3 (present more than once/week) or above were scored as present. The presence of symptoms was then summed regardless of the ED diagnosis such that symptoms of one eating disorder were treated separately from symptoms of another; each symptom was counted only once.

<sup>j</sup>. Severity of depression based on the PHQ-9 was defined on a continuous scale with scores ranging from 0-27 with a score of 0-4 being no depression, 5-9 being mild depression, 10-14 being moderate depression, 15-19 being moderate to severe depression, and 20-27 being severe depression.

<sup>k</sup>. PHQ-9 (Patient Health Questionnaire) frequency of depressive symptoms was defined on a continuous scale ranging from 0 to 10. Each symptom accounted for one and was endorsed on a scale of 0 = not at all to 3 = nearly every day; scores of 1 (several days) or above were scored as present.

Table 12

*Hypothesis 1: Severity Indicators and Time to Reach 85 Percent of Ideal Body Weight*

| Severity Indicator                              | OR   | CI        | <i>p</i> |
|---|------|-----------|----------|
| Age of Onset of ED                              | 1.13 | .91-1.41  | .269     |
| Duration of Illness                             | .97  | .94-1.01  | .157     |
| Previous Treatments <sup>a</sup>                | 1.12 | .71-2.06  | .477     |
| Psychiatric Comorbidity <sup>b</sup>            | 1.34 | .85-2.11  | .208     |
| Intensity of ED Symptoms <sup>c</sup>           | 1.90 | 1.21-2.99 | .005     |
| Frequency of ED Symptoms <sup>d</sup>           | 1.17 | .99-1.40  | .059     |
| Severity of Depression <sup>e</sup>             | 1.03 | .97-1.09  | .349     |
| PHQ-9 Frequency of Symptoms <sup>f</sup>        | 1.04 | .88-1.23  | .660     |
| Clinician Rating of Severity of ED <sup>g</sup> | .54  | .48-1.47  | .539     |

Note: Each variable was entered into the analyses separately and percent of ideal weight at baseline was entered as a control variable.

<sup>a</sup>. History of previous treatments was defined categorically where there was either no information regarding previous treatment (rated as 0), the patient has had no previous treatment (rated as 1), outpatient treatment only (rated as 2), inpatient treatment (rated as 3), or multiple inpatient treatments (rated as 4).

<sup>b</sup>. Psychiatric comorbidity was defined categorically where each patient was classified as having no comorbid psychiatric disorder (rated as 0), a depressive or anxiety disorder (rated as 1), or both (rated as 2) as diagnosed by the physician at admission.

<sup>c</sup>. Intensity of ED symptoms was a patient report of eating disordered symptoms based on the EDDS and was acquired at intake. This scale asks for information on a total of 22 questions concerning eating disorder symptoms. In order to obtain a symptom composite score for the patient reported intensity of eating disordered symptoms, raw scores for EDDS questions one through 18 and 21 were converted into z-scores using the sample mean and standard deviation, and subsequently added together.

<sup>d</sup>. Frequency of ED symptoms asks for information on a total of 10 possible symptoms present over the last three-month period (4 for anorexia nervosa, 3 for bulimia nervosa, and 3 for binge eating disorder). Each symptom is endorsed on a scale of 0 = not present to 5 = always present and scores of 3 (present more than once/week) or above were scored as present. The presence of symptoms was then summed regardless of the ED diagnosis such that symptoms of one eating

disorder were treated separately from symptoms of another; each symptom was counted only once.

<sup>e</sup>. Severity of depression based on the PHQ-9 was defined on a continuous scale with scores ranging from 0-27 with a score of 0-4 being no depression, 5-9 being mild depression, 10-14 being moderate depression, 15-19 being moderate to severe depression, and 20-27 being severe depression.

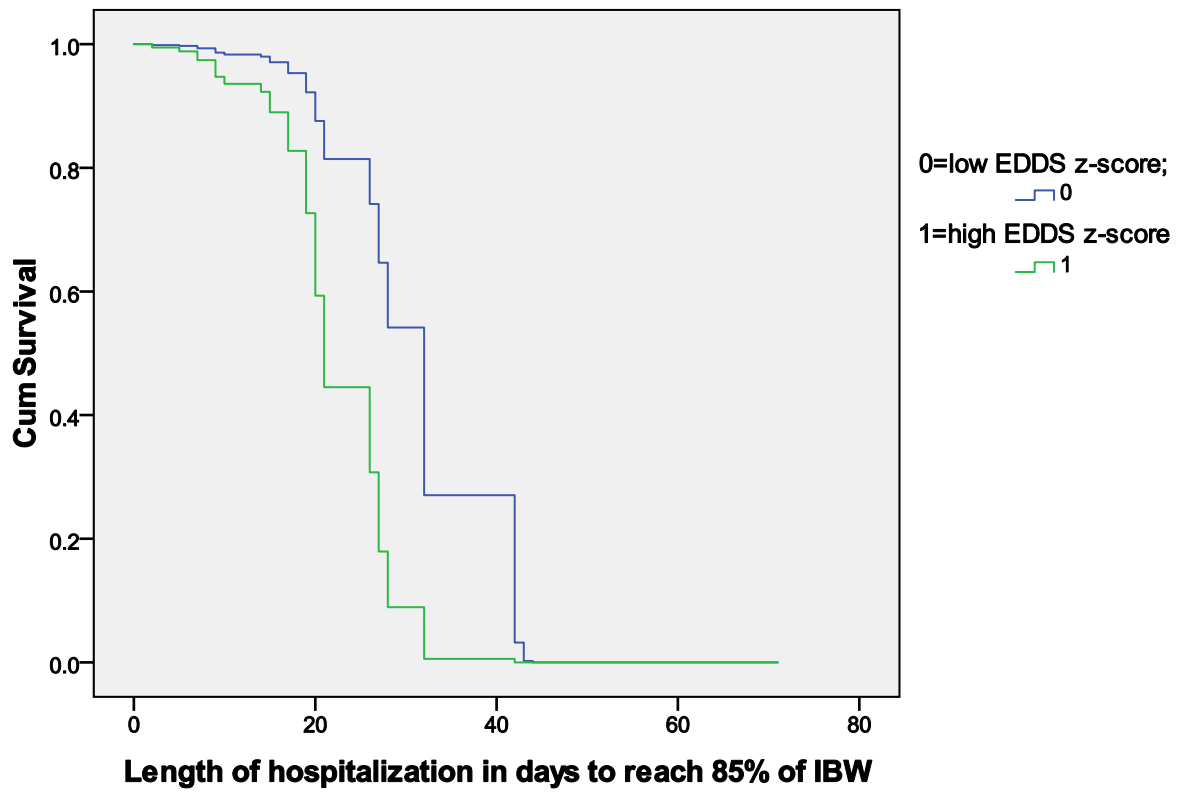
<sup>f</sup>. PHQ-9 (Patient Health Questionnaire) frequency of depressive symptoms was defined on a continuous scale ranging from 0 to 10. Each symptom accounted for one and was endorsed on a scale of 0 = not at all to 3 = nearly every day; scores of 1 (several days) or above were scored as present.

<sup>g</sup>. Clinician rating of severity of the ED was determined by the clinician at admission and was defined categorically; it ranges from 1 (normal/not ill) to 7 (extremely ill).

**Figures**

Figure 1

*Survival Function of Cumulative Survival Rates of Individuals Grouped  
According to EDDS Symptom Composite z-scores*



## APPENDIX A

### Eating Disorder Diagnostic Scale

#### Eating Screen

Please carefully complete all questions.

| Over the past 3 months . . .  | Not at all | Slightly | Moderately | Extremely |   |   |   |
|---|------------|----------|------------|-----------|---|---|---|
| 1. Have you felt fat?   | 0          | 1        | 2          | 3         | 4 | 5 | 6 |
| 2. Have you had a definite fear that you might gain weight or become fat?   | 0          | 1        | 2          | 3         | 4 | 5 | 6 |
| 3. Has your weight influenced how you think about (judge) yourself as a person?   | 0          | 1        | 2          | 3         | 4 | 5 | 6 |
| 4. Has your shape influenced how you think about (judge) yourself as a person?  | 0          | 1        | 2          | 3         | 4 | 5 | 6 |
| 5. During the past 6 months have there been times when you felt you have eaten what other people would regard as an unusually large amount of food (e.g., a quart of ice cream) given the circumstances? YES NO |            |          |            |           |   |   |   |
| 6. During the times when you ate an unusually large amount of food, did you experience a loss of control (feel you couldn't stop eating or control what or how much you were eating)? YES NO                    |            |          |            |           |   |   |   |
| 7. How many DAYS per week on average over the past 6 MONTHS have you eaten an unusually large amount of food and experienced a loss of control? 0 1 2 3 4 5 6 7   |            |          |            |           |   |   |   |
| 8. How many TIMES per week on average over the past 3 MONTHS have you eaten an unusually large amount of food and experienced a loss of control? 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14                             |            |          |            |           |   |   |   |

During these episodes of overeating and loss of control did you . . .

9. Eat much more rapidly than normal? YES NO
10. Eat until you felt uncomfortably full? YES NO
11. Eat large amounts of food when you didn't feel physically hungry? YES NO
12. Eat alone because you were embarrassed by how much you were eating? YES NO
13. Feel disgusted with yourself, depressed, or very guilty after overeating? YES NO
14. Feel very upset about your uncontrollable overeating or resulting weight gain? YES NO
| 15. How many times per week on average over the past 3 months have you made yourself vomit to prevent weight gain or counteract the effects of eating? 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 | | | | | | | |
| 16. How many times per week on average over the past 3 months have you used laxatives or diuretics to prevent weight gain or counteract the effects of eating? 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 | | | | | | | |
| 17. How many times per week on average over the past 3 months have you fasted (skipped at least 2 meals in a row) to prevent weight gain or counteract the effects of eating? 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 | | | | | | | |
| 18. How many times per week on average over the past 3 months have you engaged in excessive exercise specifically to counteract the effects of overeating episodes? 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 | | | | | | | |
| 19. How much do you weigh? If uncertain, please give your best estimate. \_\_\_lb | | | | | | | |
| 20. How tall are you? \_\_\_ft \_\_\_in. | | | | | | | |
| 21. Over the past 3 months, how many menstrual periods have you missed? 1 2 3 4 na | | | | | | | |
| 22. Have you been taking birth control pills during the past 3 months? YES NO | | | | | | | |

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**APPENDIX B**  
**PHQ-9 – Nine Symptom Checklist**

1. Over the last 2 weeks, how often have you been bothered by any of the following problems? Read each item carefully, and circle your response.
  - a. Little interest or pleasure in doing things  

|            |              |                         |                  |
|------------|--------------|-------------------------|------------------|
| Not at all | Several days | More than half the days | Nearly every day |
|------------|--------------|-------------------------|------------------|
  - b. Feeling down, depressed or hopeless  

|            |              |                         |                  |
|------------|--------------|-------------------------|------------------|
| Not at all | Several days | More than half the days | Nearly every day |
|------------|--------------|-------------------------|------------------|
  - c. Trouble falling asleep, staying asleep, or sleeping too much  

|            |              |                         |                  |
|------------|--------------|-------------------------|------------------|
| Not at all | Several days | More than half the days | Nearly every day |
|------------|--------------|-------------------------|------------------|
  - d. Feeling tired or having little energy  

|            |              |                         |                  |
|------------|--------------|-------------------------|------------------|
| Not at all | Several days | More than half the days | Nearly every day |
|------------|--------------|-------------------------|------------------|
  - e. Poor appetite or overeating  

|            |              |                         |                  |
|------------|--------------|-------------------------|------------------|
| Not at all | Several days | More than half the days | Nearly every day |
|------------|--------------|-------------------------|------------------|
  - f. Feeling bad about yourself, feeling that you are a failure, or feeling that you have let yourself or your family down  

|            |              |                         |                  |
|------------|--------------|-------------------------|------------------|
| Not at all | Several days | More than half the days | Nearly every day |
|------------|--------------|-------------------------|------------------|
  - g. Trouble concentrating on things such as reading the newspaper or watching television  

|            |              |                         |                  |
|------------|--------------|-------------------------|------------------|
| Not at all | Several days | More than half the days | Nearly every day |
|------------|--------------|-------------------------|------------------|
  - h. Moving or speaking so slowly that other people have noticed. Or being so fidgety or restless that you have been moving around a lot more than usual.  

|            |              |                         |                  |
|------------|--------------|-------------------------|------------------|
| Not at all | Several days | More than half the days | Nearly every day |
|------------|--------------|-------------------------|------------------|
  - i. Thinking that you would be better off dead or that you would want to hurt yourself in some way.  

|            |              |                         |                  |
|------------|--------------|-------------------------|------------------|
| Not at all | Several days | More than half the days | Nearly every day |
|------------|--------------|-------------------------|------------------|
2. If you checked off any problems on this questionnaire so far, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?
 

|                      |                    |                |                     |
|----------------------|--------------------|----------------|---------------------|
| Not difficult at all | Somewhat difficult | Very Difficult | Extremely Difficult |
|----------------------|--------------------|----------------|---------------------|

**APPENDIX C**  
**Checklist for Data Collection and Review of CMC Medical Records**

**Demographic Variables**

Name  
MRN #  
Birthdate  
Diagnosis  
Ethnic Identification  
Education  
Insurance info.  
Medication  
Axis III diagnosis  
Primary Diagnosis

**Weight Variables**

Admit. Weight  
85% IBW  
Admit. %IBW  
Days to 85%  
Made it to 85%

**Indicators of Severity**

Age of onset  
Duration of illness  
Previous treatment  
Psychiatric comorbidity  
Severity of Eating Disorder per clinician rating  
Patient-reported intensity of ED symptoms (per EDDS)  
Patient-reported frequency of ED symptoms (per EDDS)  
Patient-reported severity of depression (per PHQ-9)  
Patient-reported frequency of depressive symptoms (per PHQ-9)