The Relationship between Eating Disorders and Suicide Experiences: Results from a Nationally Representative Sample

by

Christine A. Henriksen

A Thesis submitted to the Faculty of Graduate Studies of

The University of Manitoba

in partial fulfilment of the requirements of the degree of

MASTER OF ARTS

Department of Psychology

University of Manitoba

Winnipeg, MB

Abstract

Eating disorders are a significant health concern due to their high rates of comorbidity, mortality, and the physical and mental distress they cause. While many people are aware of the negative effects eating disorders have on physical and mental health, few realize that suicide is a potential outcome. Although the relationships between eating disorders and suicidality have been examined in clinical populations with anorexia nervosa and bulimia nervosa, these relationships have not been examined in the general population, nor with binge eating disorder. This study aimed to investigate these relationships in the Collaborative Psychiatric Epidemiologic Surveys (CPES, N=20,013), a large, nationally representative sample of adults in the United States. Logistic regression analyses revealed that individuals with a history of each eating disorder reported higher rates of suicide ideation and suicide attempts. Rates of suicide experiences among this population are similar to individuals with a history of major depression and a comorbid anxiety disorder. It is clear from this study that suicide remains a significant concern for individuals suffering from an eating disorder in the general population. It is essential that clinicians screen for suicide experiences in individuals suspected of suffering from an eating disorder.

Acknowledgements

This research was supported by a Manitoba Graduate Scholarship. I would like thank my Master's advisor, Dr. John Walker for his hard work, support, and guidance. I also thank my committee members, Dr. Jitender Sareen, Dr. James Bolton, and Dr. Patricia Furer for their invaluable feedback. Finally, I thank my loved ones for their love and support in all of my academic endeavors.

Correspondence concerning this thesis should be addressed to Christine Henriksen, PZ432 771 Bannatyne Ave., University of Manitoba, Winnipeg, MB, R3E 3N4.

Table of Contents

List of Tables

List of Figures

Introduction

While eating disorders may be relatively uncommon in the general population, they remain a serious health concern as they are highly comorbid with other psychological disorders, under-treated, and have some of the highest mortality rates among all mental disorders (American Psychiatric Association Work Group on Eating Disorders, 2006; Hudson, Hiripi, Pope, & Kessler, 2007). Suicide experiences among persons with eating disorders have received a considerable amount of attention in the past few years. Many researchers have found that these individuals are at an increased risk for suicide experiences, but there is still a debate whether all or only some eating disorder subtypes are associated with an increased risk of suicide experiences. The current study examined the relationship between eating disorders and suicide experiences in a nationally-representative, general population sample.

Eating Disorders

The DSM-IV-TR outlines three different eating disorders: anorexia nervosa, bulimia nervosa, and eating disorder not otherwise specified (American Psychiatric Association [APA], 2000). Included in the eating disorder not otherwise specified category is binge eating disorder. These disorders are all marked by an excessive preoccupation with body shape and weight and disturbances in eating behaviors; however, each disorder has distinct features.

Anorexia nervosa.

Diagnostic criteria. Four criteria for a diagnosis of anorexia nervosa are outlined in the DSM-IV-TR (APA, 2000). Criterion A requires that the individual weigh less than 85% of what is considered normal for a person of their age and height. Criterion B states that the individual must have an intense fear of fat or gaining weight. Criterion C is that the individual has a distorted view of their body shape and weight. While some individuals may realize they are

indeed thin, they are still overly concerned about certain body parts being too fat. Others may view themselves as being overweight when in fact they are underweight. Criterion D requires that females who are postmenarcheal to have stopped menstruating.

Subtypes. Anorexia nervosa is broken into two subtypes in the DSM-IV-TR: restricting type and binge-eating/purging type (APA, 2000). Individuals who achieve weight loss through dieting, fasting, or excessive exercise and who do not regularly engage in binge eating or purging are diagnosed as the restricting type. Those who do engage in binge eating and/or purging on a regular basis are diagnosed as having the binge-eating/purging type.

Some research has shown that individuals with these subtype diagnoses differ considerably. One group found that hospital inpatients with anorexia nervosa binge-eating/purging type were more extroverted, had a stronger appetite, and tended to be older than inpatients with anorexia nervosa restricting type (Casper, Eckert, Halmi, Goldberg, & Davis, 1980). Additionally, they found that those with anorexia nervosa binge-eating/purging type reported more anxiety, depression, and guilt. This finding was replicated in subsequent research in which binge-eating/purging was associated with more psychopathology and more comorbidity than restriction (Garner, Garner, & Rosen, 1993; Laessle, Wittchen, Fichter, & Pirke, 1989). Other researchers have also found those engaging in binge-eating/purging exhibit more impulsive behavior than those who only restrict food intake (Favaro & Santonastaso, 1996; Garfinkel, Moldofsky, & Garner, 1980; Pryor, Wiederman, & McGilley, 1996).

While individuals are placed into one category or the other upon diagnosis, it appears that this categorization frequently changes over time. Several prospective studies have found 30%-64% of individuals with the restricting type crossover to the binge/eating purging type (Eckert, Halmi, Marchi, Grove, & Crosby, 1995; Eddy, Dorer, Franko, Tahilani, Thompson-Brenner, &

Herzog, 2008; Eddy, Keel, Dorer, Delinsky, Franko, & Herzog, 2002; Strober, Freeman, & Morell, 1997), whereas crossover from the binge/eating purge type to the restricting type has been found to happen in 17%-44% of cases (Anderluh, Tchanturia, Rabe-Hesketh, Collier, & Treasure, 2008; Eddy et al., 2008; Fichter, Quadflieg, & Hedlund, 2006).

Associated features. For years clinicians have commented on what was believed to be the prototypical personality of individuals with anorexia nervosa. This population has been described as rigid, obsessional, constrained, conforming, and perfectionistic (Wonderlich, Lilenfeld, Riso, Engel, & Mitchell, 2005). Features of low self-esteem, greater harm avoidance, inflexible thinking, limited social spontaneity, restricted emotional expression and high levels of anxiety have also been described (APA, 2000; Wonderlich et al., 2005). Frequently individuals with anorexia nervosa exhibit obsessive-compulsive behaviors related to food, including being preoccupied with thoughts of food, eating slowly, cutting food into small pieces, collecting recipes, and hoarding food (APA, 2000; Klein & Walsh, 2004). Exercise and activity may become obsessions as well, with many individuals with anorexia engaging in excessive exercise, maintaining rigid postures or standing for extended periods of time in order to burn more calories. Many of these features lead these individuals to avoid social contact as all of their time and energy are consumed by thoughts and rituals surrounding food and exercise (Klein & Walsh, 2004).

Anorexia nervosa is also frequently associated with other psychopathology. A large proportion of individuals currently suffering from anorexia report depressive symptoms (Kaye, 1997). In fact population-based studies have shown anorexia to be highly comorbid with major depression, dysthymia, and anxiety disorders (Hudson et al., 2007; Preti et al., 2009). Substance use disorders are also common among individuals with anorexia nervosa, especially those with

the binge-eating/purging type as they tend to be more impulsive (APA, 2000; Hudson et al., 2007). Overall, it has been estimated that over half of all individuals with a history anorexia nervosa have another Axis I mental disorder (Hudson et al., 2007).

Axis II comorbidity is also common in anorexia nervosa. A meta-analysis has shown that Cluster C personality disorders are most frequent among individuals with anorexia nervosa. Approximately 15% of this population has comorbid obsessive-compulsive personality disorder, 14% comorbid avoidant personality disorder, and 7% dependent personality disorder (Cassin & von Ranson, 2005).

Along with comorbid psychopathology, anorexia nervosa is associated with a range of neuropsychological abnormalities. Several studies have shown that individuals with anorexia nervosa have memory and attention difficulties, as well as poorer visuospatial abilities (Kingston, Szmukler, Andrewes, Tress, & Desmond, 1996; Mathias & Kent, 1998). Structural differences have also been noted in patients with anorexia. MRI studies have revealed enlarged lateral ventricles, dilated sulci, and atrophic frontal lobes (Katzman, Christensen, Young, & Zipursky, 2001; Kingston et al., 1996). It remains unclear whether these structural abnormalities and cognitive deficits return to normal after an individual gains weight and recovers from anorexia nervosa (Katzman et al., 2001).

The other medical consequences of anorexia nervosa are also significant. Most notably, the mortality rate for individuals with anorexia nervosa is quite high, with an estimated mortality rate of 5 % per decade (Steinhausen, 2002; Sullivan, 1995). Indeed this is the highest mortality rate of all mental disorders (Harris & Barraclough, 1998). Another measure of mortality is the standardized mortality ratio (SMR), which compares the number of observed deaths to the number of expected deaths in a population. Estimates of SMR for anorexia nervosa range from

1.36 – 30.5, indicating mortality in anorexia is elevated compared to the general population (Berkman, Lohr, & Bulik, 2007).

As one can imagine, anorexia nervosa takes a considerable toll on physical health. Severe dermatological problems, acne, hair loss, and the development of lanugo are frequently seen in individuals with anorexia nervosa (Strumia, 2005). Self-induced vomiting may produce scars or calluses on the surface of the hand. Numerous gastrointestinal problems, such as delayed gastric emptying, gastric motor dysfunction, constipation, and an impaired sense of hunger and satiety, have been associated with anorexia nervosa (Chial, McAlpine, & Camilleri, 2002). More serious health complications such as electrolyte imbalance, heart arrhythmias, bradycardia, and acrocyanosis are also seen in individuals with anorexia nervosa (Birmingham & Beumont, 2004; Klein-Weigel et al., 2004; Mitchell & Crow, 2006). Follow-up studies have shown anorexia nervosa is associated with reproductive problems, osteoporosis, and low BMI, even after recovery (Bulik, Sullivan, Fear, et al., 1999; Rigotti, Neer, Skates, Herzog, & Nussbaum, 1991; Sullivan, Bulik, Fear, & Pickering, 1998; Szmukler, Brown, & Darby, 1985).

Prevalence and course. The prevalence of anorexia nervosa is low compared to other mental disorders. The lifetime prevalence among adult women in the United States and Canada has been estimated to be between 0.5%-0.9% (Garfinkel et al., 1996; Hudson et al., 2007; Walters & Kendler, 1995), while the lifetime prevalence among men has been estimated to be 0.1%-0.3% (Garfinkel et al., 1996; Hudson et al., 2007). The incidence of anorexia nervosa has been estimated at 4.7 per 100,000 people in the United Kingdom (Currin, Schmidt, Treasure, & Jick, 2005), and 7.7 per 100,000 people in the Netherlands (Hoek, van Son, van Hoeken, Bartelds, & van Furth, 2005). A recent meta-analysis revealed that incidence rates of anorexia in

Europe increased from 1930-1970, but have remained stable since 1970 (Hoek & van Hoeken, 2003).

The onset of anorexia nervosa typically occurs in adolescence. Hudson et al. (2007) found the median age of onset to be 18 years old in the United States, with 75% of cases exhibiting an onset between 16 and 22 years of age, and no cases beginning after the mid-20's. Incidence is highest among females aged 15-19, representing nearly 40% of all identified cases (Hoek & van Hoeken, 2003).

Although the population-based study by Hudson et al. (2007) found no current cases of anorexia nervosa, respondents with a lifetime history of anorexia nervosa still suffered from adverse effects. These respondents had a lower current BMI than those without a history of an eating disorder as well as a greater prevalence of underweight BMI's. Additionally, respondents with a lifetime history of anorexia nervosa had increased odds of having specific phobia, major depressive disorder, dysthymia, alcohol abuse or dependence, and drug abuse or dependence than those without a history of eating disorders.

Much research has demonstrated that anorexia nervosa is a chronic and disabling condition. A review of 119 studies by Steinhausen (2002) found that only 46.9% of patients with anorexia nervosa showed full recovery, 33.5% improved, and 20.8% continued to meet diagnostic criteria for anorexia nervosa at follow-up. However, some recent studies provide evidence that anorexia is not a chronic condition. For example, Hudson et al. (2007) found that the mean number of years that individuals suffered from anorexia nervosa was only 1.7 years. One possible explanation for these discrepant findings is that the majority of studies in the Steinhausen review were from clinical settings, whereas those in the Hudson et al. study are from

the general population. It can be expected that individuals in clinical settings have a more severe and chronic course.

Bulimia nervosa.

Diagnostic criteria. The DSM-IV-TR outlines five criteria for the diagnosis of bulimia nervosa (APA, 2000). First, a person must engage in binge eating. This is defined as eating an unusually large amount of food in a discrete period of time during which the individual feels a lack of control over their eating (Criterions A1 and A2). Second, the individual must partake in inappropriate compensatory behaviors, such as vomiting or using laxatives, to avoid gaining weight (Criterion B). This binge eating and use of compensatory behaviors must occur at least twice a week for three months (Criterion C). Also, individuals must over-emphasize the significance of their body shape and weight in evaluating themselves and determining their self-esteem (Criterion D). Lastly, these features must be present without a diagnosis of anorexia nervosa.

Subtypes. Like anorexia nervosa, bulimia nervosa has two subtypes: purging and non-purging (APA, 2000). Individuals who engage in self-induced vomiting or use laxatives, diuretics, or enemas to control their weight following binge eating are described as the purging subtype. Individuals who do not engage in purging but use inappropriate compensatory behaviors like fasting or exercising excessively, are described as the non-purging subtype.

Associated features. Unlike individuals with anorexia nervosa, those with bulimia nervosa tend to be in the normal weight range. Bulimia nervosa may even occur in individuals who are obese (APA, 2000).

Bulimia nervosa has been associated with numerous maladaptive personality traits. A recent review found that bulimia nervosa, like anorexia nervosa, is associated with

perfectionistism and obsessive-compulsive traits when compared to other psychiatric disorders (Cassin & von Ranson, 2005). Researchers have also described impulsiveness (Claes, Vandereycken, & Vertommen, 2002; Diaz-Marsa, Carrasco, & Saiz, 2000) and sensation seeking (Rossier, Plancherel, & Halfon, 2000). These individuals are often described as dramatic, neurotic, excitable, and intolerant of routine (Brewerton, Hand, & Bishop, 1993; Diaz-Marsa et al., 2000).

Mood disturbance is also associated with bulimia nervosa. Binge eating episodes are often spurred by anxiety, feelings of rejection and low mood or frustration. The binges serve as a coping mechanism, as many individuals report a feeling of numbness during a binge (Heatherton & Baumeister, 1991). However, negative affect is often seen after the binge eating. Individuals with this disorder tend to feel guilty and ashamed of their eating habits. They usually binge in secrecy and may even plan their binges in advance to avoid being caught (Klein & Walsh, 2004).

Bulimia nervosa has the highest comorbidity rates of all the eating disorders. A population-based study found that 94.5% of individuals with a history of bulimia nervosa also met criteria for another Axis I mental disorder. More specifically, 80.6% had a comorbid anxiety disorder and 70.7% had a comorbid mood disorder (Hudson et al., 2007). Impulse-control disorders and substance use disorders are also common in this population (Hudson et al., 2007; Kendler et al., 1991). This finding is not surprising given that individuals with bulimia nervosa tend to be more impulsive than others and rate higher on measures of novelty seeking (Diaz-Marsa et al., 2000).

Like anorexia, bulimia nervosa is highly comorbid with Axis II personality disorders (Bulik, Sullivan, Joyce, & Carter, 1995). Most notably, there is a strong link between bulimia nervosa and borderline personality disorder. These two disorders share several diagnostic

features including binge eating, impulsive behavior, and self-harming behavior. It has been estimated that over 21% of individuals with bulimia nervosa also meet criteria for borderline personality disorder. Other personality disorders that are most common in this group are avoidant personality disorder, dependent personality disorder and paranoid personality disorder (Cassin & von Ranson, 2005).

Neuropsychological deficits are also seen in the acute phases of bulimia nervosa. Several studies have found that individuals with bulimia nervosa show impaired executive functioning (Pendleton Jones, Duncan, & Brouwers, 1991), perceptual shifting (Tchanturia, Serpell, Troop, & Treasure, 2001), and perceptual sensitivity (Laessle, Bossert, Hank, Hahlweg, & Pirke, 1990). Additionally, mental flexibility appears to be impaired compared to healthy controls (Tchanturia et al., 2004). A longitudinal study found that participants with bulimia nervosa performed similarly to participants with anorexia nervosa, and that both groups showed deficits on tasks measuring attentional demands and problem solving abilities (Lauer, Gorzewski, Gerlinghoff, Backmund, & Zihl, 1999). Scores on these measures improved significantly after several months of therapy, suggesting that disordered eating behavior has a significant effect on cognitive functioning.

In addition to adverse psychological consequences, bulimia nervosa is associated with significant physical health problems. Most common are dental erosion and enlargement of salivary glands due to induced vomiting (Frydrych, Davies, & McDermott, 2005; Mandel & Abai, 2004). Individuals may also develop scars or calluses on their hands. Dermatological problems include acne, xerosis, and hair loss (Strumia, 2005). Dehydration, electrolyte imbalance, and gastrointestinal problems, such as delayed gastric emptying, increased gastric

capacity, and impaired sense of satiety are frequently seen in individuals with bulimia nervosa (Klein & Walsh, 2004; Strumia, 2005).

While mortality is not as high in bulimia nervosa as in anorexia nervosa, it still remains elevated compared to the general population. A meta-analysis of 43 studies calculated an overall SMR of 1.6 (Halmi, Agras, Mitchell, Wilson, & Crow, 2003), and a more recent longitudinal study found a SMR of 1.57 (Crow et al., 2009). It appears that death in individuals with bulimia is rarely attributable to their eating habits, but more often a result of substance use, suicide, and other medical problems (Quadflieg & Fichter, 2003).

Prevalence and course. Bulimia is more common than anorexia nervosa. Lifetime prevalence estimates range from 1.1-2.8% for women in Canada, the United States and New Zealand (Bushnell, Wells, Hornblow, Oakley-Browne, & Joyce, 1990; Garfinkel et al., 1996; Hudson et al., 2007; Kendler et al., 1991). For men lifetime prevalence is lower, with estimates ranging from 0.1-0.5% in these countries (Bushnell et al., 1990; Garfinkel et al., 1996; Hudson et al., 2007). The annual incidence rate of bulimia nervosa in the population has been estimated at about 12 per 100,000 people, and appears to have risen during the 1980's and then decreased during the late 1990's (Hoek, 2006; Hoek et al., 1995; Hoek & van Hoeken, 2003; Hudson et al., 2007;).

Onset of bulimia nervosa typically occurs in adolescence or early adulthood (Klein & Walsh, 2004). Hudson et al. (2007) found a mean age of onset of 19.7, with the majority of cases beginning between the ages of 14 and 22. However, there were some cases where onset occurred in the 30's or 40's.

Like anorexia nervosa, research on bulimia nervosa indicates that it is a chronic disorder. Hudson et al. (2007) found the average duration to be longer in bulimia nervosa than anorexia

nervosa. In that study, individuals with bulimia nervosa had a mean episode length of 8.3 years. A recent review of twenty-seven outcome studies using a three-level classification system of outcome, the majority of which were clinical samples, found that less than half of the patients were fully recovered from bulimia nervosa, and nearly one-quarter of the patients had a chronic course (Steinhausen & Weber, 2009). Comorbid mental disorders, including affective disorders, anxiety disorders and personality disorders, were also common at follow-up.

Binge eating disorder.

Diagnostic criteria. Binge eating disorder is not an official diagnosis in the DSM-IV-TR; however it has been proposed as an additional clinical category and is outlined in the DSM as a diagnosis in need of further study (APA, 2000). The current DSM outlines five criteria for the diagnosis of binge eating disorder. First, an individual must engage in recurrent episodes of binge eating in which the individual eats an unusually large amount of food in a discrete period of time and feels a lack of control during the eating episode (Criterion A). Second, the binge eating episodes must be associated with at least three of the following features: (1) eating rapidly, (2) eating until uncomfortably full, (3) eating when not physically hungry, (4) eating alone due to embarrassment, (5) feeling depressed, guilty, or disgusted with oneself after eating (Criterion B). Third, the individual must exhibit marked distress over their binge eating (Criterion C). Fourth, the binge eating episodes must occur at least two days a week for six months (Criterion D). Finally, the binge eating must not be followed by any inappropriate compensatory behaviors, and cannot occur during an episode of anorexia nervosa or bulimia nervosa (Criterion E).

Associated features. Binge eating disorder is most often associated with being overweight or obese (Fairburn et al., 1998). Individuals with binge eating disorder may have a

history of dieting and unsuccessful weight loss attempts. They also may have a history of significant weight fluctuations (de Zwaan et al., 1994). While these individuals tend to be overweight, they are still preoccupied by body shape and weight concerns and emphasize these factors in their self-evaluation (Masheb & Grilo, 2000; Striegel-Moore et al., 2001).

Like the other eating disorders, binge eating disorder is associated with significant mood disturbance and maladaptive personality traits. Obese individuals with binge eating disorder have lower self-esteem, are more perfectionistic and are more impulsive than obese individuals who do not meet criteria for binge eating disorder (de Zwaan et al., 1994). They are described as having high sensation seeking, disinhibition, and have poor interoceptive awareness. As with individuals with bulimia nervosa, those with binge eating disorder are also described as excitable, dramatic, and disliking routine (Cassin & von Ranson, 2005; Diaz-Marsa et al., 2000). Additionally, researchers have found that binging serves to regulate emotions in individuals with binge eating disorder. Research reports suggest that binges are precipitated by feelings of anxiety, depressed mood and boredom, and that following a binge episode feelings of depression, fatigue, and reduced anxiety are described (Binford, Mussell, Peterson, Crow, & Mitchell, 2004; Mitchell et al., 1999).

Comorbid Axis I and Axis II disorders are common in individuals with binge eating disorder. In a recent population-based study, 78.9% of individuals with a lifetime history of binge eating disorder also met criteria for another lifetime Axis I mental disorder (Hudson et al., 2007). Depression is frequently seen in this population (Mussell et al., 1995), as are anxiety disorders, impulse-control disorders, and substance use disorders (Hudson et al., 2007). Moreover, individuals with binge eating disorder show higher rates of histrionic, borderline,

obsessive-compulsive and avoidant personality disorder (Cassin & von Ranson, 2005; Specker, de Zwaan, Raymond, & Mitchell, 1994).

Considering the high rates of obesity in individuals with binge eating disorder, the adverse health consequences of binge eating disorder are significant. Binge eating is associated with insomnia, chronic pain, increased body fat, insulin resistance, increased triglyceride levels, as well as neck, shoulder and back pain (Field, Skinner, Corliss, & Horton, 2009; Reichborn-Kjennerud, Bulik, Sullivan, Tambs, & Harris, 2004; Tanofsky-Kraff et al., 2006). Obese individuals with binge eating disorder have higher rates of diabetes, hypertension, visual impairment, asthma and respiratory problems, cardiac problems, and osteoarthritis (Bulik, Sullivan, & Kendler, 2002; Johnson, Spitzer, & Williams, 2001).

Prevalence and course. Prevalence of binge eating disorder is higher than anorexia nervosa and bulimia nervosa. The lifetime prevalence was recently found to be 3.5% in females and 2.0% in males in the United States (Hudson et al., 2007). In Europe, lifetime prevalence was estimated to be 1.92% for females and 0.26% in males (Preti et al., 2009). Clearly the gender difference is not as pronounced in binge eating disorder as it is in anorexia nervosa and bulimia nervosa. To date, there are not any reports on the incidence of binge eating disorder.

Age of onset for binge eating disorder is typically in early adulthood. Hudson et al. (2007) found the mean age of onset to be 25.4 years old, with the majority of cases beginning between the ages of 17 and 32. Similarly, Pope et al. (2006) found a mean age of onset of 23.1 years old. However, there are reports of onset occurring in the 40's, 50's, or 60's (Hudson et al., 2007; Preti et al., 2009).

Recent research has had mixed results regarding the course and chronicity of binge eating disorder. Some authors have suggested that binge eating disorder is a relatively transient

condition in comparison to anorexia nervosa and bulimia nervosa. One group found that at five year follow-up only 18% of women with a past history of binge eating disorder had any clinical eating disorder, and only 10% still met criteria for binge eating disorder (Fairburn, Cooper, Doll, Normal, & O'Connor, 2000). The same study also found that recurrence was low for binge eating disorder. However, more recently researchers have found average length of binge eating disorder episodes to be 8.1 years (Hudson et al., 2007) and 14.4 years (Pope et al., 2006). At this point it remains unclear whether binge eating disorder is a relatively short-term disorder, or a more chronic, longstanding condition.

Suicide Experiences

Risk factors. According to 2002 health statistics, suicide is the 13th leading cause of death worldwide (World Health Organization, 2002). Much research has identified suicide attempts as the leading risk factor for subsequent completed suicides (Harris & Barraclough, 1997; Johnsson-Fridell, Ojehagen, & Traskman-Bendz, 1996; Nordstrom, Samuelsson, & Asberg, 1995), with approximately 6-10% of individuals who attempt suicide eventually dying from suicide (American Psychiatric Work Group on Suicide Behaviors, 2003). A natural trajectory leads an individual from seriously thinking about suicide, to making a suicide plan, to attempting to commit suicide, with the probability of going from suicide ideation to plans being 34% and from plans to attempts being 72% (Kessler, Borges, & Walters, 1999). Results from the original National Comorbidity Survey indicate that 13.5% of Americans report suicide ideation, 3.9% report having a suicide plan, and 4.6% making a suicide attempt at some point in their lifetime (Kessler et al., 1999).

One of the main risk factors for suicide ideation and attempts is mental disorder. In fact 90% of those who commit suicide are suffering from a mental disorder at the time of their death

(Beautrais, Joyce, & Mudler, 1996). Nearly all Axis I mental disorders are associated with increased rates of suicide ideation and attempts (Kessler et al., 1999; Nock et al., 2009). The association appears to be stronger for mood disorders (Harris & Barraclough, 1997; Kessler et al., 1999; Nock et al., 2009), with odds ratios for ideation and attempts highest among individuals with mania (Kessler et al., 1999). Additionally, research suggests there is a dose-response relationship between number of disorders and risk for attempted suicide (Kessler et al., 1999).

Considering the high rate of comorbidity in eating disorders, a growing body of literature has focused on the association between suicide and eating disorders. The risk for suicide in eating disorders is comparable to other Axis I disorders (Harris & Barraclough, 1997), and depression in particular (Bulik, Sullivan, & Joyce, 1999). Additionally, suicide is the second leading cause of death in anorexia nervosa (Crisp, Callender, Halek, & Hsu, 1992; Moller-Madsen & Nystrup, 1996; Patton, 1988), and the cause of a significant proportion of deaths in bulimia nervosa (Franko et al., 2004). Clearly, suicide is one of the most concerning outcomes of eating disorders.

Suicide ideation in eating disorders. Suicide ideation has been linked to eating pathology. For example, in an Italian community-based sample of adolescents, individuals who achieved scores above the cut-off suggestive of an eating disorder on three eating disorder inventories reported more hopelessness and suicide ideation than individuals scoring in the normal range on the inventories (Miotto, de Coppi, Frezza, & Preti, 2003). In that same study, researchers found that subjects who reported suicide ideation scored significantly higher on eating disorder inventories than those who did not report suicide ideation. Other studies have found that body image, body attitudes and feelings, unhealthy weight control behaviors, and

body dissatisfaction are correlated with suicide ideation in adolescent samples (Brausch & Muehlenkamp, 2007; Crow, Eisenberg, Story, & Neumark-Sztainer, 2008b). Furthermore, in a longitudinal study of weight control behaviors in adolescents, extreme weight control behaviors, such as self-induced vomiting, taking diet pills, and using laxatives or diuretics, predicted later suicide ideation in female subjects (Crow, Eisenberg, Story, & Neumark-Sztainer, 2008a).

Suicide attempts in eating disorders. Suicide attempts are common among individuals with eating disorders. In a longitudinal community-based study, individuals with a history of any DSM-IV eating disorder had significantly higher rates of attempted suicide compared to individuals with no psychiatric disorder (Lewinsohn, Striegel-Moore, & Seeley, 2000). Studies examining the prevalence of suicide attempt in bulimia nervosa have estimated between 15% and 40% of individuals with bulimia have a lifetime history of suicide attempt (Bulik, Sullivan, & Joyce, 1999; Corcos et al., 2002; Favaro & Santonastaso, 1997). A review found the overall prevalence of suicide attempts among outpatients with bulimia to be 23%, and prevalence among inpatients to be 39% (Sansone & Levitt, 2002). The same study found an overall prevalence rate of suicide attempt among outpatients with anorexia to be 16%.

There has been conflicting evidence regarding differences in rates of suicide attempts among the different eating disorders. In a Swedish sample of eating disorder inpatients, suicide attempts were retrospectively reported more frequently by individuals with bulimia nervosa as compared to those with anorexia nervosa (Ahren-Moonga, Holmgren, von Knorring, & af Klinteberg, 2008). Similar results were found in a large sample of French inpatients with eating disorders. Individuals with bulimia nervosa had the highest rates of suicide attempts, followed by the binge eating/purging subtype of anorexia, and those with the restricting type of anorexia having the lowest rates of suicide attempts (Fedorowicz et al., 2007). However, in a Swiss

sample of inpatient and outpatient females with eating disorders, researchers found the highest rate of suicide attempts among individuals with the binge-purge type of anorexia (34.7%), followed by the purging type of bulimia (29.9%), non-purging bulimia (14.3%) and restricting anorexia (10.5%; Milos, Spindler, Hepp, & Schnyder, 2004). Similarly, an 8-year, prospective longitudinal study of treatment-seeking women with DSM-IV eating disorders found more suicide attempts in women with anorexia than those with bulimia (Franko et al., 2004).

While the evidence is unclear about whether suicide attempts are more common in anorexia or bulimia, research in clinical samples does indicate that suicide attempts are more common in purging disorders. For example, one study of eating disorders found that a larger proportion of individuals reporting history of suicide attempts or self-injurious behaviors had binge eating/or purging behavior than individuals without this history (Stein, Lilenfeld, Wildman, & Marcus, 2004). Persons with bulimia who engage in purging report a greater preoccupation with suicide and attempt suicide more often than individuals with bulimia who do not purge (Favaro & Santonastaso, 1996; Viesselman & Roig, 1985; Youssef et al., 2004). The same has been found for individuals with anorexia nervosa who engage in purging behaviors (Favaro & Santonastaso, 1997; Youssef et al., 2004). Also, one study found that binge eating/purging behavior was the most important predictor for distinguishing individuals with anorexia who have a history of suicide attempts from those who do not (Foulon et al., 2007). The same study found that switching from the restricting to the binge eating/purging subtype of anorexia and having comorbid major depressive disorder were the two most frequent occurrences before a suicide attempt.

The difference in rates of suicide attempts in different eating disorder subtypes may be due to impulsivity differences. Numerous studies have shown impulsive behaviors to be strongly

associated with suicidality. For instance, among adolescent girls with eating disorders, suicide ideation was reported more often by those with bulimia nervosa (Ruuska, Kaltiala-Heino, Rantanen, & Koivisto, 2005). Moreover, suicide attempts and self-injurious behaviors are more common among individuals who abuse laxatives and diuretics (Corcos et al., 2002), as well as those who partake in numerous compensatory purging behaviors (Favaro & Santonastaso, 1997; Herzog et al., 2000). Suicide attempts and self-injury among eating disorder patients is also associated with a history of drug use disorder and other impulse control problems, such as shoplifting, sexual promiscuity, being verbally abusive, and being physically violent (Stein et al., 2004). In a study examining suicide experiences among patients with anorexia, significantly more individuals with the binge eating/purging subtype attempted suicide than those with the restricting subtype (Bulik et al., 2008). Among individuals with anorexia nervosa, suicide attempts appear to be associated with substance abuse and impulsive traits and behaviors, such as stealing and shoplifting (Bulik et al., 2008). In a sample of individuals with the purging type of bulimia nervosa, suicide attempts were significantly associated with substance or alcohol abuse, Cluster B personality disorders, and impulsive self-injurious behaviors (Favaro et al., 2008). In a different sample of outpatients with bulimia, individuals with a history of suicide attempts were more likely to have substance abuse problems, kleptomania, compulsive buying, and self-injurious behaviors than individuals without a history of suicide attempt (Forcano et al., 2009).

Completed suicide in eating disorders. While suicide attempts are common in both anorexia and bulimia, most research indicates mortality from suicide is only increased in anorexia nervosa. In a sample of both eating disorder inpatients and outpatients, the standardized mortality ratio for suicide over a five-year period was elevated for individuals with anorexia (SMR=56.9), but not for those with bulimia (Keel et al., 2003). Numerous studies have indicated

that completed suicide rates in anorexia are substantially higher than in the general population (Crisp et al., 1992; Eckert et al., 1995; Patton, 1988). Additionally, in their 1997 meta-analysis, Harris and Barraclough found the risk for suicide in anorexia nervosa was increased by a factor of 23. These statistics are alarmingly high. However, a more recent study found standardized mortality ratios due to suicide over an 8-25 year follow-up were significantly elevated in patients with bulimia nervosa and eating disorder not otherwise specified, but not for patients with anorexia nervosa (Crow et al., 2009). This discrepant finding may be attributed to the fact that it was an outpatient, rather than inpatient sample and had a longer follow-up period than previous studies.

Limitations of Previous Research

While the link between eating disorders and suicidality has been examined in recent years, most studies have used clinical samples. Individuals with eating disorders rarely seek treatment (Turnbull, Ward, Treasure, Jick, & Derby, 1996), and those seen in inpatient and outpatient settings are likely to differ in severity of disorder and other psychological variables compared to those who do not seek treatment. It is important to evaluate these associations in community samples, and ideally, in epidemiological studies. To date, there are no studies examining these relationships in large, nationally representative samples.

Although suicide experiences have been examined in connection with anorexia nervosa and bulimia nervosa, there is a dearth of information in regards to binge eating disorder. To date, there are no studies examining suicide experiences in individuals with binge eating disorder.

Other limitations of previous research should be noted. While numerous studies examine the relationship between eating disorders and suicide experiences, not all studies examine the eating disorders separately. Since each disorder has its own unique qualities, these relationships

need to be studied individually. Also, few studies have looked at suicide experiences other than suicide attempts in connection with eating disorders. Since suicide ideation and suicide plans are strong predictors of suicide attempts, the association of these experiences with eating disorders should be investigated as well. These relationships are important for designing prevention and intervention strategies for suicide. Finally, many studies fail to examine the relationship between suicidality and the different eating disorder subtypes. It is important to evaluate which behaviors seen in the different subtypes of eating disorders are related to suicide experiences, rather than looking at the diagnostic categories as a whole, since psychopathology vary depending on the subtype.

Goals of Current Study

The current study has three main goals: (1) to examine the relationship between the DSM-IV-TR eating disorders anorexia nervosa and bulimia nervosa and suicide experiences in the general population, (2) to examine the relationship between the proposed DSM-IV-TR binge eating disorder and suicide experiences in the general population, and (3) to examine the relationship between binge eating and purging behaviors and suicide experiences among individuals with a lifetime history of eating disorders in the general population. Additionally, the current study has a secondary goal: to describe the demographic characteristics of individuals with a lifetime history of eating disorders in the general population.

Method

CPES Sample

The current study is based on the Collaborative Psychiatric Epidemiologic Surveys (CPES, N=20,013), which are comprised of the National Comorbidity Survey Replication (NCS-R), the National Survey of American Life (NSAL) and the National Latina and Asian American

Study (NLAAS). The CPES were funded by the National Institutes of Mental Health, and subsequently designed and conducted by the Survey Research Center of the Institute for Social Research at the University of Michigan (Heeringa et al., 2004). These three surveys are representative of the United States non-institutionalized adult population, and were carried out between 2001 and 2003 (Pennell et al., 2004). In all three surveys trained lay-interviewers conducted face-to-face interviews. However, if respondents were hesitant about an in-person interview or budgetary restraints prevented travel to the respondents' home, telephone interviews were used instead. Each interview utilized computer-assisted interviewing, which allows for complex skip patterns and sampling algorithms. Informed consent was obtained from all respondents before completing the interviews. Detailed information on sampling and weighting procedures employed in the CPES can be found elsewhere (Heeringa et al., 2004).

NCS-R. The NCS-R screened 13,054 households, and surveyed 9,282 English-speaking adults residing in the 48 contiguous United States (Heeringa et al., 2004). Among the 9,282 respondents, 7,693 were the main respondent in the identified household and 1,589 were individuals identified as a second eligible adult within the household (Pennell et al., 2004). The NCS-R yielded a response rate of 70.9% among main respondents and 80.4% among the second respondents. An additional 554 interviews were collected at the end of the survey period in which non-respondents were offered $100 to complete a shortened version of the NCS-R survey (Heeringa et al., 2004), resulting in a final sample of 9,282.

NSAL. The NSAL (n=6,082) is a nationally representative sample of African American and Afro-Caribbean American adults in the contiguous 48 states, based on 1990 US census data (Pennell et al., 2004). In this survey 11,634 eligible households were identified, in which only one respondent was selected to attempt to contact for an interview. Of the potential respondents,

3,750 African Americans, 1,623 Afro-Caribbean Americans, and random sample of 1,006 non-Hispanic whites residing in predominately black neighborhoods completed interviews (Heeringa et al., 2004). Like the NCS-R, only adults who were able to speak English were eligible for the survey. The response rate for the core NSAL sample was 71.5% and 76.4% for the Caribbean Supplement sample (Heeringa et al., 2004; Pennell et al., 2004).

NLAAS. The NLAAS (n=4,649) is a nationally representative sample of Latino American, Asian American, and a control group of non-Hispanic, non-Asian white adults living in areas highly populated by Asian and Latino Americans (Pennell et al., 2004). Latino groups included Cuban, Mexican, Puerto Rican, and other Latino descent, while the Asian groups included Chinese, Filipino, Vietnamese, and other Asian descent. Unlike the NCS-R and the NSAL, the NLAAS sample included individuals from all 50 states, including Hawaii and Alaska (Heeringa et al., 2004). Eligible households were identified, in which one main respondent and a possible second respondent were contacted for interviews. Of the 4,345 eligible main respondents, 3,620 completed interviews, and of the 1,234 eligible second respondents, 1,029 completed interviews (Pennell et al., 2004). Response rates were 75.7% for the main respondents and 80.3% for second respondents.

Measures

Sociodemographic variables. All three CPES surveys measured an array of sociodemographic variables: age, sex, race, marital status, and education. Age is a continuous measure, while all other sociodemographic variables are categorical. For the purposes of this study race has been collapsed into five categories (non-Hispanic white, Asian, Hispanic, Black, and other), marital status collapsed into three categories (married/cohabitating,

divorced/separated/widowed, and never married), and education collapsed into four categories (0-11 years, 12 years, 13-15 years, and 16+ years).

Psychiatric diagnoses. The CPES utilized the World Mental Health Composite Diagnostic Interview (WMH-CIDI), a fully structured diagnostic interview, to diagnose respondents with Axis I psychiatric disorders according to DSM-IV-TR criteria (Kessler & Ustun, 2004). The WMH-CIDI assesses mood disorders (major depression, mania), anxiety disorders (panic disorder, specific phobia, agoraphobia, generalized anxiety disorder, post-traumatic stress disorder, obsessive-compulsive disorder, social phobia), and substance use disorders (alcohol abuse, alcohol dependence, drug abuse, drug dependence). The WMH-CIDI also includes questions about functioning, treatment, and risk-factors for these various psychiatric disorders. In a clinical reappraisal study comparing CIDI and Structured Clinical Interview for Diagnosis (SCID) diagnoses in the NCS-R, researchers found moderate concordance between individual lifetime SCID and CIDI diagnoses (Haro et al., 2006). Previous versions of the CIDI have been shown to have excellent inter-rater reliability, good test-retest reliability and good validity (Andrews & Peters, 1998).

Eating disorders are also included in the WMH-CIDI; however not all respondents of the three surveys were assessed for eating disorder diagnoses. The NCS-R was administered in two parts (Kessler et al., 2004). Part I assessed main demographic features and core WMH-CIDI psychiatric disorders, and was administered to all NCS-R respondents. Part II assessed additional psychiatric disorders in a sub-sample of Part I respondents (n=5,692), including all respondents with a lifetime history of a Part I psychiatric disorder and a probability sample of other respondents. Only a random sample of Part II respondents was selected to complete the eating disorders section of the WMH-CIDI, which includes anorexia nervosa, bulimia nervosa, and

binge eating disorder (Hudson et al., 2007). Thus only 2,980 NCS-R respondents were assessed for eating disorders. Meanwhile, all NSAL and NLAAS respondents completed the eating disorder sections of the WMH-CIDI.

Like the other psychiatric disorders assessed by the WMH-CIDI, eating disorder diagnoses were based on DSM-IV-TR criteria (Kessler & Ustun, 2004). Questions assessing anorexia nervosa and bulimia nervosa closely resembled DSM-IV-TR criteria; however one criterion used to diagnose binge eating disorder differed from the definition given in DSM-IV-TR (Hudson et al., 2007). While the DSM-IV requires a minimum of six months of binge eating to be diagnosed with binge eating disorder, the WMH-CIDI only asked whether an individual had experienced binge eating for at least three months. Diagnostic hierarchy and exclusion rules were used in all diagnoses such that an individual could not be diagnosed with more than one eating disorder simultaneously; however they could display more than one lifetime eating disorder diagnosis if they had switched from one disorder to another. For the purposes of the current study, individuals with a history of more than one eating disorder have only been included in one eating disorder group. To reduce problems with small cell sizes, individuals with a history of anorexia nervosa and any other eating disorder have been placed in the anorexia group and removed from other eating disorder groups. Similarly, respondents who had a lifetime history of both bulimia nervosa and binge eating disorder were placed in the bulimia group and removed from the binge eating disorder group. With this approach the three eating disorder groups did not overlap.

Among the questions assessing eating disorder criteria, respondents were asked about binge eating and purging behaviors. Interviewers first gave respondents a specific definition of binge eating. Presence of regular binge eating was then assessed by asking respondents, “Did

you ever have a time in your life when you went on eating binges at least twice a week for several months or longer?" Respondents were also asked three separate questions regarding purging: "Did you take water pills, diuretics, or weight control medicines?", "Did you make yourself vomit?", and, "Did you take laxatives or enemas?" For those respondents who had a lifetime history of any eating disorder, a dichotomous binge eating variable and three dichotomous purging variables were created based on their responses to the binge eating and purging questions

Suicidality. Suicide experiences were assessed by three questions in each CPES survey. Each respondent was asked, "Have you ever seriously thought about committing suicide?", "Have you ever made a plan for committing suicide?", and "Have you ever attempted suicide?" These questions were used to make three separate binary suicidality variables: *lifetime suicide ideation, lifetime suicide plan,* and *lifetime suicide attempt*.

Disability. All NSAL, NLAAS and NCS-R Part II respondents completed the World Health Organization Disability Assessment Schedule II (WHODAS-II), a measure of past 30 day disturbances in behavior or functioning resulting from physical or mental health disorders (Rehm et al., 1999; World Health Organization, 1998). The WHODAS-II assesses both the persistence and severity of difficulties in six dimensions of functioning: understanding and communicating, getting around, self care, getting along with people, life activities, and participation in society. The WHODAS-II yields six domain scores ranging from 0-100, with higher scores indicating greater levels of disability. Studies have shown this instrument has good internal consistency, moderately correlates with Short Form-36 Health Survey, and has acceptable discriminatory validity (Buist-Bouwman et al., 2008; Garin et al., 2010; Rehm et al., 1999).

Analyses

The Taylor Series Linearization method in the SUDAAN statistical program, a variance estimation procedure, was used for all analyses. This method allows the data to be representative of the national population by utilizing the appropriate statistical weights and stratification information supplied by the CPES.

Logistic regression analyses were used to examine the relationship between lifetime eating disorder diagnoses and suicide experiences using two comparison groups: individuals with no lifetime history of mental disorder and individuals with a lifetime history of both major depression and an anxiety disorder, but no history of an eating disorder. This reference group was chosen based on findings that age of onset is similar to eating disorders (Andrade et al., 2003; Wittchen, Knäuper, & Kessler, 1994), and that individuals with comorbid depression and anxiety tend to have more impairment and higher rates of suicide experiences than those with either condition alone (Kessler, DuPont, Berglund, & Wittchen, 1999; Roy-Byrne et al., 2000; Sareen et al., 2003). First, a bivariate logistic regression, using eating disorder diagnosis as the predictor variable and suicide experience as the outcome variable, was used to find the unadjusted odds ratio of each suicide experience. Next, the same logistic regression analysis was used to find the adjusted odds ratio of each suicide experience while controlling for sex, race, education, marital status, and age. Finally, a third logistic regression analysis examined the relationship between eating disorders and suicidality, while controlling for sociodemographic variables and comorbid mood, anxiety, and substance use disorders. In the first two analyses individuals with a lifetime history of eating disorders were compared to individuals with no history of mental disorder and again to individuals with a history of both major depression and an anxiety disorder. However, for the third logistic regression, individuals with a history of eating disorders were only compared to those with a history of both major depression and an

anxiety disorder. The series of logistic regressions was repeated with each eating disorder diagnosis and each suicide experience.

The relationship between the specific eating behaviors of binge eating and purging and the various types of suicide experience was also examined through logistic regression analyses. For individuals with a lifetime history of any eating disorder, a series of three logistic regressions with binge eating as the independent variable and suicide experience as the dependent variable, was conducted. The first was an unadjusted, bivariate logistic regression, the second was a multivariate logistic regression controlling for sociodemographics (sex, race, education, marital status, and age), and the third was a multivariate logistic regression controlling for sociodemographic variables and comorbid mood, anxiety, or substance use disorders. The sequence of regressions was repeated with each of the three purging behaviors predicting each suicide experience.

In order to assess current levels of disability across the three eating disorder groups and two reference groups, linear regression analyses were used. In each analysis mean WHODAS scores were compared between each of the five groups using linear contrasts while controlling for age, sex, race, education and marital status. These analyses were repeated to compare mean disability scores for all six WHODAS subscales.

Weighted mean scores and the standard error of each mean were computed for continuous sociodemographic variables. Linear regression analyses were used to compare mean scores of the three eating disorder groups and two comparison groups for continuous sociodemographic variables. Cross-tabulations and chi-square analyses were used to compare the distribution of categorical sociodemgraphic characteristics across the five groups. Alpha level was set to 0.05 for all statistical comparisons.

Results

Table 1 presents categorical sociodemographic characteristics of all three eating disorder groups and the two reference groups. Chi-square analyses revealed the five study groups differed on all categorical sociodemographic factors. There is a higher proportion of females, married, highly-educated, and white persons in the anorexia nervosa group compared to other groups, and there is a higher proportion of blacks and Hispanics in the bulimia group.

Current mean age varied significantly across the five groups, with individuals in the depression and anxiety, bulimia, and binge eating disorder groups being significantly younger compared to those with no lifetime history of mental disorder (See Table 2 and Figure 1). The Centers for Disease Control and Prevention (CDC) uses Body Mass Index (BMI) to define normal weight range, with "healthy weight" defined as a BMI between 18.5 and 24.9 (CDC, 2010). BMI less than 18.5 is considered underweight, BMI of 25.0-29.9 is overweight, and a BMI of 30.0 or greater is considered obese. Individuals with a lifetime history of anorexia have a significantly lower current BMI than individuals in the other eating disorder groups and non-eating disorder groups, and those with a history of bulimia or binge eating disorder have a significantly higher current BMI compared to those in the non-eating disorder groups (See Figure 2). Moreover, chi-square analyses revealed proportions of underweight, healthy weight, overweight, and obese individuals varied significantly across the five groups (See Table 1). The anorexia group contained a considerably higher proportion of underweight and healthy weight individuals than other groups, while the bulimia and binge eating disorder group had a considerably higher proportion of obese individuals than the anorexia group and reference groups.

Figure 3 and Table 2 demonstrate the differences in WHODAS disability scores among the three eating disorder and two reference groups. Compared to individuals with no lifetime history mental disorder, those with a history of major depression and an anxiety disorder, bulimia nervosa, or binge eating disorder had higher disability scores on the Cognitive and Role Impairment subscales. Mean scores for the Mobility and Time Out of Role subscales were significantly higher among all three eating disorder groups and the depression and anxiety group compared to those in the no disorder group. In comparing the eating disorder groups to the depression and anxiety group, the only significant mean score difference was on the Social Interaction subscale, with individuals with a history of anorexia nervosa having a lower mean score (indicating less impairment in social functioning) than individuals with major depression and anxiety. Mean scores for individuals with a history of anorexia on this subscale were also lower compared to individuals with a history of bulimia; however, no other significant differences were found in comparing disability scores among the three eating disorder groups.

Mean age of onset and duration of disorder were calculated for the three eating disorder groups. Mean age of onset ranged from 19.1-23.5 years old, with age of onset tending to be older in the binge eating disorder group compared to both anorexia and bulimia (See Table 3). Average duration was considerably shorter in the anorexia nervosa group (3.6 years) and considerably longer in the bulimia nervosa and binge eating disorder groups (14.0 and 12.6 years, respectively).

Table 4 presents the percentage of individuals in each eating disorder group who had a lifetime diagnosis of other Axis I mental disorders. Comorbidity was high among the three eating disorder groups, with 72.7% of individuals with anorexia, 82.4% of individuals with bulimia, and 75.9% of individuals with binge eating disorder having any other lifetime Axis I disorder. Major

depression was the most common comorbid disorder, with 31.0-40.7% of individuals in each eating disorder group having a lifetime history of depression. The majority of individuals in each eating disorder group also had a lifetime history of panic attacks. Social anxiety disorder was also common all three groups. Posttraumatic stress disorder was also quite common among individuals with bulimia, and considerably more common in this group than the other eating disorder groups. Drug abuse was the most common substance use disorder among all three eating disorder groups.

Suicide experiences were common among individuals with a history of mental disorder in this sample (See Tables 5-10). Prevalence of suicide ideation ranged from 19.2% in individuals with a history of anorexia nervosa, to 39.9% in individuals with a history of major depression and any anxiety disorder. Suicide attempts were slightly less common, with prevalence rates ranging from 10.1% among those with anorexia, to 17.8% of individuals with bulimia. Among each mental disorder group examined, roughly 1/3-1/2 of individuals who reported suicide ideation also reported a suicide attempt.

Tables 5 and 6 present the results of logistic regression analyses examining the association between anorexia nervosa and suicide experiences. The small sample size in the anorexia nervosa group limits the power in the comparisons with the reference groups. Compared to individuals with no lifetime disorder, those with a lifetime history of anorexia nervosa were approximately 3 times more likely to experience suicide ideation and 7 times more likely to attempt suicide, even after controlling for sociodemographic factors. However the suicide experiences of ideation and attempts did not differ between individuals with a lifetime history of anorexia and those with a lifetime history of depression and an anxiety disorder. The

relationship between anorexia nervosa and suicide plans could not be examined due to small cell sizes.

Tables 7 and 8 present the results of logistic regression analyses examining the relationship between suicide experiences and bulimia nervosa. While using the no lifetime disorder group as the reference group, significant relationships between bulimia and suicide ideation, plans, and attempts emerged, and these relationships remained significant after adding covariates. After controlling for age, race, education, sex, and marital status, individuals with a lifetime history of bulimia had nearly 9.5, 20, and 14 times the odds of experiencing suicide ideation, plans, and attempts, respectively, compared to individuals with no lifetime history of mental disorder. However, rates of suicide experiences among individuals with bulimia nervosa were not significantly different than those with a history of depression and anxiety.

Results of the logistic regression analyses examining the association between binge eating disorder and suicide experiences are presented in Tables 9 and 10. A significant association between lifetime binge eating disorder and all three suicide experiences emerged while comparing to individuals with no lifetime mental disorder, with adjusted odds ratios ranging from 8.59 (ideation) to 13.57 (plans). However, in comparison to individuals with a lifetime history of major depression and anxiety, those with a history of binge eating disorder were no more or less likely to have suicide experiences.

As shown in Table 11, only 21 of the 478 respondents with an eating disorder did not engage in binge eating at some point. It can be presumed that these 21 individuals came from the anorexia nervosa group since binge eating is not a diagnostic criterion for anorexia. Thus, nearly one third of all individuals with a history of anorexia nervosa engaged in binge eating.

Cell sizes were too small to examine the relationship between binge eating and suicide experiences among individuals with a lifetime history of any eating disorder (See Table 11).

Tables 12-14 present the results of logistic regression analyses examining the association between purging behaviors and suicide experiences. Among respondents with a lifetime history of any eating disorder, those who took diuretics or weight loss pills were not at increased odds of experiencing suicide ideation, plans, or attempts compared to those who did not take diuretics or weight loss pills (See Table 12). A similar pattern of results was observed in examining the relationship between laxative and/or enema use (See Table 13). Rates of suicide experiences did not significantly differ between individuals who did and did not take laxatives and/or enemas to control their weight. However, there was a significant association between vomiting and suicide experiences (See Table 14). Among individuals with a lifetime history of any eating disorder, vomiting to control weight was associated with increased odds of having suicide ideation and attempts, even after controlling for sociodemographic variables and other Axis I psychiatric disorders.

Discussion

The current study is the first to examine the relationships between anorexia nervosa, bulimia nervosa, and binge eating disorder and suicidal experiences in a large, nationally-representative sample. Suicide ideation, plans, and attempts are relatively common experiences among persons with these disorders. Additionally, individuals with a lifetime history of these three disorders had higher rates of suicide ideation and suicide attempts compared to persons with no history of mental disorder. Moverover, those with a lifetime history of bulimia nervosa or binge eating disorder had higher rates of suicide plans compared to those without a history of mental disorder. These findings are consistent with previous community-based studies that have

found increased rates of suicidal ideation among those with higher eating disorder assessment scores (Brausch & Muehlenkamp, 2007; Crow, Eisenberg, Story, & Neumark-Sztainer, 2008b; Miotto, de Coppi, Frezza, & Preti, 2003), and higher rates of suicide attempts among individuals with a DSM-IV eating disorder compared to individuals with no psychiatric disorder (Lewinsohn, Striegel-Moore, & Seeley, 2000). Moreover, this extends the finding that nearly all Axis I mental disorders are associated with increased rates of both suicide ideation and attempts (Kessler et al., 1999; Nock et al., 2009), to include eating disorders as well.

Prevalence of all three suicide experiences was highest among respondents with bulimia, and lowest among those with anorexia. These results are similar to those of recent European inpatient studies (Ahren-Moonga et al., 2008; Fedorowicz et al., 2007), yet inconsistent with a longitudinal study by Franko and colleagues (2004), who found suicide attempts were more common in women with anorexia than women with bulimia. Differences in findings may be attributed to the inclusion of patients with eating disorder not otherwise specificed in the Ahren-Moonga et al. (2008) study, or the inclusion of outpatients and potential diagnostic crossover in the Franko et al. (2004) study. The current findings also support recent research indicating suicide attempts are seen more often in individuals with purging-type disorders (Favaro & Santonastaso, 1996; Stein, Lilenfeld, Wildman, & Marcus, 2004; Viesselman & Roig, 1985; Youssef et al., 2004)

While indviduals with a history of eating disorders experienced higher rates of suicide experiences than individuals with no lifetime mental disorder, the rate was not higher (or lower) than for persons with a history of depression and an anxiety disorder. This is consistent with Bulik, Sullivan, & Joyce's (1999) study, which found the risk for suicide in individuals with eating disorders is comparable to the risk for individuals with depression. It appears that suicide

experiences among individuals with a history of any eating disorder are similar to those with comorbid major depression and an anxiety disorder.

The current study's finding that suicide rates in eating disorders are similar to those with comorbid depression and anxiety may be explained by the high rates of comorbidity seen in eating disorders. Consistent with previous studies (Hudson et al., 2007; Franko et al., 2004; Lewinsohn et al., 2000; Preti et al., 2009), Axis I comorbidity was quite high in this eating disorder sample, with major depression being the most common comorbid disorder across the three eating disorder diagnoses. Research on the association between anxiety disorders and suicide have found that comorbid depression greatly increases the risk of suicide attempts (Diaconu & Turecki, 2007; Sareen et al., 2005). A similar relationship may be present in eating disorders. Several studies have found depressive symptoms to be associated with both suicide ideation and suicide attempts among individuals with eating disorders (Corcos et al., 2002; Fedorowicz et al., 2007; Fennig & Hadas, 2010; Ruuska et al., 2005); however some studies have failed to find this association (Favaro et al., 2008). An important factor may be the timing of depressive episode and onset of the eating disorder. Some researchers have hypothesized that depression may result from starvation and disordered eating habits (Altemus & Gold, 1992; Cowen, Anderson, & Fairburn, 1992; Laessle, Platte, Schweiger, & Pirke, 1996), while others believe eating pathology follows the onset of depression, as eating disorders are viewed as a particular variant of mood disturbance by these researchers (Hudson, Laffer, & Pope, 1982; Levy & Dixon, 1985). It is possible that suicide experiences among individuals with eating disorders occur more frequently (or exclusively) in the presence of a depressive episode. Longitudinal studies will be needed to further understand the complex relationship between eating disorders, depression and suicide experiences.

The results of the current study also suggest that not all purging behaviors are associated with increased rates of suicide experiences. More specifically, vomiting in persons with eating disorders is associated with higher rates of suicide ideation and attempts compared to those without vomiting. Those with eating disorders and use of laxatives, enemas, diuretics and weight loss pills do not have higher rates of suicide experiences relative to persons who do not engage in these purging behaviors. These results are inconsistent with previous studies that have specifically linked laxative and diuretic use to higher rates of suicide experiences (Corcos et al., 2002; Favaro & Santonastaso, 1996). One potential explanation for this discrepant finding is the use of different samples. Previous studies that found a link between suicide experiences and purging behaviors utilized clinical samples, which are likely to contain more severe cases of eating disorders than the current community sample. It is possible that this relationship does not exist outside of more severe cases of eating disorders. Considering numerous researchers have demonstrated that impulsivity is associated with suicidal behavior (Bulik et al., 2008; Favaro et al., 2008; Favaro & Santonastaso, 1997; Forcano et al., 2009; Herzog et al., 2000; Stein et al., 2004), another possible explanation is that taking laxatives, enemas, diuretics and weight loss pills is not an impulsive behavior like vomiting. More research is necessary to fully understand the relationship between various purging behaviors and suicide experiences.

Another interesting result was that the duration of the condition in the eating disorder groups was considerably longer for individuals with bulimia nervosa and binge eating disorder compared to those with anorexia nervosa. In 2007 Hudson et al. examined the mean number of years with an eating disorder episode in the NCS-R with similar results. The current study which also included the NSAL and NLAAS found slightly higher mean episode lengths for all three eating disorder groups. These results, taken together, are in opposition to the majority of

previous research suggesting that anorexia is a chronic condition (Steinhausen, 2002), as well as research indicating binge eating disorder is a relatively transient disorder (Fairburn et al., 2000). Instead the current results support recent studies indicating both bulimia and binge eating disorder are chronic disorders, while anorexia tends to present with shorter episode lengths (Hudson et al., 2007; Pope et al., 2006; Steinhausen & Weber, 2009). Given the majority of previous research has utilized clinical samples, and the current study, along with those by Hudson and colleagues, and Pope and colleagues, have been population-based studies, it is likely the episode lengths found here may be more representative of the majority of eating disorder cases.

Additionally, the results of the current study indicate that the current BMI of individuals with a history of an eating disorder is significantly different from those who have never met diagnostic criteria for an eating disorder. Respondents who had a history of anorexia had lower BMI's compared to the two reference groups, which is consistent with previous research showing individuals with a history of anorexia have a low BMI after recovery (Rigotti et al., 1991; Sullivan et al., 1998). A sizeable proportion (17%) have BMI's in the underweight range although the sample size is very small. Individuals with a history of bulimia or binge eating disorder had significantly higher BMI's than the reference group, and there was a greater proportion of obese individuals in the bulimia and binge eating disorder groups than the two reference groups. It is important to note that the majority of the individuals in the three eating disorder groups did not meet diagnostic criteria for an eating disorder at the time of the interviews. Clearly, weight problems persist for these individuals despite being in remission from the eating disorder.

Persons with a lifetime history of any eating disorder experience higher levels of current disability than individuals without a history of mental disorder. Few differences emerged in comparing disability scores between the eating disorder groups and the depression and anxiety group. These results suggest that more persons with a history of eating disorders have difficulties in the areas of understanding and communicating, getting around, getting along with others, and carrying out daily activities. Despite the fact that the majority of these individuals were in remission at the time of the interviews, they were still experiencing functional impairment, and their level of impairment was similar to individuals with a history of comorbid depression and anxiety. Given the high proponderance of obesity in the bulimia and binge eating disorder groups, it is possible that their disability is related to weight problems. Persons with obesity may have difficulties moving around and engaging in physical activity, thus limiting their daily activities. Moreover, obesity has been shown to increase the risk of numerous chronic health conditions (World Health Organization Global Strategy on Diet, Physical Activity and Health, 2003), which may further restrict functioning in these individuals. Again, this suggests that the effects of these eating disorders are not limited to the time individuals meet diagnostic criteria.

Although the current study has made significant contributions to the eating disorder literature, several limitations should be noted. First, the data is cross-sectional. As such, no assumptions can be made about causation. While history of eating disorders and eating disorder behaviors were used to predict suicide experiences, it is possible that the suicide experiences occurred before the onset of an individual's eating disorders. Second, while most WMH-CIDI diagnoses are precisely based on DSM-IV-TR criteria, the criteria for binge eating disorder do not match exactly. The DSM-IV-TR requires a longer period of binge eating than WMH-CIDI criteria, thus prevalence of binge eating disorder in this sample may be over-estimated. Third,

given the retrospective nature of the interviews, recall bias may be present, altering the accuracy of interviewees' responses. As such, prevalence of certain behaviors and/or disorders may not be completely representative of the general population. Fourth, small cell sizes may not have provided sufficient power to detect small differences in suicidal experiences for the eating disorder groups, particularly anorexia nervosa. Fifth, due to the small number of eating disorder cases in the sample the author was not able to examine the eating disorder subtypes separately. However, our examination of binge eating and purging behaviors did allow us to make conclusions about their relationship to suicidality. Sixth, although Axis II personality disorders and impulse-control disorders have been shown to be associated with suicide experiences in eating disorder populations, these disorders were not assessed in the CPES (or only assessed in a small subsample of the survey population). Therefore the author was not able to control for these disorders in the analyses. And finally, due to small cell sizes, individuals who had received more than one lifetime eating disorder diagnosis were included in the study. As such, the relationships observed were not that of "pure" eating disorders.

Conclusions

Despite the aforementioned limitations, several important conclusions can be drawn from the current study. Most significantly, individuals in the general population with a history of any eating disorder, including the recently proposed binge eating disorder, frequently report suicide ideation, plans, and attempts, and are more likely to experience suicidality than individuals without a history of mental disorder. The likelihood of experiencing suicidal behaviors in eating disorder populations is similar to individuals with a lifetime history of major depression with a comorbid anxiety disorder. Moreover, among individuals with a history of an eating disorder, those who vomit to control their weight are at an increased likelihood of experiencing suicidal

ideation and attempting suicide over those who do not engage in vomiting. However, other types of purging behaviors appear to be unrelated to remains to suicide experiences. Furthermore, longitudinal research will be needed to examine the direction of causality in these associations, as well as the role that onset of comorbid depression or other mental disorders plays in these associations.

Overall, suicide is a significant concern in eating disorder populations. Taking into consideration that these groups rarely seek treatment, it is essential that clinicians and other front line health care providers screen individuals for eating disorders, and for suicidal thoughts and behaviors among those suspected suffering from an eating disorder. Moreover, it is important to develop suicide prevention strategies and treatment modalities specific to this high-risk population.

References

Andrade, L., Caraveo-Anduaga, J. J., Berglund, P., Bijl, R. V., de Graaf, R., Vollebergh, W.,...Wittchen, H. U. (2003). The epidemiology of major depressive episodes: Results from the International Consortium of Psychiatric Epidemiology (ICPE) Surverys. *International Journal of Methods in Psychiatric Research, 12*, 3-21. doi:10.1002/mpr.138

Ahren-Moonga, J., Holmgren, S., von Knorring, L., & af Klinteberg, B. (2008). Personality traits and self-injurious behavior in patients with eating disorders. *European Eating Disorders Review, 16*, 268-275. doi:10.1002/erv

Altemus, M., & Gold, P. W. (1992). Neuroendocrine abnormalities in anorexia nervosa and bulimia nervosa. In G. H. Anderson, & S. H. Kennedy (Eds.), *The biology of feast and famine: relevance to eating disorders* (pp. 135-150). San Diego, CA: Academic Press.

American Psychiatric Association. (2000). *Diagnositic and Statistical Manual IV - Text Revision.* Washington D.C.: American Psychiatric Association.

American Psychiatric Association, Work Group on Eating Disorders. (2006). *Practice guideline for the treatment of patients with eating disorders* (3rd ed.). doi:10.1176/appi.books.9780890423363.138660

American Psychiatric Association, Work Group on Suicidal Behaviors. (2003). *Practice guideline for the assessment and treatment patients with suicidal behaviors.* doi:10.1176/appi.books.9780890423363.56008

Anderluh, M., Tchanturia, K., Rabe-Hesketh, S., Collier, D., & Treasure, J. (2008). Lifetime course of eating disorders: Design and validity of a new strategy to define eating disorders phenotype. *Psychological Medicine, 39*, 105-114. doi:10.1017/S0033291708003292

Andrews, G., & Peters, L. (1998). The psychometric properties of the Composite International Diagnostic Interview. *Social Psychiatry and Psychiatric Epidemiology, 33*, 80-88. doi:10.1007/s001270050026

Beautrais, A. L., Joyce, P. R., & Mudler, R. T. (1996). Risk factors for serious suicide attemtps among youths aged 13 to 24 years. *Journal of the American Academy of Child and Adolescent Psychiatry, 35*, 1174-1182. doi:10.1097/00004583-199609000-00015

Berkman, N. D., Lohr, K. N., & Bulik, C. M. (2007). Outcomes of eating disorders: a systematic review of the literature. *International Journal of Eating Disorders, 40*(4), 293-309. doi:10.1002/eat.20369

Binford, R. B., Mussell, M. P., Peterson, C. B., Crow, S. J., & Mitchell, J. E. (2004). Relation of binge eating age of onset to functional aspects of binge eating in binge eating disorder. *International Journal of Eating Disorders, 35*, 286-292. doi:10.1002/eat.10272

Birmingham, C. L., & Beumont, P. (2004). *Medical Management of Eating Disorders.* New York: Cambridge University Press.

Brausch, A. M., & Muehlenkamp, J. J. (2007). Body image and suicidal ideation in adolescents. *Body Image, 4*, 207-212. doi:10.1016/j.bodyim.2007.02.001

Brewerton, T. C., Hand, L. D., & Bishop, E. R. (1993). The Tridimensional Personality Questionnaire in eating disorder patients. *International Journal of Eating Disorders, 14*, 213-218. doi:10.1002/1098-108X(199309)14:2<213::AID-EAT2260140211>3.0.CO;2-P

Buist-Bouwman, M. A., Ormel, J., De Graaf, R., Vilagut, G., Alonso, J., Van Sonderen, E.,... The ESEMED/MHEDEA 2000 Investigators (2008). Psychometric properties of the World Health Organization Disability Assessment Schedule used in the European Study

of the Epidemiology of Mental Disorders. *International Journal of Methods in Psychiatric Research, 17,* 185-197. doi:10.1002/mpr.261

Bulik, C. M., Sullivan, P. F., Fear, J., Pickering, A., Dawn, A., & McCullin, M. (1999). Fertility and reproduction in women with anorexia nervosa: a controlled study. *Journal of Clinical Psychiatry, 60*(2), 130-135. Retrieved from http://www.psychiatrist.com/

Bulik, C. M., Sullivan, P. F., & Joyce, P. R. (1999). Temperament, character and suicide attempts in anorexia nervosa, bulimia nervosa and major depression. *Acta Psychiatrica Scandinavica, 100*, 27-32. doi:10.1111/j.1600-0447.1999.tb10910.x

Bulik, C. M., Sullivan, P. F., Joyce, P. R., & Carter, F. A. (1995). Temperament, character, and personality disorder in bulimia nervosa. *Journal of Nervous and Mental Disease, 32*, 593-598. Retrieved from http://journals.lww.com/jonmd/pages/default.aspx

Bulik, C. M., Sullivan, P. F., & Kendler, K. S. (2002). Medical and psychiatric comorbidity in obese women with and without binge eating. *International Journal of Eating Disorders, 32*, 72-78. doi:10.1002/eat.10072

Bulik, C. M., Thornton, L., Pinheiro, A. P., Plotinicov, K., Klump, K. L., Brandt, H.,…Kaye, W. H. (2008). Suicide attempts in anorexia nervosa. *Psychosomatic Medicine, 70*, 378-383. doi:10.1097/PSY.0b013e3181646765

Bushnell, J. A., Wells, J. E., Hornblow, A. R., Oakley-Browne, M. A., & Joyce, P. (1990). Prevalence of three bulimia syndromes in the general population. *Psychological Medicine, 20*, 671-680. doi:10.1017/S0033291700017190

Casper, R. C., Eckert, E. D., Halmi, K. A., Goldberg, S. C., & Davis, J. M. (1980). Bulimia. Its incidence and clinical importance in patients with anorexia nervosa. *Archives of General Psychiatry, 37*, 1030-1035. Retrieved from http://archpsyc.ama-assn.org/

Cassin, S. E., & von Ranson, K. M. (2005). Personality and eating disorders: A decade in review. *Clinical Psychology Review, 25*, 895-916. doi:10.1016/j.cpr.2005.04.012

CDC. (2010, June 21). Defining obesity and overweight. Retrieved from http://www.cdc.gov/obesity/index.html

Chial, H. J., McAlpine, D. E., & Camilleri, M. (2002). Anorexia nervosa: manifestations and management for the gastroenterologist. *American Journal of Gastroenterology, 97*, 255-269. doi:10.1111/j.1572-0241.2002.05452.x

Claes, L., Vandereycken, W., & Vertommen, H. (2002). Impulsive and compulsive traits in eating disordered patients compared with controls. *Personality and Individual Differences, 32*, 707-714. doi:10.1016/j.eatbeh.2006.05.001

Corcos, M., Taieb, O., Benoit-Lamy, S., Paterniti, S., Jeammet, P., & Flament, M. F. (2002). Suicide attempts in women with bulimia nervosa: Frequency and characteristics. *Acta Psychiatrica Scandinavica, 106*, 381-386. doi:10.1034/j.1600-0447.2002.02318.x

Cowen, P. J., Anderson, I. M., & Fairburn, C. G. (1992). Neurochemical effects of dieting: relevance to changes in eating and affective disorders. In G. H. Anderson, & S. H. Kennedy (Eds.), *The biology of feast and famine: relevance to eating disorders* (pp. 269-284). San Diego, CA: Academic Press.

Crisp, A. H., Callender, J. S., Halek, C., & Hsu, L. K. (1992). Long-term mortality in anorexia nervosa. A 20-year follow-up of the St. George's and Aberdeen cohorts. *British Journal of Psychiatry, 161*, 104-107. Retrieved from http://bjp.rcpsych.org/

Crow, S. J., Peterson, C. B., Swanson, S. A., Raymond, N. C., Specker, S., Eckert, E. D., & Mitchell, J. E. (2009). Increased mortality in bulimia nervosa and other eating disorders. *American Journal of Psychiatry, 166*, 1342-1346. doi:10.1176/appi.ajp.2009.09020247

Crow, S., Eisenberg, M. E., Story, M., & Neumark-Sztainer, D. (2008a). Are body dissatisfaction, eating disturbance, and body mass index predictors of suicidal behavior in adolescents? A longitudinal study. *Journal of Consulting and Clinical Psychology, 76*, 887-892. doi:10.1037/a0012783

Crow, S., Eisenberg, M. E., Story, M., & Neumark-Sztainer, D. (2008b). Suicidal behavior in adolescents: Relationship to weight status, weight control behaviors, and body dissatisfaction. *International Journal of Eating Disorders, 41*, 82-87. doi:10.1002/eat.20466

Currin, L., Schmidt, U., Treasure, J., & Jick, H. (2005). Time trends in eating disorder incidence. *British Journal of Psychiatry, 186*, 132-135. Retrieved from http://bjp.rcpsych.org/

de Zwaan, M., Mitchell, J. E., Seim, H. C., Specker, S. M., Pyle, R. L., Raymond, N. C., & Crosby, R. B. (1994). Eating related and general psychopathology in obese females with binge eating disorder. *International Journal of Eating Disorders, 15*, 43-52. doi:10.1002/1098-108X(199401)15:1<43::AID-EAT2260150106>3.0.CO;2-6

Diaconu, G., & Turecki, G. (2007). Panic disorder and suicidality: Is comorbidity with depression the key? *Journal of Affective Disorders, 104*, 203-209. doi:10.1016/j.jad.2007.03.006

Diaz-Marsa, M., Carrasco, J. L., & Saiz, J. (2000). A study of temperament and personality in anorexia and bulimia nervosa. *Journal of Personality Disorders, 14*, 352-359.

Eckert, E. D., Halmi, K. A., Marchi, P., Grove, W., & Crosby, R. (1995). Ten-year follow-up study of anorexia nervosa: Clinical course and outcome. *Psychological Medicine, 25*, 143-156. doi:10.1017/S0033291700028166

Eddy, K. T., Dorer, D. H., Franko, D. L., Tahilani, K., Thompson-Brenner, H., & Herzog, D. B. (2008). Diagnostic crossover in anorexia nervosa and bulimia nervosa: Implications for DSM-V. *American Journal of Psychiatry, 165*, 245-250. doi:10.1176/appi.ajp.2007.07060951

Eddy, K. T., Keel, P. K., Dorer, D. J., Delinsky, S. S., Franko, D. K., & Herzog, D. B. (2002). Longitudinal comparison of anorexia nervosa subtypes. *International Journal of Eating Disorders, 31*, 191-201. doi:10.1002/eat.10016

Fairburn, C. G., Cooper, Z., Doll, H. A., Normal, P., & O'Connor, M. (2000). The natural course of bulimia nervosa and binge eating disorder in young women. *Archives of General Psychiatry, 57*, 659-665. Retrieved from http://archpsyc.ama-assn.org/

Fairburn, C. G., Doll, H. A., Welch, S. L., Hay, P. J., Davies, B. A., & O'Connor, M. E. (1998). Risk factors for binge eating disorder: A community-based, case-control study. *Archives of General Psychiatry, 55*, 425-432. Retrieved from http://archpsyc.ama-assn.org/

Favaro, A., & Santonastaso, P. (1996). Purging behaviors, suicide attempts and psychiatric symptoms in 398 eating disordered subjects. *International Journal of Eating Disorders, 20*, 99-103. doi:10.1002/(SICI)1098-108X(199607)20:1<99::AID-EAT11>3.0.CO;2-E

Favaro, A., & Santonastaso, P. (1997). Suicidality in eating disorders: Clinical and psychological correlates. *Acta Psychiatrica Scandinavica, 95*, 508-514. doi:10.1111/j.1600-0447.1997.tb10139.x

Favaro, A., Santonastaso, P., Monteleone, P., Bellodi, L., Mauri, M., Rotondo, A.,…Maj, M. (2008). Self-injurious behavior and attempted suicide in purging bulimia nervosa: Associations with psychiatric comorbidity. *Journal of Affective Disorders, 105*, 285-289. doi:10.1016/j.jad.2007.05.010

Fedorowicz, V. J., Falissard, V., Foulon, C., Dardennes, R., Divac, S. M., Guelfi, J. D., Rouillon, F. (2007). Factors associated with suicidal behaviors in a large French sample of inpatients with eating disorders. *International Journal of Eating Disorders, 40*, 589-595. doi:10.1002/eat.20415

Fennig, S. & Hadas, A. (2010). Suicidal behavior and depression in adolescents with eating disorders. *Nordic Journal of Psychiatry, 64*, 32-39. doi:10.3109/08039480903265751

Fichter, M. M., Quadflieg, N., & Hedlund, S. (2006). Twelve-year course and outcome predictors of anorexia nervosa. *International Journal of Eating Disorders, 39*, 87-100. doi:10.1002/eat.20215

Field, A. E., Skinner, H., Corliss, H., & Horton, N. (2009). *Loss of control eating as a predictor of weight gain and the develoment of overweight, depressive symptoms, binge drinking, and substance use*. Presented at the Classification and Diagnosis of Eating Disorders Meeting: Scientific evidence regarding eating disorder classification for the Diagnostic and Statistical Manual, 5th ed. Arlington, VA.

Forcano, L., Fernandez-Aranda, F., Alvarez-Moya, E., Bulik, C., Granero, R., Gratacos, M.,...Estivill, X. (2009). Suicide attempts in bulimia nervosa: Personality and psychopathological correlates. *European Psychiatry, 24*, 91-97. doi:10.1016/j.eurpsy.2008.10.002

Foulon, C., Guelfi, J. D., Kipman, A., Ades, J., Romo, L., Houdeyer, K.,…Gorwood, P. (2007). Switching to the bingeing/purging subtype of anorexia nervosa is frequently associated with suicidal attempts. *European Psychiatry, 22*, 513-519. doi:10.1016/j.eurpsy.2007.03.004

Franko, D. L., Keel, P. K., Dorer, D. J., Blais, M. A., Delinsky, S. S., Eddy, K. T.,…Herzog, D. B. (2004). What predicts suicide attempts in women with eating disorders? *Psychological Medicine, 34*, 843-853. doi:10.1017/S0033291703001545

Frydrych, A. M., Davies, G. R., & McDermott, B. M. (2005). Eating disorders and oral health: A review of the literature. *Australian Dental Journal, 50*, 6-15. doi:10.1111/j.1834-7819.2005.tb00079.x

Garfinkel, P. E., Lin, E., Goering, C., Spegg, D., Goldbloom, D., & Kennedy, S. (1996). Should amenorrhea be necessary for the diagnosis of anorexia nervosa? Evidence from a Canadian community sample. *British Journal of Psychiatry, 168*, 500-506. Retrieved from http://bjp.rcpsych.org/

Garfinkel, P. E., Moldofsky, H., & Garner, D. M. (1980). The heterogeneity of anorexia nervosa. Bulimia as a distinct subgroup. *Archives of General Psychiatry, 37*, 1036-1040. Retrieved from http://archpsyc.ama-assn.org/

Garin, O., Ayuso-Mateos, J. L., Almansa, J., Nieto, M., Chatterji, S., Vilagut, G.,…Ferrer, M. (2010). Validation of the World Health Organization Disability Assessment Schedule (WHODAS-2) in patients with chronic diseases. *Health and Quality of Life Outcomes, 8,* 1-15. doi:10.1186/1477-7525-8-51

Garner, D. M., Garner, M. V., & Rosen, L. W. (1993). Anorexia nervosa "restrictors" who purge: Implications for subtyping anorexia nervosa. *International Journal of Eating Disorders, 13*, 171-185. doi:10.1002/1098-108X(199303)13:2<171::AID-EAT2260130205>3.0.CO;2-L

Haro, J. M., Arbabzadeh-Bouchez, S., Brugha, T. S., De Girolamo, G., Guyer, M. E., Jin, R.,…Kessler, R. C. (2006). Concordance of the Composite International Diagnostic

Interview Version 3.0 (CIDI 3.0) with standardized clinical assessments in the WHO World Mental Health Surveys. *International Journal of Methods in Psychiatric Research, 15*, 167-180. doi:10.1002/mpr.196

Harris, E. C., & Barraclough, B. (1997). Suicide as an outcome for mental disorders: A meta-analysis. *British Journal of Psychiatry, 170*, 205-228. Retrieved from http://bjp.rcpsych.org/

Harris, E. C., & Barraclough, B. (1998). Excess Mortality of Mental Disorder. *British Journal of Psychiatry, 173*, 11-53. Retrieved from http://bjp.rcpsych.org/

Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as an escape from self-awareness. *Psychological Bulletin, 110*, 86-108. doi:10.1037/0033-2909.110.1.86

Heeringa, S. G., Wagner, J., Torres, M., Duan, N., Adams, T., & Berglund, P. (2004). Sample designs and sampling methods for the Collaborative Psychiatric Epidemiology Studies. *International Journal of Methods in Psychiatric Research, 13*, 221-240. doi:10.1002/mpr.179

Herzog, D. B., Greenwood, D. N., Dorer, D. J., Flores, A. T., Ekeblad, E. R., Richards, A.,…Keller, M. B. (2000). Mortality in eating disorders: A descriptive study. *International Journal of Eating Disorders, 28*, 20-26. doi:10.1002/(SICI)1098-108X(200007)28:1<20::AID-EAT3>3.0.CO;2-X

Hoek. (2006). Incidence, prevalence and mortality of anorexia nervosa and other eating disorders. *Current Opinion in Pyschiatry, 19*, 389-394. doi:10.1097/01.yco.0000228759.95237.78

Hoek, H. W., Bartelds, A. I., Bosveld, J. J., van der Graaf, Y., Limpens, V. E., Maiwald, M., & Spaaij, C. J. (1995). Impact of urbanization on detection rates of eating disorders.

American Journal of Psychiatry, 152, 1272-1278. Retrieved from http://ajp.psychiatryonline.org/index.dtl

Hoek, H. W., & van Hoeken, D. (2003). Review of the prevalence and incidence of eating disorders. *International Journal of Eating Disorders, 34*, 383-396. doi:10.1002/eat.10222

Hoek, H. W., van Son, G. E., van Hoeken, D., Bartelds, A. I., & van Furth, E. F. (2005, April). *Changes in the incidence of eating disorders.* Paper presented at the International Conference on Eating Disorders, Montreal, QC, Canada.

Hudson, J., Laffer, P., & Pope, H. (1982). Bulimia related to affective disorder by family history and response to dexamethasone suppression test. *American Journal of Psychiatry, 139*, 685-687. Retrieved from http://ajp.psychiatryonline.org/index.dtl

Hudson, J. I., Hiripi, E., Pope, H. G., & Kessler, R. C. (2007). The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. *Biological Psychiatry, 61*, 348-358. doi:10.1016/j.biopsych.2006.03.040

Johnson, J. G., Spitzer, R. L., & Williams, J. B. (2001). Health problems, impairment and illnesses associated with bulimia nervosa and binge eating disorder among primary care and obstetric gynaecology patients. *Psychological Medicine, 31*, 1455-1466. doi:10.1017/S0033291701004640

Johnsson-Fridell, E., Ojehagen, A., & Traskman-Bendz, L. (1996). A 5-year follow-up study of suicide attempts. *Acta Psychiatrica Scandinavica, 93*, 151-157. doi:10.1111/j.1600-0447.1996.tb10622.x

Jones, B. P., Duncan, C., & Brouwers, P. M. (1991). Cognition in eating disorders. *Journal of Clinical and Experimental Neuropsychology, 13*, 711-728. doi:10.1080/01688639108401085

Katzman, D. K., Christensen, B., Young, A. R., & Zipursky, R. B. (2001). Starving the brain: structural abnormalities and cognitive impairment in adolescents with anorexia nervosa. *Seminars in Clinical Neuropsychiatry, 6*(2), 146-152.

Kaye, W. H. (1997). Anorexia nervosa, obsessional behavior, and serotonin. *Psychopharmacology Bulletin, 33*, 335-344. Retrieved from http://www.medworksmedia.com/

Keel, P. K., Dorer, D. J., Eddy, K. T., Franko, D., Charatan, D. L., & Herzog, D. B. (2003). Predictors of mortality in eating disorders. *Archives of General Psychiatry, 60*, 179-183. Retrieved from http://archpsyc.ama-assn.org/

Kendler, K. S., MacLean, C., Neale, M., Kessler, R., Heath, A., & Eaves, L. (1991). The genetic epidemiology of bulimia nervosa. *American Journal of Psychiatry, 148*, 1627-1637. Retrieved from http://ajp.psychiatryonline.org/index.dtl

Kessler, R. C., Berglund, P., Chiu, W. T., Demler, O., Heeringa, S., Hiripi, E.,...Zheng, H. (2004). The US National Comorbidity Survey Replication (NCS-R): Design and field procedures. *International Journal of Methods in Psychiatric Research, 13*, 69-92. doi:10.1002/mpr.167

Kessler, R. C., Borges, G., & Walters, E. E. (1999). Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. *Archives of General Psychiatry, 56*, 617-626. Retrieved from http://archpsyc.ama-assn.org/

Kessler, R. C., DuPont, R. L., Berglund, P., & Wittchen, H. U. (1999). Impairment in pure and comorbid generalized anxiety disorder and major depression at 12 months in two national surveys. *American Journal of Psychiatry, 156*, 1915-1923. Retrieved from http://ajp.psychiatryonline.org/

Kessler, R. C., & Ustun, T. B. (2004). The World Mental Health (WMH) Survey Initiative Version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). *International Journal of Methods in Psychiatric Research, 13*, 93-121. doi:10.1002/mpr.168

Kingston, K., Szmukler, G., Andrewes, D., Tress, B., & Desmond, P. (1996). Neuropsychological and structural brain changes in anorexia nervosa before and after refeeding. *Psychological Medicine, 26*(1), 15-28. doi:10.1017/S0033291700033687

Klein, D. A., & Walsh, T. B. (2004). Eating disorders: Clinical features and pathophysiology. *Physiology & Behavior, 81*, 359-374. doi:10.1016/j.physbeh.2004.02.009

Klein-Weigel, P., Rein, P., Kronenberg, F., List, E., Kinzl, J., Biebl, W., & Fraedrich, G. (2004). Microcirculatory assessment of vascular acrosyndrome in anorexia nervosa and analysis of manifestation factors. *Journal of Psychsomatic Research, 36*, 145-148. doi:10.1016/S0022-3999(03)00381-7

Laessle, R. G., Bossert, S., Hank, G., Hahlweg, K., & Pirke, K. M. (1990). Cognitive performance in patients with bulimia nervosa: Relationship to intermittent starvation. *Biological Psychiatry, 27*, 549-551. Retrieved from http://www.biologicalpsychiatryjournal.com/home

Laessle, R. G., Platte, P., Schweiger, U., & Pirke, K. M. (1996). Biological and psychological correlates of intermittent dieting behavior in young women. A model for bulimia nervosa. *Physiology and Behavior, 60*, 1-5. doi:10.1016/0031-9384(95)02215-5

Laessle, R. G., Wittchen, H. U., Fichter, M. M., & Pirke, K. M. (1989). The significance of subgroups of bulimia and anorexia nervosa: Lifetime frequency of psychiatric disorders.

International Journal of Eating Disorders, 8, 569-574. doi:10.1002/1098-108X(198909)8:5<569::AID-EAT2260080508>3.0.CO;2-0

Lauer, C. J., Gorzewski, B., Gerlinghoff, M., Backmund, H., & Zihl, J. (1999). Neuropsychological assessmnets before and after treatment in patients with anorexia nervosa and bulimia nervosa. *Journal of Psychiatric Research, 33*, 129-138. doi:10.1016/S0022-3956(98)00020-X

Levy, A. B., & Dixon, K. N. (1985). The relationship between anorexia nervosa and depression: a reevaluation. *International Journal of Eating Disorders, 4*, 389-405. doi:10.1002/1098-108X(198511)4:4<389::AID-EAT2260040403>3.0.CO;2-3

Lewinsohn, P. M., Striegel-Moore, R. H., & Seeley, J. R. (2000). Epidemiology and natural course of eating disorders in young women from adolescence to adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry, 39*, 1284-1292. doi:10.1097/00004583-200010000-00016

Mandel, L., & Abai, S. (2004). Diagnosing bulimia nervosa with parotid gland swelling. *Journal of the American Dental Association, 135*, 613-616. Retrieved from http://jada.ada.org/

Masheb, R. M., & Grilo, C. M. (2000). Binge eating disorder: A need for additional diagnostic criteria. *Comprehensive Psychiatry , 41*, 159-162. doi:10.1016/S0010-440X(00)90041-5

Mathias, J. L., & Kent, P. (1998). Neuropsychological consequences of extreme weight loss and dietary restriction in patients with anorexia nervosa. *Journal of Clinical and Experimental Neurospychology, 20*(4), 548-564. doi:10.1076/jcen.20.4.548.1476

Milos, G., Spindler, A., Hepp, U., & Schnyder, U. (2004). Suicide attempts and suicidal ideation: Links with psychiatric comorbidity in eating disorder subjects. *General Hospital Psychiatry, 26*, 129-135. doi:10.1016/j.genhosppsych.2003.10.005

Miotto, P., de Coppi, M., Frezza, M., & Preti, A. (2003). Eating disorders and suicide risk factors in adolescents: An Italian community-based study. *Journal of Nervous and Mental Disease, 191*, 437-443. Retrieved from http://journals.lww.com/jonmd/pages/default.aspx

Mitchell, J. E., & Crow, S. (2006). Medical complications of anorexia nervosa and bulimia nervosa. *Current Opinion in Psychiatry, 19*, 438-443. doi:10.1097/01.yco.0000228768.79097.3e

Mitchell, J. E., Mussell, M. P., Peterson, C. B., Crow, S., Wonderlich, S. A., Crosby, R. D.,…Weller, C. (1999). Hedonics of binge eating in women with bulimia nervosa and binge eating disorder. *International Journal of Eating Disorders, 26*, 165-170. Retrieved from http://www3.interscience.wiley.com/journal/34698/home

Moller-Madsen, S., & Nystrup, J. N. (1996). Mortality in anorexia nervosa in Denmark during the period 1970-1987. *Acta Psychiatrica Scandinavica, 94*, 454-459. doi:10.1111/j.1600-0447.1996.tb09890.x

Mussell, M. P., Mitchell, J. E., Weller, C. L., Raymond, N. C., Crow, S. J., & Crosby, R. D. (1995). Onset of binge eating, dieting, obesity, and mood diosrders among subjects seeking treatment for binge eating disorder. *International Journal of Eating Disorders, 17*, 395-401. doi:10.1002/1098-108X(199505)17:4<395::AID-EAT2260170412>3.0.CO;2-I

Nielsen, S. (2003). Standardized mortality ratio in bulimia nervosa. *Archives of General Psychiatry, 60*, 851-852. Retrieved from http://archpsyc.ama-assn.org/

Nock, M. K., Hwang, I., Sampson, N., Kessler, R. C., Angermeyer, M., Beautrais, A.,…Williams, D. R. (2009). Cross-national analysis of the associations among mental

disorders and suicidal behavior: Findings from the WHO World Mental Health Surveys. *PLoS Medicine, 6*, e1000123-e1000123. doi:10.1371/journal.pmed.1000123.

Nordstrom, P., Samuelsson, M., & Asberg, M. (1995). Survival analysis of suicide risk after attempted suicide. *Acta Psychiatrica Scandinavica, 91*, 336-340. doi:10.1111/j.1600-0447.1995.tb09791.x

Patton, G. C. (1988). Mortality in eating disorders. *Psychological Medicine, 18*, 947-951. doi:10.1017/S0033291700009879

Pennell, B. E., Bowers, A., Carr, D., Chardoul, S., Cheung, G. Q., Dinkelmann, K.,…Torres, M. (2004). The development and implementation of the National Comorbidity Survey Replication, the National Survey of American Life, and the National Latino and Asian American Survey. *International Journal of Methods in Psychiatric Research, 13*, 241-269. doi:10.1002/mpr.180

Pope, H. G., Lalonde, J. K., Pindyck, L. J., Walsh, T., Bulik, C. M., Crow, S. J.,…Hudson, J. I. (2006). Binge eating disorder: A stable syndrome. *American Journal of Psychiatry, 163*, 2181-2183. doi:10.1176/appi.ajp.163.12.2181

Preti, A., de Girolamo, G., Vilagut, G., Alonso, J., de Graaf, R., Bruffaerts, R.,…ESMeD-WMH Investigators (2009). The epidemiology of eating disorders in six European countries: Results of the ESEMeD-WMH project. *Journal of Psychiatric Research, 43*(14), 1125-1132. doi:10.1016/j.jpsychires.2009.04.003

Pryor, T., Wiederman, M. W., & McGilley, B. (1996). Clinical correlates of anorexia nervosa subtypes. *International Journal of Eating Disorders, 19*, 371-379.

Quadflieg, N., & Fichter, M. M. (2003). The course and outcome of bulimia nervosa. *European Child and Adolescent Psychiatry, 12*, 99-109. doi:10.1007/s00787-003-1113-9

Rehm, J., Ustun, T. B., Saxena, S., Nelson, C. B., & Chatterji, S. (1999). On the development and psychometric testing of the WHO screening instrument to assess disablement in the general population. *International Journal of Methods in Psychiatric Research, 8,* 110-122. doi:10.1002/mpr.61

Reichborn-Kjennerud, T., Bulik, C. M., Sullivan, P. F., Tambs, K., & Harris, J. R. (2004). Psychiatric and medical symptoms in binge eating in the absence of compensatory behaviors. *Obesity Research, 12*, 1445-1454. doi:10.1002/eat.20047

Rigotti, N., Neer, R., Skates, S., Herzog, B., & Nussbaum, S. (1991). The clinical course of osteoporosis in anorexia nervosa: a longitudinal study of cortical bone mass. *Journal of the American Medical Association, 265*(9), 1133-1138. Retrieved from http://jama.ama-assn.org/

Rossier, V., Plancherel, B., & Halfon, O. (2000). Sensation seeking: a personality trait characterstic of adolescent girls and young women with eating disorders. *European Eating Disorders Review, 8*, 245-252. doi:10.1002/(SICI)1099-0968(200005)8:3<245::AID-ERV308>3.0.CO;2-D

Roy-Byrne, P. P., Stang, P., Wittchen, H. U., Ustun, B., Walters, E. E., & Kessler, R. C. (2000). Lifetime panic-depression comorbidity in the National Comorbidity Survey. Associations with symptoms, impairment, course, and help-seeking. *British Journal of Psychiatry, 176*, 229-235. Retrieved from http://bjp.rcpsych.org/

Ruuska, J., Kaltiala-Heino, R., Rantanen, P., & Koivisto, A. M. (2005). Psychopathological distress predicts suicidal ideation and self-harm in adolescent eating disorder outpatients. *European Child and Adolescent Psychiatry, 14*, 276-281. doi:10.1007/s00787-005-0473-8

Sansone, R. A., & Levitt, J. L. (2002). Self-harm behaviors among those with eating disorders: An overview. *Eating Disorders, 10*, 205-213. doi:10.1080/10640260290081786

Sareen, J., Cox, B. J., Afifi, T. O., de Graaf, R., Asmundson, G. J. G., ten Have, M., & Stein, M. B. (2005). Anxiety disorders and risk for suicidal ideation and suicide attempts: a population-based longitudinal study of adults. *Archives of General Psychiatry, 62*, 1249-1257. Retrieved from http://archpsyc.ama-assn.org/

Specker, S., de Zwaan, M., Raymond, N., & Mitchell, J. (1994). Psychopathology in subgroups of obese women with and without binge eating disorders. *Comprehensive Psychiatry, 35*, 185-190. doi:10.1016/0010-440X(94)90190-2

Stein, D., Lilenfeld, L. R., Wildman, P. C., & Marcus, M. D. (2004). Attempted suicide and self-injury in patients diagnosed with eating disorders. *Comprehensive Psychiatry, 45*, 447-451. doi:10.1016/j.comppsych.2004.07.011

Steinhausen, H. C. (2002). The ouctome of anorexia nervosa in the 20th century. *American Journal of Psychiatry, 159*(8), 1284-1293. Retrieved from http://ajp.psychiatryonline.org/

Steinhausen, H. C., & Weber, S. (2009). The outcome of bulimia nervosa: Findings from one-quarter century of research. *American Journal of Psychiatry, 166*, 1331-1341. doi:10.1176/appi.ajp.2009.09040582

Striegel-Moore, R. H., Cachelin, R. M., Dohm, F. A., Pike, K. M., Wilfley, D. E., & Fairburn, C. G. (2001). Comparison of binge eating disorder and bulimia nervosa in a community sample. *International Journal of Eating Disorders, 29*, 157-165. doi:10.1002/1098-108X(200103)29:2<157::AID-EAT1005>3.0.CO;2-8

Strober, M., Freeman, R., & Morell, W. (1997). The long-term course of severe anorexia nervosa in adolescents: Survival analysis of recovery, relapse, and outcome predictors over 10-15

years in a prospective study. *International Journal of Eating Disorders, 22*, 339-360. doi:10.1002/(SICI)1098-108X(199712)22:4<339::AID-EAT1>3.0.CO;2-N

Strumia, R. (2005). Dermatologic signs in patients with eating disorders. *American Journal of Clinical Dermatology, 6*, 165-173. Retrieved from http://adisonline.com/dermatology/pages/default.aspx

Sullivan, P. F., Bulik, C. M., Fear, J. L., & Pickering, A. (1998). Outcome of anorexia nervosa: a case control study. *American Journal of Psychiatry, 155*(7), 939-946. Retrieved from http://ajp.psychiatryonline.org/

Sullivan, P. (1995). Mortality in Anorexia Nervosa. *American Journal of Psychiatry, 152*, 1073. Retrieved from http://ajp.psychiatryonline.org/

Szmukler, G., Brown, S., V., P., & Darby, A. (1985). Premature loss of bone in chronic anorexia nervosa. *British Medical Journal, 290*, 26-27. Retrieved from http://www.bmj.com/

Tanofsky-Kraff, M., Cohen, M. L., Yanovski, S. Z., Cox, C., Theim, K. R., Keil, M.,…Yanovski, J. A. (2006). A prospective study of psychological predictors of body fat gain among children at high risk for adult obesity. *Pediatrics, 117*, 1203-1209. doi:10.1542/peds.2005-1329

Tchanturia, K., Anderluh, M. B., Morris, R. G., Rabe-Hesketh, S., Collier, D. A., Sanchez, P., & Treasure, J. L. (2004). Cognitive flexibility in anorexia nervosa and bulimia nervosa. *Journal of the International Neuropsychological Society, 10*, 513-520. doi:10.1017/S1355617704104086

Tchanturia, K., Serpell, L., Troop, N., & Treasure, J. (2001). Perceptual illusions in eating disorders: Rigid and fluctuating styles. *Journal of Behavior Therapy and Experimental Psychiatry, 32*, 107-115. doi:10.1016/S0005-7916(01)00025-8

Turnbull, S., Ward, A., Treasure, J., Jick, H., & Derby, L. (1996). The demand for eating disorder care: An epidemiological study using the General Practice Research Database. *British Journal of Psychiatry, 169*, 705-712. Retrieved from http://bjp.rcpsych.org/

Viesselman, J. O., & Roig, M. (1985). Depression and suicidality in eating disorders. *Journal of Clinical Psychiatry, 46*, 118-124. Retrieved from http://www.psychiatrist.com/

Walters, E. E., & Kendler, K. S. (1995). Anorexia nervosa and anorexic-like syndromes in a population-based female twin sample. *American Journal of Psychiatry, 152*, 64-71. Retrieved from http://ajp.psychiatryonline.org/

Wittchen, H. U., Knäuper, B., & Kessler, R. C. (1994). Lifetime risk of depression. *British Journal of Psychiatry, Supplement(26)*, 16-22.

Wonderlich, S. A., Lilenfeld, L. R., Riso, L. P., Engel, S., & Mitchell, J. E. (2005). Personality and anorexia nervosa. *Internation Journal of Eating Disorders, 37*, S68-S71. doi:10.1002/eat.20120

World Health Organization. (1998). *WHO Disablements Assessment Schedule II (WHO-DAS II).* Geneva: World Health Organization.

World Health Organization. (2002). *World Report on Violence and Health.* (E. G. Krug, L. L. Dahlberg, J. A. Mercy, A. B. Zwi, & R. Lozano, Eds.) Geneva: World Health Organization.

World Health Organization Global Strategy on Diet, Physical Activity and Health. (2003). *Information sheet on obesity and overweight.* Retrieved from http://www.who.int/dietphysicalactivity/media/en/gsfs_obesity.pdf

Youssef, G., Plancherel, B., Laget, J., Corcos, M., Flament, M. F., & Halfon, O. (2004). Personality trait risk factors for attempted suicide among young women with eating disorders. *European Psychiatry, 19*, 131-139. doi:10.1016/j.eurpsy.2003.11.005

Table 1

Sex, Marital Status, Education, and Race of Eating Disorder Groups and Reference Groups

	No Lifetime Disorder	Lifetime Depression & Anxiety	Lifetime Anorexia	Lifetime Bulimia	Lifetime Binge Eating Disorder	
Variable	n (%)	n (%)	n (%)	n (%)	n (%)	χ^2 (df)
Sex						32.24 (4)***
Male	3515 (49.6)	278 (27.6)	6 (19.4)	46 (24.4)	74 (33.0)	
Female	4549 (50.4)	938 (72.4)	25 (80.6)	139 (75.6)	189 (67.0)	
Marital Status						5.87 (8)***
Married/Cohabitating	4535 (61.6)	599 (54.0)	23 (79.0)	77 (53.9)	126 (56.4)	
Divorced/Separated/Widowed	1590 (18.1)	326 (24.1)	4 (15.5)	50 (24.8)	61 (16.9)	
Never Married	1939 (20.3)	291 (21.9)	4 (5.4)	58 (21.3)	76 (26.8)	
Education						1.90 (12)*
0-11 Years	1824 (19.6)	221 (16.5)	5 (5.5)	41 (26.7)	80 (25.2)	
12 Years	2335 (31.2)	351 (28.4)	10 (30.9)	61 (25.6)	76 (22.9)	
13-15 Years	1981 (26.1)	345 (30.1)	8 (34.4)	48 (25.1)	69 (32.5)	
16 Years or More	1924 (23.2)	299 (25.0)	8 (29.2)	35 (22.6)	38 (19.4)	
Race						18.62 (16)***
White	1285 (64.2)	561 (77.7)	19 (91.2)	30 (40.0)	72 (65.4)	
Asian	1618 (6.7)	74 (2.1)	4 (1.7)	18 (6.5)	26 (3.9)	
Hispanic	1854 (14.9)	271 (10.5)	3 (2.2)	53 (25.6)	76 (16.9)	
Black	3270 (13.3)	274 (6.6)	5 (4.9)	80 (21.3)	88 (12.1)	
Other	37 (0.9)	36 (3.0)	0 (0)	4 (6.6)	1 (1.8)	
Weight Status						5.05(20)****
Underweight	223 (3.5)	42 (3.6)	3 (17.3)	3 (2.9)	8 (2.4)	
Healthy Weight	3006 (36.1)	423 (36.4)	21 (55.6)	41 (22.4)	47 (16.2)	
Overweight	2780 (37.0)	375 (30.9)	3 (25.0)	50 (29.1)	76 (34.7)	
Obese	1897 (23.4)	354 (29.1)	4 (2.1)	85 (46.2)	125 (46.7)	

Note: All n's are unweighted and percentages are weighted.

*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$

Table 2

Mean (and 95% Confidence Interval) Age, Body Mass Index (BMI), and Disability Scores of Eating Disorder Groups and Reference Groups

Characteristic	No Lifetime Disorder	Lifetime Depression & Anxiety	Lifetime Anorexia	Lifetime Bulimia	Lifetime Binge Eating Disorder
Age	46.8 (45.6-48.0)	42.9 (41.7-44.1)$_{a}$	42.1 (35.8-48.4)	36.8 (34.3-39.2)$_{a,b}$	41.6 (38.3-45.0)$_{a,d}$
BMI	27.0 (26.7-27.3)	27.6 (27.2-28.0)$_{a}$	23.1 (20.7-25.4)$_{a,b}$	30.9 (29.3-32.4)$_{a,b,c}$	31.2 (29.6-32.8)$_{a,b,c}$
WHODAS Cognitive	0.26 (0.16-0.35)	3.08 (2.46-3.71)$_{a}$	2.82 (0.0-5.94)	4.10 (2.42-5.79)$_{a}$	3.10 (1.64-4.57)$_{a}$
WHODAS Mobility	3.52 (2.81-4.24)	8.24 (7.03-9.44)$_{a}$	16.33 (3.14-29.52)$_{a}$	7.89 (2.76-13.01)$_{a}$	8.89 (5.26-12.52)$_{a}$
WHODAS Self-Care	0.80 (0.39-1.21)	1.80 (1.23-2.37)$_{a}$	2.10 (0.0-4.81)	1.82 (0.73-2.90)	1.66 (0.0-3.39)
WHODAS Social Interaction	0.16 (0.06-0.26)	2.00 (1.43-2.56)$_{a}$	0.72 (0.0-1.69)$_{b}$	2.99 (1.59-4.39)$_{a,c}$	1.34 (0.61-2.08)$_{a}$
WHODAS Role Impairment	2.62 (2.16-3.07)	9.98 (8.77-11.19)$_{a}$	7.09 (0.0-15.08)	11.67 (5.86-17.47)$_{a}$	8.90 (5.25-12.56)$_{a}$
WHODAS Time Out of Role	6.37 (5.43-7.31)	20.83 (18.57-23.09)$_{a}$	36.12 (15.34-56.90)$_{a}$	26.12 (17.41-34.84)$_{a}$	21.22 (15.58-26.86)$_{a}$

Note: WHODAS = World Health Organization Disability Assessment Schedule. All means are weighted. $_{a}$ different from no disorder at $p<.05$, $_{b}$ different from depression and anxiety at $p<.05$, $_{c}$ different from anorexia at $p<.05$, $_{d}$ different from bulimia at $p<.05$

Table 3

Mean (and 95% Confidence Interval) Age of Onset and Disorder Duration in Eating Disorders

Characteristic	Anorexia	Bulimia	Binge Eating Disorder
Age of Onset	19.3 (17.7-20.9)	19.1 (17.7-20.4)	23.5 (21.1-25.8)
Disorder Duration	3.6 (1.4-5.7)	14.0 (11.4-16.6)	12.6 (10.0-15.2)

Note: All means are weighted.

Table 4

Comorbidity between Eating Disorders and other Axis I Disorders

	Lifetime Anorexia N = 31		Lifetime Bulimia N = 184		Lifetime Binge Eating Disorder N=263	
Comorbid Lifetime Disorder	n	%	n	%	n	%
Major Depressive Disorder	15	40.7	64	35.7	89	31.0
Dysthymia	5	13.8	12	11.2	27	9.6
Bipolar I	0	0	11	6.6	8	4.0
Bipolar II	0	0	9	5.4	8	4.4
Manic Episode	0	0	19	13.1	14	8.6
Hypomanic Episode	1	3.4	8	3.1	11	2.2
Alcohol Abuse	4	12.7	8	7.1	31	11.3
Alcohol Dependence	5	12.9	19	13.1	27	9.8
Drug Abuse	6	18.1	22	13.8	42	14.7
Drug Dependence	1	5.7	11	7.6	20	7.1
Panic Attacks	19	59.0	97	57.0	135	55.8
Panic Disorder	2	3.6	31	13.2	34	11.7
Posttraumtatic Stress Disorder	7	13.9	47	31.0	45	16.8
Agoraphobia	4	7.2	27	12.4	28	8.4
Generalized Anxiety Disorder	3	8.0	21	11.7	24	10.9
Social Anxiety Disorder	10	28.2	52	32.6	71	25.9
Any Axis I Disorder	24	72.7	146	82.4	201	75.9

Note: All n's are unweighted. All percentages are weighted. The number in the lifetime anorexia group is small and so this should be considered when reviewing the number and percentage with comorbid disorders.

Table 5

Suicide Experiences in Persons with Lifetime Anorexia Nervosa Compared to No Lifetime Disorder

	No Disorder (N=8062)	Anorexia (N=31)		
Suicide Experience	n (%)	n (%)	OR (95% CI)	AOR-1 (95% CI)
Suicide Ideation	446 (5.1)	11 (19.2)	4.40 (1.43-13.54)*	3.20 (1.13-9.02)*
Suicide Plans	105 (1.1)	3 (1.2)	-	-
Suicide Attempts	107 (1.0)	5 (10.1)	10.75 (2.89-39.98)***	7.02 (1.95-25.25)**

Note. CI = Confidence Interval. OR = Odds Ratio. AOR = Adjusted Odds Ratio. All n's are unweighted and percentages are weighted. AOR-1 adjusted for age, sex, race, marital status, and education.

*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$

Table 6

Suicide Experiences in Persons with Lifetime Anorexia Nervosa Compared to Lifetime Depression and Anxiety

	Depression & Anxiety (N=1215)	Anorexia (N=31)			
Suicide Experience	n (%)	n (%)	OR (95% CI)	AOR-1 (95% CI)	AOR-2 (95% CI)
Suicide Ideation	448 (39.9)	11 (19.2)	0.36 (0.11-1.18)	0.41 (0.13-1.33)	0.60 (0.20-1.82)
Suicide Plans	192 (16.8)	3 (1.2)	-	-	-
Suicide Attempts	160 (13.0)	5 (10.1)	0.75 (0.18-3.06)	0.99 (0.25-3.92)	1.31 (0.35-4.86)

Note. CI = Confidence Interval. OR = Odds Ratio. AOR = Adjusted Odds Ratio. All n's are unweighted and percentages are weighted. AOR-1 adjusted for age, sex, race, marital status, and education; AOR-2 adjusted for age, sex, race, education, marital status, and any lifetime anxiety, mood, or substance use disorder.

*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$

Table 7

Suicide Experiences in Persons with Lifetime Bulimia Nervosa Compared to No Lifetime Disorder

	No Disorder (N=8062)	Bulimia (N=184)		
Suicide Experience	n (%)	n (%)	OR (95% CI)	AOR-1 (95% CI)
Suicide Ideation	446 (5.1)	63 (38.9)	11.76 (7.92-17.45)***	9.47 (5.99-14.97)***
Suicide Plans	105 (1.1)	27 (21.7)	25.92 (13.99-48.02)***	20.24 (11.18-36.64)***
Suicide Attempts	107 (1.0)	27 (17.8)	20.77 (10.68-40.39)***	13.73 (7.37-25.59)***

Note. CI = Confidence Interval. OR = Odds Ratio. AOR = Adjusted Odds Ratio. All n's are unweighted and percentages are weighted. AOR-1 adjusted for age, sex, race, marital status, and education.

*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$

Table 8

Suicide Experiences in Persons with Lifetime Bulimia Nervosa Compared to Lifetime Depression and Anxiety

	Depression & Anxiety (N=1213)	Bulimia (N=184)			
Suicide Experience	n (%)	n (%)	OR (95% CI)	AOR-1 (95% CI)	AOR-2 (95% CI)
Suicide Ideation	448 (39.9)	63 (38.9)	0.96 (0.59-1.55)	0.94 (0.60-1.48)	1.17 (0.72-1.90)
Suicide Plans	192 (16.8)	27 (21.7)	1.37 (0.68-2.77)	1.27 (0.64-2.52)	1.55 (0.77-3.12)
Suicide Attempts	160 (13.0)	27 (17.8)	1.45 (0.70-3.01)	1.18 (0.56-2.49)	1.47 (1.00-3.10)

Note. CI = Confidence Interval. OR = Odds Ratio. AOR = Adjusted Odds Ratio. All n's are unweighted and percentages are weighted. AOR-1 adjusted for age, sex, race, marital status, and education; AOR-2 adjusted for age, sex, race, education, marital status, and any lifetime anxiety, mood, or substance use disorder.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$

Table 9

Suicide Experiences in Persons with Lifetime Binge Eating Disorder Compared to No Lifetime Disorder

	No Disorder (N=8062)	Binge Eating Disorder (N=263)		
Suicide Experience	n (%)	n (%)	OR (95% CI)	AOR-1 (95% CI)
Suicide Ideation	446 (5.1)	83 (35.2)	10.03 (6.87-14.65)***	8.59 (5.74-12.85)***
Suicide Plans	105 (1.1)	37 (14.7)	16.11 (10.39-25.00)***	13.57 (8.21-22.42)***
Suicide Attempts	107 (1.0)	39 (13.6)	15.03 (9.69-23.33)***	11.43 (6.85-19.05)***

Note. CI = Confidence Interval. OR = Odds Ratio. AOR = Adjusted Odds Ratio. All n's are unweighted and percentages are weighted. AOR-1 adjusted for age, sex, race, marital status, and education.

*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$

Table 10

Suicide Experiences in Persons with Lifetime Binge Eating Disorder Compared to Lifetime Depression and Anxiety

	Depression & Anxiety (N=1213)	Binge Eating Disorder (N=263)			
Suicide Experience	n (%)	n (%)	OR (95% CI)	AOR-1 (95% CI)	AOR-2 (95% CI)
Suicide Ideation	448 (39.9)	83 (35.2)	0.82 (0.53-1.26)	0.82 (0.53-1.25)	0.89 (0.53-1.48)
Suicide Plans	192 (16.8)	37 (14.7)	0.85 (0.52-1.39)	0.86 (0.52-1.40)	1.15 (0.70-1.89)
Suicide Attempts	160 (13.0)	39 (13.6)	1.05 (0.67-1.64)	1.00 (0.64-1.57)	1.29 (0.81-2.06)

Note. CI = Confidence Interval. OR = Odds Ratio. AOR = Adjusted Odds Ratio. All n's are unweighted and percentages are weighted. AOR-1 adjusted for age, sex, race, marital status, and education; AOR-2 adjusted for age, sex, race, education, marital status, and any lifetime anxiety, mood, or substance use disorder.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$

Table 11

Association between Binge Eating and Suicide Experiences among Individuals with any Lifetime Eating Disorder

	No Binge Eating (N=21)	Binge Eating (N=457)			
Suicide Experience	n(%)	n(%)	OR (95% CI)	AOR-1 (95% CI)	AOR-2 (95% CI)
Suicide Ideation	4 (8.3)	153 (37.1)	-	-	-
Suicide Plans	1 (0.7)	66 (16.6)	-	-	-
Suicide Attempts	2 (5.9)	69 (15.3)	-	-	-

Note. CI = Confidence Interval. OR = Odds Ratio. AOR = Adjusted Odds Ratio. All n's are unweighted and percentages are weighted. AOR-1 adjusted for age, sex, race, marital status, and education; AOR-2 adjusted for age, sex, race, education, marital status, and any lifetime anxiety, mood, or substance use disorder.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$

Table 12

Association between Diuretic and/or Weight Loss Pill Use and Suicide Experiences among Individuals with any Lifetime Eating Disorder

	No Diuretic or Weight Loss Pill Use (N=316)	Diuretic or Weight Loss Pill Use (N=141)			
Suicide Experience	n(%)	n(%)	OR (95% CI)	AOR-1 (95% CI)	AOR-2 (95% CI)
Suicide Ideation	104 (36.1)	49 (39.6)	1.16 (0.56-2.39)	1.20 (0.64-2.26)	1.19 (0.62-2.29)
Suicide Plans	49 (16.0)	17 (18.3)	1.17 (0.51-2.70)	1.31 (0.57-3.00)	1.23 (0.51-3.00)
Suicide Attempts	48 (14.3)	21 (17.7)	1.29 (0.65-2.57)	1.35 (0.67-2.70)	1.40 (0.66-2.94)

Note. CI = Confidence Interval. OR = Odds Ratio. AOR = Adjusted Odds Ratio. All n's are unweighted and percentages are weighted. AOR-1 adjusted for age, sex, race, marital status, and education; AOR-2 adjusted for age, sex, race, education, marital status, and any lifetime anxiety, mood, or substance use disorder.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$

Table 13

Association between Laxative and/or Enema Use and Suicide Experiences among Individuals with any Lifetime Eating Disorder

	No Laxative/Enema Use (N=369)	Laxative/Enema Use (N=88)			
Suicide Experience	n(%)	n(%)	OR (95% CI)	AOR-1 (95% CI)	AOR-2 (95% CI)
Suicide Ideation	115 (35.8)	38 (43.8)	1.40 (0.64-3.03)	1.63 (0.77-3.42)	1.59 (0.74-3.42)
Suicide Plans	51 (15.4)	15 (22.9)	1.63 (0.63-4.18)	2.02 (0.87-4.66)	2.04 (0.84-4.59)
Suicide Attempts	54 (15.4)	15 (14.9)	0.96 (0.41-2.27)	1.08 (0.47-2.46)	0.91 (0.33-2.54)

Note. CI = Confidence Interval. OR = Odds Ratio. AOR = Adjusted Odds Ratio. All n's are unweighted and percentages are weighted. AOR-1 adjusted for age, sex, race, marital status, and education; AOR-2 adjusted for age, sex, race, education, marital status, and any lifetime anxiety, mood, or substance use disorder.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$

Table 14

Association between Vomiting and Suicide Experiences among Individuals with any Lifetime Eating Disorder

	No Vomiting (N=373)	Vomiting (N=82)			
Suicide Experience	n(%)	n(%)	OR (95% CI)	AOR-1 (95% CI)	AOR-2 (95% CI)
Suicide Ideation	109 (32.1)	43 (58.5)	2.98 (1.49-5.95)**	3.12 (1.47-6.62)**	2.35 (1.08-5.13)*
Suicide Plans	47 (13.0)	18 (30.3)	2.90 (1.10-7.68)*	2.60 (0.94-7.32)	1.70 (0.54-5.31)
Suicide Attempts	44 (10.6)	25 (38.9)	5.40 (2.19-13.32)***	5.24 (2.06-13.34)***	3.48 (1.19-10.16)*

Note. CI = Confidence Interval. OR = Odds Ratio. AOR = Adjusted Odds Ratio. All n's are unweighted and percentages are weighted. AOR-1 adjusted for age, sex, race, marital status, and education; AOR-2 adjusted for age, sex, race, education, marital status, and any lifetime anxiety, mood, or substance use disorder.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$

Figure 1

Mean Ages (and 95% Confidence Intervals) of Eating Disorder and Comparison Groups

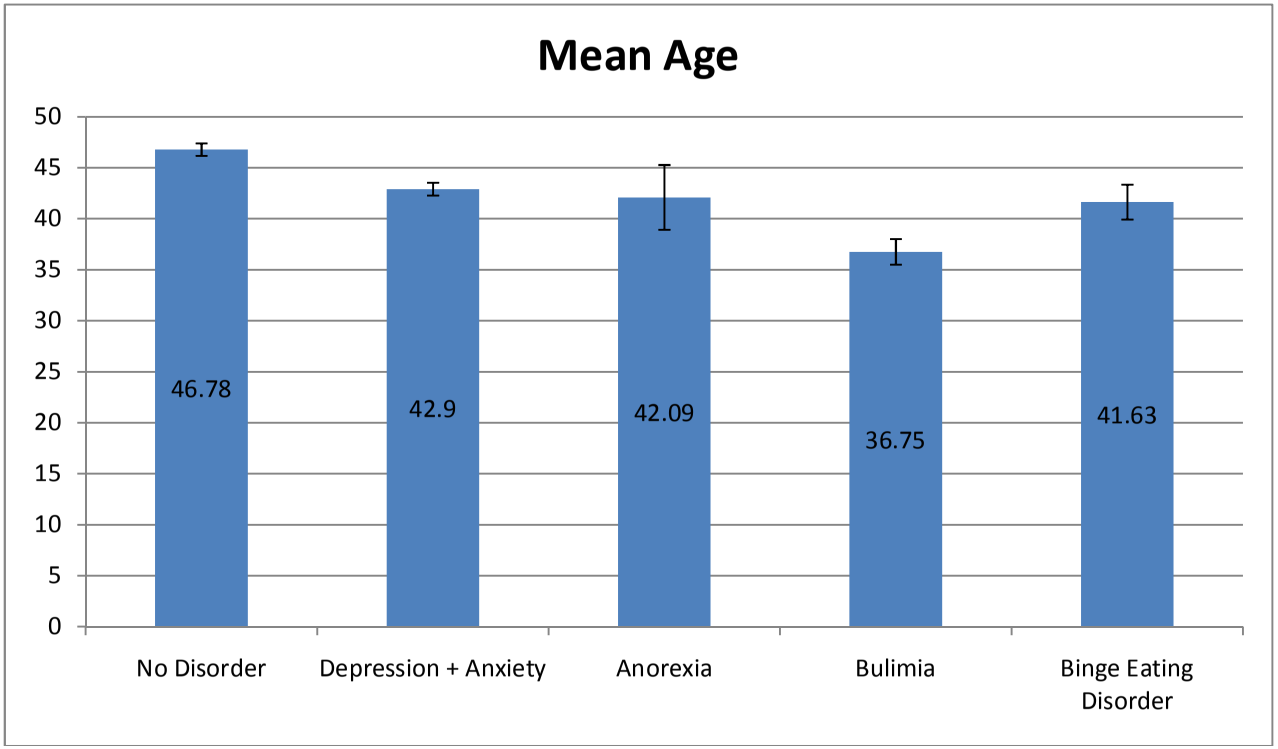

Figure 2

Mean BMI (and 95% Confidence Intervals) of Eating Disorder and Comparison Groups

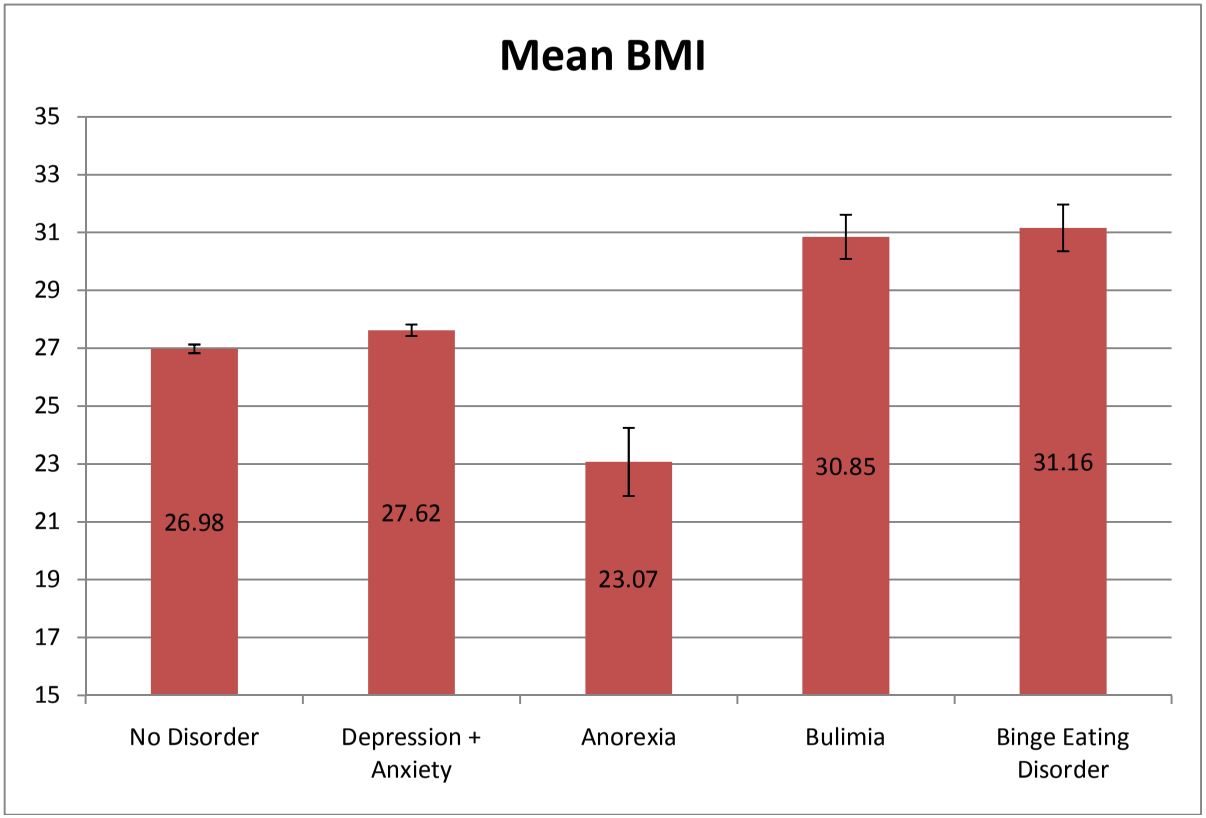

Figure 3

Mean WHODAS Scores(and 95% Confidence Intervals)