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Food for Thought: An Examination of the Relationship between Binge Eating and Psychological Variables in a Diverse College-Student Population

Valentina Ivezaj

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FOOD FOR THOUGHT: AN EXAMINATION OF THE RELATIONSHIP BETWEEN
BINGE EATING AND PSYCHOLOGICAL VARIABLES IN A DIVERSE COLLEGE-
STUDENT POPULATION.

by

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Submitted to the Department of Psychology

Eastern Michigan University

in partial fulfillment of the requirements

for the degree of

MASTER OF SCIENCE

in

Clinical Psychology

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Dedication

I dedicate my thesis to my family for their love and support throughout this long journey. To my parents, Fran and File, for their understanding of the time commitment needed to complete this project. To my sisters, Kristina and Lisa, for their encouragement, and to my brother, Martin, for his ability to always make me smile and laugh. Thank you for believing in me.

I also dedicate my thesis to my mentor, Dr. Karen K. Saules, for her inspiration and enthusiasm in conducting research. Thank you for encouraging me to pursue my research interests and to follow my dreams.

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Abstract

Binge eating is associated with a host of adverse outcomes, but little is known about sex and racial differences among those who binge eat. The present study examined sex and racial group differences in binge eating within a college-student population. It was hypothesized that White women would endorse higher rates of binge eating than the other groups, and that predictors of binge eating would differ across groups. Participants completed a web-based survey assessing depression, anxiety, body image, weight history, physical activity, smoking, and body mass index. Findings highlight sex and racial differences in the predictors of binge eating, with depression a common predictor across groups. Results suggest that approaches to preventing BE among college students should focus on depression and overweight preoccupation among White students and Black women. These findings may help in the development of tailored treatment approaches, which could be evaluated in future research.

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Food for Thought: An Examination of the Relationship between Binge Eating and
Psychological Variables in a Diverse College-Student Population

Statement of the Problem

“Food is our common ground, a universal experience.” – James Beard

The phenomenon of binge eating without compensation has increasingly been emphasized in both psychological and medical research. Given the recent awareness of the negative outcomes associated with binge eating, many researchers have begun to attempt to understand the underlying factors contributing to this occasionally deadly behavior. Specifically, binge eating has been related to bulimia (Corstorphine, Waller, & Ohanian, 2006), binge eating disorder (Masheb & Grilo, 2006), substance use (Dunn, Larimer, & Neighbors, 2002), cigarette smoking (Crisp, Sedgwick, Halek, Joughin, & Humphrey, 1999), negative mood (Stein, Kenardy, Wiseman, Zoler Douchis, Arnow, & Wilfley, 2007), depression (Stice, Presnell, & Spangler, 2002), anxiety (Marcus, Wing, Ewing, Kern, Gooding, & McDermott, 1990), body image dissatisfaction (Grilo, Masheb, Brody, Burke-Martindale, & Rothschild, 2005), and obesity (Riener, Shindler, & Ludvik, 2006). The association between obesity and binge eating is particularly well documented. Unfortunately, obesity is also associated with early mortality rates, which has important implications given the high prevalence rate (34%) of obesity in the United States.

Recently, binge eating as a disorder has become a controversial topic. Currently, binge eating disorder (BED) is included in the DSM-IV-TR as a provisional disorder. Research has sought to determine whether BED is a distinct disorder, or if it is simply associated with bulimia nervosa (BN) or more severe eating disturbances in obese

individuals. Literature will be reviewed in this paper to provide rationale for considering BED as a discrete disorder.

Although binge eating is commonly investigated in obese populations, it is important to note that non-obese individuals also engage in binge-eating behaviors, with similar negative psychological and physical outcomes. Thus, while binge eating is commonly investigated in obese populations, population-based studies are lacking. Moreover, binge-eating studies have primarily targeted White women, often excluding men and ethnic minority groups, despite recent evidence of unexpectedly high rates of binge eating in those populations. Thus, the purpose of the present study is to investigate predictors of binge eating in underrepresented groups, namely men and ethnic minorities, in a college-student population. Given the high prevalence rates of binge eating (41%) among college women (Vanderlinden, Dalle Grave, Vandereycken, & Noorduyn, 2001), this study will serve to examine predictors of binge eating in a college student population.

Literature Review

A national epidemic. Obesity is one of the leading health concerns in the nation. Approximately 64% of the United States population is considered overweight or obese (United States Department of Health & Human Services, 2004). In fact, obesity rates are currently on the rise, creating a serious public health problem. Specifically, in the United States, the prevalence of obesity among adults has doubled over the last two decades (Flegal, Carroll, Ogden, & Johnson, 2002; Hedley, Ogden, Johnson, Carroll, Curtin, & Flegal, 2004; Ogden, Flegal, Carroll, & Johnson, 2002). Moreover, Smith (2007) reported a 61% increase in the prevalence of obesity from 1991 to 2000. Thus, given such high rates, factors associated with obesity have become the focus of many research investigations.

Specifically, one study reported that obesity-related factors, such as poor diet and physical inactivity, may soon become the primary actual cause of death in the United States, exceeding smoking. Note that actual causes of death were defined as “major external (nongenetic) modifiable factors that contribute to death in the United States” (Mokdad, Marks, Stroup, & Gerberding, 2004, p. 1238). Using this definition, it is currently estimated that approximately 365,000 deaths per year are caused by poor diet and physical inactivity (Mokdad, Marks, Stroup, & Gerberding, 2005). In fact, Mokdad et al. (2005) estimated that actual deaths caused by poor diet and physical inactivity increased from 14% in 1990 to 15.2% in 2000, while deaths caused by tobacco showed a decreasing trend from 19% in 1990 to 18.1% in 2000. Thus, it appears that poor diet and physical inactivity may soon become the primary cause of mortality in the nation, as obesity and overweight prevalence rates also continue to increase.

Obesity is linked to a host of negative physical sequelae including coronary heart disease, type 2 diabetes, hypertension, stroke, respiratory problems, some forms of cancer (United States Department of Health & Human Services, 2004), and early mortality rates as associated with these diseases. Obesity is also related to various psychosocial outcomes, such as body image dissatisfaction (Grilo & Masheb, 2005) and mood disorders and depressive symptoms (Moreira, Marca, Appolinario, & Coutinho, 2007). Moreover, in 2001, direct and indirect costs related to obesity were an estimated \$61 billion and \$56 billion, respectively (United States Department of Health and Human Service). Thus, the cost of obesity comprised a total of \$117 billion in 2001, an estimated \$18 billion increase from 1995. Accordingly, in 2004, Secretary Thompson of the United States Department of Health and Human Services announced that, “Americans need to understand that overweight and obesity

are literally killing us. To know that poor eating habits and inactivity are on the verge of surpassing tobacco use as the leading cause of preventable death in America should motivate all Americans to take action to protect their health.”

Given the severe sequelae of obesity, it is important to examine factors that may influence this growing public health problem. While both genetic and behavioral variables certainly appear to contribute to the development of obesity, Striegel-Moore and Bulik (2007) reported that the increasing rates of obesity are largely due to environmental variables since genetic alterations cannot have occurred in such a short amount of time, at least not at the population level. Moreover, improving our understanding of modifiable behavioral risk factors, such as problematic eating behaviors, may provide useful targets for obesity prevention. In fact, increases in rates of maladaptive eating patterns, such as weight cycling (Kensinger, Murtaugh, Reichmann, & Tangney, 1998), frequent eating or “grazing,” overeating during scheduled meals (Brody, Walsh, & Devlin, 1994), nocturnal eating, and binge eating (Tanofsky-Kraff & Yanovski, 2004) may be contributing to the epidemic.

Striegel-Moore and Bulik (2007) discussed the importance of studying both obesity and disordered eating. Specifically, the extant literature focuses on the significant relationship between binge eating and obesity (Grilo, Masheb, Brody, Burke-Martindale, & Rothschild; 2005; Reas, White, & Grilo, 2006; Striegel-Moore, Wilson, Wilfley, Elder, & Brownell, 1998; Womble et al., 2001). Yanovski (2003) suggested that interventions targeting binge eating could reduce obesity rates. In fact, among obese individuals with binge eating problems, targeting binge eating may be more effective than many current standard obesity treatment strategies (Devlin, Goldfein, & Dobrow, 2003).

Binge eating. “The phenomenon of uncompensated binge eating exists and is troubling to those who experience it” (Devlin et al., 2003, S15). The DSM-IV criteria for binge eating include “eating, in a discrete period of time, an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances and a sense of lack of control over eating during the episode” (p. 594). Due to the subjective nature of the criteria, binge eating is often difficult to define, as many perceive binge eating differently. However, Johnson, Carr-Nangle, Nangle, Antony, and Zayfert (1997) argue that the individual’s perspective of a binge episode is critical, supporting the advisability of using self-report measures in identifying binge eating.

As reviewed earlier, binge eating has been linked to various negative outcomes including bulimia (Corstorphine, Waller, & Ohanian, 2006), BED (Masheb & Grilo, 2006), substance use (Dunn, Larimer, & Neighbors, 2002), cigarette smoking (Crisp, Sedgwick, Halek, Joughin, & Humphrey, 1999), negative mood (Stein, Kenardy, Wiseman, Zoler Dounchis, Arnow, & Wilfley, 2007), depression (Stice, Presnell, & Spangler, 2002), anxiety (Marcus, Wing, Ewing, Kern, Gooding, & McDermott, 1990), increased suicide risk (Grucza, Przybeck, & Cloninger, 2007), body image dissatisfaction (Grilo et al., 2005), and obesity (Riener, Shindler, & Ludvik, 2006). Specifically, the literature suggests that obese binge eaters tend to be more depressed than obese non-binge eaters (Marcus, Wing, & Hopkins, 1988; Marcus et al., 1990). In support of this, researchers have found that obese women who engage in binge-eating behaviors were found to have increased psychiatric (depression, anxiety, panic disorder, and alcohol dependence) and medical (hypertension, visual impairment, asthma, diabetes, cardiac problems and osteoarthritis) problems compared to obese women who did not binge eat (Bulik, Sullivan, & Kendler, 2002). Importantly, even

among those of normal weight, binge eaters reported significantly more depression and anxiety than non-binge eaters (Webber, 1994), indicating that obesity does not completely mediate the relationship between binge eating and psychopathology (Telch & Agras, 1994).

In recent years, researchers have begun to categorize binge eating as a unique disorder, BED. Currently BED is a provisional disorder for further study in the DSM-IV-TR. However, many research findings lend support to future inclusion of BED as an eating disorder in the DSM-V (Hudson, Hiripi, Pope, & Kessler, 2007; Reichborn-Kjennerud, Bulik, Tambs, & Harris, 2004) along with anorexia nervosa (AN), bulimia nervosa (BN), and eating disorders not-otherwise-specified (EDNOS). Notably, BED is different than simply overeating (Streigel-Moore et al., 1998). Specifically, when formalized in the DSM-V, diagnostic criteria for BED are anticipated to include five criteria:

- 1) recurrent episodes of binge eating, accompanied by a sense of loss of control
- 2) at least three of the following associated features: eating much more rapidly than normal, eating until feeling uncomfortably full, eating large amounts of food when not feeling physically hungry, eating alone because of being embarrassed by how much one is eating, and feeling disgusted with oneself, depressed, or very guilty after overeating
- 3) marked distress regarding binge eating
- 4) binge eating occurs, on average, at least 2 days a week for 6 months
- 5) binge eating is not associated with the regular use of inappropriate compensatory behaviors and does not occur exclusively during the course of Anorexia Nervosa (AN) or Bulimia Nervosa (BN)” (DSM-IV-TR, p. 787).

However, there remains some controversy over these proposed criteria, as Hrabosky, Masheb, White, and Grilo (2007) have suggested that shape/weight overvaluation should be a diagnostic criterion of BED. They defined overvaluation as “excessive influence of shape or weight on one’s self-evaluation” (p. 175). The authors found that overweight BED individuals reported increased weight/shape concerns when compared to overweight non-

BED individuals. Whether this criterion will be included in the next DSM is currently a matter of some debate.

Research investigating BED has commonly focused on obese populations. Particularly, obese individuals with BED were more likely to have a lifetime history of Axis I and Axis II disorders than those without BED (Specker, de Zwaan, Raymond, & Mitchell, 1994; Yanovski, Nelson, Dubbert, & Spitzer, 1993). Moreover, obese BED smokers were more likely to meet criteria for an Axis I disorder (depression, anxiety, and substance use disorders) than obese BED individuals who never smoked cigarettes. In general, obese individuals with BED reported significantly higher levels of depression than non-BED obese individuals (Mussell, Petersen, Weller, Crosby, de Zwaan, & Mitchell, 1996). In addition, the literature suggests that obese individuals with BED appear to engage in eating behaviors distinct from those observed among obese individuals without BED (Devlin et al., 2003). The two groups differ primarily in type and amount of food consumed, eating patterns, and degree of fullness. Furthermore, in a laboratory study of eating behavior, when participants were asked to consume as much food as possible, obese women with BED ate significantly more food than obese women without BED (Walsh & Boudreau, 2003; Yanovski et al., 1992). Obese BED individuals also consumed higher fat food on binge days (Raymond, Neumeyer, Warren, Lee, & Peterson, 2003; Yanovski et al., 1992). Taken together, these studies strongly support the existence of distinguishable eating patterns between obese BED and non-BED individuals.

Although binge eating is commonly associated with forbidden foods such as snacks and desserts, Guertin (1999) reported that individuals who engage in binge eating without compensation may actually prefer to binge on other types of foods. For example, in one study

a participant responded “If you’d had pizza [or Chinese food, or a specific brand of superpremium ice cream], then I really would have binged” (Yanovski et al., 1992, p. 979). Similarly, Cooke, Guss, Kissilef, Devlin, and Walsh (1997) found that obese BED women ate more meat than obese non-BED women. Obese women with BED also reported engaging in evening binge episodes significantly more often than obese women without BED on binge days. During these evening binges, BED obese women consumed more calories than non-BED obese women, consuming 1741 ± 734 versus 964 ± 437 calories per binge episode, on average, respectively (Raymond et al., 2003). In addition, relative to their non-BED counterparts, obese women with BED were more likely to engage in nocturnal eating, defined as “getting up out of bed to eat” (Greeno, Wing, & Marcus, 1995). In contrast to individuals with BN, research suggests that obese binge eaters seem to often consume more meat early in meals, decrease their meat intake later in the meal, and increase dessert intake later in the meal. Conversely, women with BN tend to eat more desserts and snacks earlier in the meal and distribute meat throughout the entire meal (Cooke et al., 1997).

Recent research has revealed that obese BED women also report feelings of fullness similar to non-BED obese and normal weight women only when significantly more food is consumed (Sysko, Devlin, Walsh, Zimmerli, & Kissileff, 2007). Finally, overweight BED women also reported more cravings for sweet and nonsweet foods than overweight women without BED (Greeno, Wing, & Shiffman, 2000). Notably, obese and normal-weight non-binge eaters engaged in similar eating behaviors, which differed greatly from the aforementioned behaviors of obese and overweight binge eaters (Anderson, Williamson, Johnson, & Grieve, 2001). Accordingly, although binge eating is commonly associated with obesity, non-obese individuals of average weights also meet criteria for BED (Barry, Grilo,

& Masheb, 2003; Fairburn, Cooper, Doll, Norman, & O'Connor, 2000). Thus, accumulating evidence seems to suggest that BED is a distinct entity from bulimia nervosa or obesity, and it is characterized by observable differences in eating patterns and related feelings.

While a clear definition of binge eating and BED is evident in the literature, there is a poor understanding of the etiology of binge eating and BED. Given the prevalence rates of BED in community samples and weight loss treatment-seeking samples of approximately 2.8% (Hudson et al., 2007) and 30% (Spitzer et al., 1993), respectively, it is crucial that researchers gain a better understanding of the underlying processes that drive binge eating. To date, various theories have attempted to describe binge eating, including restraint theory, affective theories, and biological theories.

Herman and Polivy's theory of dietary restraint is commonly referred to when describing binge eating. According to restraint theory, "Prolonged dietary restraint creates a physiologic and psychological deprivation that potentiates the eventual counterregulation of appetite, leading to binge eating" (Engelberg, Gauvin, & Steiger, 2005, p. 355). Researchers suggest that binge eaters may restrain from eating in the morning and afternoon, leading to subsequent binge episodes in the evenings due to deprivation (Raymond et al., 2003). However, despite the association between binge eating and dietary restraint, Engelberg et al. (2005) found that dietary restraint may not necessarily trigger binge eating. Rather, for some binge eaters, dietary restraint may be a less salient feature of binge episodes. For instance, a group of treatment-seeking overweight adults with BED participated in a study to examine the timing and sequence of becoming overweight, dieting, and binge eating. Results revealed that 63% of the participants reported becoming overweight first, 21% reported dieting first, and 16% reported binge eating first, followed by becoming overweight and then dieting.

Participants who reported binge eating first were younger when they were diagnosed with BED, reported less dietary restraint than those who reported becoming overweight first, and had an increased risk for obesity. It is important to note that approximately twice as many women reported dieting first and binge eating last, indicating possible sex differences in binge eating antecedents.

Negative mood is also often described as a precursor to binge eating in affective models (Meyer & Waller, 1998). Greeno et al. (2000) prospectively examined the relationship between binge eaters and negative mood in a group of overweight women seeking weight-loss treatment. They found that treatment-seeking women with BED generally endorsed significantly more negative affect than treatment-seeking women without BED. More importantly, they found that treatment-seeking women with BED reported significantly lower mood scores before binges, suggesting that mood could be a potential target for treatment. However, among a subclinical group of binge eaters in a college student population, individuals reported lower mood scores following binges as well (Wegner, Smyth, Crosby, Wittrock, Wonderlich, & Mitchell, 2002). Therefore, negative mood is not necessarily alleviated by a binge episode. These findings highlight the relationship between mood and binge eating.

In support of biological theories, twin studies have documented a genetic component to binge eating, with concordance rates estimated to be 49-51% (Bulik, Sullivan & Kendler, 2003; Sullivan, Bulik, & Kendler, 1998). There is some evidence that serotonin may play a role in BED, specifically that a polymorphism in the serotonin transporter gene, 5HTTPRL, may play a role in susceptibility to BED (Monteleone, Tortorella, Castaldo, & Maj, 2006). Monteleone et al. (2006) also reviewed literature on 5HTTPRL and reported that it has been

associated with other psychological outcomes such as impulsivity, suicidality, affective disorders, AN, and BN. While genetic factors have been associated with binge eating, environmental factors appear to play an important role as well. For example, in a population-based twin study, Reichborn-Kjennerud et al. (2004) found that the heritability of binge eating was 41%, whereas environmental factors accounted for the remaining 59% of the variance.

Taken together, while there is some support for each of the prominent theories, none can fully explain binge eating. Womble et al. (2001) suggested that binge eating may be more multifaceted than previously explained by the aforementioned theories. The authors found important differences between men and women in relation to the best model of binge eating. In their model, weight cycling, body dissatisfaction, teasing, negative affect, and dietary restraint all contributed to binge eating for both men and women. However, negative affect was associated with dietary restraint only in women, indicating the importance of examining sex differences in predictors of binge eating as will be discussed later.

Binge eating and body image. A review of the literature points to a strong relationship between body image and binge eating (Grilo & Masheb, 2005; Sorbara & Geliebter, 2002). Body image is a multidimensional construct including cognitive, behavioral, affective, and evaluative components of self-perceptions, attitudes, and experiences (Cash, 1994; Cash, Santos, & Williams, 2005). The concept of body image is so complex that Cash has actually coined the term “body images” to describe the phenomenon (Keeton, Cash, & Brown, 1990). Given the complexity of body image, Cash (2004) reported that body image disturbance differs from body image dissatisfaction. However, researchers commonly use the terms interchangeably. Therefore, it is important to note that definitions and measures of body

image vary across studies. Nonetheless, despite the multitude of definitions for body image, the construct has frequently been associated with binge eating, and concomitantly with obesity.

Binge eaters have reported significantly higher levels of body image dissatisfaction (as assessed by the Eating Disorder Examination; Fairburn & Cooper, 1993, and the Body Shape Questionnaire; Cooper, Taylor, Cooper, & Fairburn, 1987) than non-binge eaters. The relationship between binge eating and body image has been observed among non-treatment-seeking obese individuals (Wilfley, Schwartz, Spurrell, & Fairburn, 2000) and obese individuals seeking bariatric surgery (Grilo et al., 2005). Additionally, obese individuals with BED have reported higher levels of body image concerns (as assessed by the Eating Disorder Inventory; Garner, Olmstead, & Polivy, 1993) than obese individuals without BED (Mussell et al., 1996). However, it is also important to note that even non-overweight individuals with BED report high levels of body image dissatisfaction (as assessed by the Eating Disorder Inventory; Garner et al., 1983; Barry, Grilo, & Masheb, 2003). Clearly, body dissatisfaction, BED, and obesity appear to be highly interrelated (Devlin et al., 2003), but the nature of and conditions under which these relationships operate merits further study.

Group differences: An overview. The following sections will provide a review of the literature on both sex and ethnic differences in relation to binge eating. Although the extant literature focuses primarily on White women with eating disturbances and body image concerns, recent literature has begun to explore important sex and ethnic differences in relation to binge eating, obesity, and body image. For example, with respect to binge eating, a relatively early study found that Hispanic women had more problems with binge eating than both Black and White women (Fitzgibbon, Spring, Avellone, Blackman, Pingitore, &

Stolley, 1998). In addition to differences in binge eating, important sex and ethnic differences in obesity rates have also been found. For instance, obesity prevalence rates are increasing among men, while remaining relatively stable among women. Across ethnic groups, however, Black women have higher prevalence rates of obesity than do Hispanic women, but rates do not differ by ethnicity for men (Ogden, Carroll, Curtin, McDowell, Tabak, & Flegal, 2006). Therefore, with rates of binge eating and obesity on the rise for ethnic groups (Hrabosky & Grilo, 2007), perhaps body image concerns will emerge as a more salient factor among these groups as well. Hrabosky and Grilo (2007) reported that “the predominant minority groups in the United States appear to be reaching parity in the degree and severity of body image and eating disturbances” (p. 112). Therefore, it appears that body image is also becoming more of a problem than previously considered for various ethnic groups. A review of the literature examining correlates of binge eating across diverse samples will be covered more systematically in the following sections.

Sex differences. It is important to examine sex differences in binge eating and BED. While prevalence rates for most eating disorders are lower for males than females, recent research has revealed that rates of binge eating (Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002; Woodside et al., 2001) and BED are similar for both groups (Barry, Grilo, & Masheb, 2002; Grucza, Przybeck, & Cloninger, 2007; Womble et al., 2001). Prevalence rates were reported in the first representative study of eating disorders, which included 9,282 participants. Results revealed that the lifetime prevalence rates of AN, BN, subthreshold BED, and BED for women were 0.9%, 1.5%, 0.6%, and 3.5%, respectively, whereas the lifetime prevalence rates for men were 0.3%, 0.5%, 1.9%, and 2%, respectively (Hudson et al., 2007). Clearly, males reported binge eating about as much as females when combining

both subthreshold and clinical levels of BED, 3.9% versus 4.1%, respectively. However, men are not meeting BED criteria at the same rate as women, as will be discussed in further detail shortly.

Across genders, BED was generally more prevalent than the commonly studied disorders, AN and BN, though rates of BED were statistically higher among women than men. However, in comparison to other eating disorders, rates of BED among men were more comparable to those found among women. In addition, compared to AN and BN, males were much more commonly diagnosed with BED (Gruzca et al., 2007). Therefore, with comparable rates of binge eating, men represent an important group that need to be included in research examining binge eating.

To further emphasize the importance of including men in binge-eating research, Hudson et al. (2007) found that rates of subthreshold BED were significantly higher among men than women. The authors explained that the difference between subthreshold BED and clinical BED is that individuals with clinical BED experience distress. Therefore, perhaps more women are diagnosed with BED because women report more feelings of distress. Although the criterion of distress may be an important distinction for binge eating as a disorder, negative health consequences of binge eating may still persist in both men and women due to the actual binge-eating behavior. Put another way, although men and women may have different attitudes and feelings in relation to binge eating, binge eating may still negatively affect both men and women physically as they both engage in binge-eating behaviors. Accordingly, the authors reported that significant sex differences did not emerge for lifetime prevalence rates of “any binge eating,” 4.0% for men and 4.9% for women.

Consequently, despite the levels of distress accompanied by individuals with BED, health implications in relation to binge-eating behavior may be important for both men and women.

While similar rates of binge eating have been found for men and women, some earlier studies found significant sex differences in binge-eating rates and patterns. Specifically, Katzman, Wolchik, and Braver (1984) reported that females in a college-student population engaged in binge eating much more than did males, 56% and 38%, respectively. In this study, binge eating was assessed by asking, “Do you binge eat,” thereby excluding the criteria now commonly used in measuring binge eating, namely lack of control and eating a large amount of food in a short period of time. Regardless of this difference in the assessment of binge eating, it appears that the sex gap may be narrowing considerably given the recent findings previously described. While binge eating may be reaching similar rates across genders, binge-eating patterns appear to be quite different between males and females.

Men and women have reported eating different foods during binge episodes. Women were more likely to binge eat using snack foods, such as pastries, whereas men were more likely to binge eat using hamburgers (Leon, Carroll, Chernyk, & Finn, 1985). Finally, males reported eating in public more than did women, who tended to binge eat alone, highlighting important sex differences in binge-eating patterns (Schneider & Agras, 1987). If women and men engage in different binge-eating patterns, perhaps different factors contribute to the binge eating behavior and experiences among men and women.

More recent literature has explored important sex differences in relation to experiences associated with binge eating. In a review comparing sex differences among binge eaters, Weltzin, Weisensel, Franczyk, Burnett, Klitz, and Bean (2005) reported that females were more likely to experience a “loss of control” during a binge, whereas males

were not as likely to encounter this “loss of control” (Schneider & Agras, 1987). Even perceptions of a binge differed between men and women. For example, females were more likely to perceive their own eating as a binge, whereas males required more doughnuts and/or faster eating to warrant labeling an episode a “binge” (LaPorte, 1997). It is important to note that regardless of how the individual may have defined a binge, a perceived binge was associated with negative outcomes more than actual quantity consumed. Thus, despite the clinical definition of a binge, the individual’s perceived binge status was associated with poor outcomes for both men and women. Therefore, it may be that the individual’s perception of binge eating is more important in determining negative outcomes than the actual quantity of food consumed.

Another important sex difference is that men may use different compensation methods (e.g., creatine and weight gain supplements) than women (e.g., metabolife and diet groups; Anderson & Bulik, 2004). Since different compensation methods are used for men and women following a binge, it may be that different predictors of binge eating exist between the sexes as well. Thus, further research on binge eating will improve our understanding of underlying factors contributing to binge eating between men and women, as well as the behavioral and psychological features, which may vary by sex.

The literature on sex differences in relation to binge eating and various psychological and physical factors presents an equivocal picture that may be changing over time. Advancing our understanding of sex differences through further research may account for the inconsistencies in the literature and the changing trends. For example, sex differences have been identified for emotional eating, which is defined as “the urge to cope with negative affect by eating” (Tanofsky, Wilfley, Spurrell, Welch, & Brownell, 1997, p. 51). Tanofsky et

al. (1997) found that women with BED reported more emotional eating than men with BED did. However, about a decade later, men and women with BED appear to be reporting similar levels of emotional eating (Masheb & Grilo, 2006). This changing picture highlights the importance of including men in binge eating research. Interestingly, the measure used to assess emotional eating (Emotional Eating Scale) was not significantly related to depression or self-esteem (Tanofsky et al., 1997).

As discussed earlier, BED is strongly associated with obesity (Mussell et al., 1996; Raymond, Bartholome, Lee, Peterson, & Raatz, 2007; Reas & Grilo, 2007; Yanovski et al., 1993). With respect to sex differences, Barry et al. (2002) found that men with BED were more likely to be obese than were women with BED, 85.7% versus 70.7%, respectively. As previously mentioned, although the literature suggests notable relationships among BED, obesity, and body image, the picture becomes more complicated when considering sex differences among these highly interrelated factors. For example, using the Eating Disorders Inventory-2 (Garner, 1991), Womble et al. (2001) found that although body dissatisfaction was associated with obesity among both males and females, the relationship was more apparent in men. However, Grilo and Masheb (2005) found that women seeking BED treatment reported higher levels of body image dissatisfaction (as assessed by the Body Shape Questionnaire; Cooper, Taylor, Cooper, & Fairburn, 1987) than treatment-seeking men, even though these men had higher BMIs than did the women in the study.

Taking a different approach, Sorbara and Geliebter (2002) found that before weight loss, obese outpatient men reported more body image disturbance than obese outpatient women, even though BMIs were not statistically different. In that study, body image dissatisfaction was comprised of three factors, namely distortion, discrepancy, and

dissatisfaction. Distortion was defined as the difference between participant and clinician report of body size. Discrepancy was defined as the difference between participants' actual and ideal body size (as assessed by the Figure Rating Scale; Stunkard, Sorensen, & Schulsinger, 1983). Dissatisfaction was defined as the participant's self-report of body size dissatisfaction. Finally, a composite of these scores comprised the overall body image disturbance score. It is important to note that although men in this sample reported more overall body image disturbance, this appears to have been largely attributed to their higher scores on the distortion variable. Men tended to overestimate their body size more than women did, viewing themselves as larger than they actually were; however, sex differences were not found in relation to body dissatisfaction. Thus, depending on the definition of body image, study results may vary. Therefore, in light of varying definitions of body image throughout the literature, it is important to note that differences across studies may sometimes be attributable to the multitude of body image definitions.

Overall, given the mixed research findings of binge eating and various associated psychological and physical sequelae, it will be important to conduct a more thorough examination of binge eating in respect to sex differences. Along with sex differences, investigating other underrepresented groups in binge eating research, such as various ethnic groups, may provide a clearer picture of binge eating.

Racial differences. White populations are commonly sampled in research, yet examination of racial differences may be crucial to understand fully the risk factors for eating disorders such as BED (Striegel-Moore & Bulik, 2007). Striegel-Moore and Bulik (2007) note, "White race/ethnicity may be a marker for eating disorders involving severely restrictive or compensatory behaviors but not for binge eating" (p. 185). Said another way,

binge eating may be more common than previously recognized in minority populations. Therefore, more comprehensive studies examining diverse samples are needed to understand clearly the underlying processes influencing the binge-eating phenomenon. The following sections will first review literature on body image, binge eating, and BED among diverse women, followed by a review of the literature among diverse men in relation to binge eating and body image.

Belonging to a minority racial group is often considered a protective factor against body image dissatisfaction (Warren, Gleaves, Cepeda-Benito, Fernandez, & Rodriguez-Ruiz, 2005). For example, Warren et al. (2005) found that White women internalized the Western appearance ideal and had significantly higher rates of body dissatisfaction (as assessed by the Body Shape Questionnaire; Cooper, Taylor, Cooper, & Fairburn, 1987) than did Mexican American or Spanish women. Similarly, Pike, Dohm, Striegel-Moore, Wilfley, and Fairburn (2001) found that Black women reported less body image concerns (as assessed by the Eating Disorder Examination Questionnaire; Fairburn & Beglin, 1994) than White women did, despite increased levels of binge eating and weight status. Results of a recent meta-analytic review, however, suggest that Black-White differences in body image dissatisfaction may be decreasing (Roberts, Cash, Feingold, & Johnson, 2006). In a more recent study, Hrabosky and Grilo (2007) investigated body image (as assessed by the Body Shape Questionnaire; Cooper, Taylor, Cooper, & Fairburn, 1987) and maladaptive eating patterns in a group of Black and Hispanic women. Average weight Hispanics reported more body shape concerns as compared to Black women. As previously noted, body image appears to play an important role for some non-White groups of women as well. However, body image concerns may only be associated with binge eating for certain groups.

The literature on binge eating across various racial groups is inconsistent. For example, one study found that Black women engaged in binge eating behaviors more than did White women (Striegel-Moore, Franko, Thompson, Barton, Schreiber, & Daniels, 2005). Although Black and White racial differences have recently been reported, studies including other racial groups are lacking. One study, however, has examined the correlates of binge eating in Hispanic, Black, and White women (Fitzgibbon et al., 1998). Results indicated that Hispanic women actually exhibited the most binge eating behaviors and the highest rates of BED in the sample. Moreover, depression was associated with binge eating severity in White and Hispanic women, while weight was associated with binge eating in Hispanic women only. Binge eating was not associated with these factors in Black women. In addition, differences in binge eating were not found among average weight, overweight, and obese Hispanic women, indicating again that binge eating is not always associated with obesity (Hrabosky and Grilo, 2007). It remains important to decipher whether or not -- and under what conditions -- obesity and binge eating are highly related among various racial groups.

In the first investigation of a group of severely obese Black, Hispanic, and White women seeking bariatric surgery, Sanchez-Johnson, Dymek, Alverdy, and le Grange (2003) found that 40.2% of the women reported binge eating, while 26.3% met BED diagnostic criteria. Interestingly, there were no significant differences between Black, Hispanic, and White women in relation to binge eating, number of binges per week, or BED. Some suggest that the lack of differences may be due to greater acculturation by various racial groups. “Given the extreme idealization of thinness within white culture, higher socioeconomic status and greater assimilation into white culture in the United States may render black women more vulnerable to developing certain eating and weight disorders” (Pike et al., 2001, p.

1460). Sanchez-Johnson et al.'s results suggest that perhaps this may generalize to other racial groups as well.

Men from various minority groups may also be increasingly vulnerable to eating and weight disturbances as well. The following section will first review early literature on body image for men, followed by a review of a comprehensive study on binge eating and body image concerns among males. Regrettably, research on men in this area is scarce. Second, across the available studies, instruments measuring eating behaviors and body image were validated on White women, not men from various racial backgrounds. Therefore, the results of the following studies must be interpreted cautiously.

Early research did not focus on men's personal body image. Rather, early studies examined men's perceptions of women's body image. Such findings suggested that body image perceptions of women differed among males from different racial backgrounds. For example, Greenberg and LaPorte (1996) found that White men wanted their girlfriends to lose weight more than Black men did. Moreover, when asked to choose among nine figures of women with different shapes, White men chose thinner shapes in representing the ideal woman, indicating important differences across racial groups in relation to body image.

More recently, research has begun to explore men's own body image concerns. In fact, the following study provided an overview of research pertaining to men's own body image concerns, as well as binge eating behaviors. Ricciardelli, McCabe, Williams, and Thompson (2007) conducted a comprehensive review of studies comparing White males to non-White males in relation to eating behaviors. They reported that in general, Black males preferred a larger body size (Aruguete et al., 2004; Yates et al., 2004) and endorsed less body image dissatisfaction (according to the Appearance Orientation subscale of the MBSRQ)

than did White males (Aruguete et al., 2004; Harris et al., 1991), despite placing greater value in their appearance (Miller et al., 2000; Smith et al., 1999). However, it was noted that Black males may still engage in more binge eating and weight loss behaviors than White males do (Aruguete et al., 2004, Gray et al., 1987). Black males were also less likely to call themselves overweight than White males were (Bhuiyan et al., 2003). It is also important to note that binge eating and weight loss strategies may be associated with building muscle in Black men, which may contribute to their maintenance of a positive body image (Ricciardelli et al., 2007).

Although findings are mixed for Hispanic males, it appears that Hispanic males experience similar body image concerns compared to White males; some studies, however, suggest that Hispanic males may have a more positive body image than did White males. As reviewed by Ricciardelli et al. (2007), George and Johnson (2001) found that Hispanic men were more concerned about weight than were White men. In addition, the authors reported that some studies show that Hispanic males engage in more binge-eating behaviors than White males did; these studies, however, have focused on adolescents. Prevalence rates of BED among adolescents (about 1%) are quite different than are those for adults (Johnson, Rohan, & Kirk, 2002). In addition, binge eating has been found usually to begin in early adulthood (Mussell, Mitchell, Weller, Raymond, Crow, & Crosby, 1995). Nevertheless, because the literature on Hispanic men in this area is limited, findings from adolescent samples are of heuristic value at this stage.

Although the literature is extremely limited with respect to studies including Native American males, Ricciardelli et al. (2007) reported on three studies that suggest that Native American males endorse more body image dissatisfaction and more binge eating than White

males do (Croll et al., 2002; Neumark-Sztainer et al., 2002; Smith & Krejci, 1991; Story et al., 1995). Again, these studies focused on adolescents, not adults.

Thus, overall it appears that Black men have a more positive body image than White men do, whereas Native American men endorse a poorer body image than White men do. Moreover, it appears that Black men, Hispanic American men, and Native American men may binge eat more than do White men. It has been suggested that “one of the reasons that any individuals develop eating disorders and disordered eating is to cope with their emotional and identity problems. It is well established that many members of cultural minorities have experienced and continue to experience emotional and identity problems associated with straddling between two cultures” (Ricciardelli et al., 2007, p. 601). This may be the case for binge-eating behaviors across various racial groups. Given the rates of binge eating among racial groups, different affective experiences have been associated with binge eating for Asian, Native American, Hispanic, Black, and White women (Bennett & Dodge, 2007). Given that, it appears that examining racial differences in binge eating is warranted.

Taken together, the literature suggests that binge eating varies by sex and ethnicity, in ways that remain poorly understood (Sorbara & Geliebter, 2002). Few studies have simultaneously investigated the interaction between sex and ethnicity in relation to binge eating. Even among such studies, findings are mixed. For example, one study found that women and Blacks had increased rates of binge eating in the general population (Langer, Warheit, & Zimmerman, 1991). In contrast, Sorbara and Geliebter (2002) found that Whites were more likely to binge eat and develop obesity earlier than were Blacks and Hispanics in an obese outpatient sample. The differences in findings between the two studies may be attributed to different populations sampled. Perhaps binge eaters in the general population

differ from those in an obese outpatient sample. Nonetheless, research examining the relationship between binge eating and psychological factors is quite limited, and findings thus far are mixed with respect to potentially important sex and race differences. While most binge eating research has targeted treatment-seeking populations, few studies have focused on community samples.

Community samples. While recent binge-eating research has begun to examine sex and racial differences among treatment-seeking and obese populations, little research has targeted community populations. This is important because clinical populations are not necessarily representative of the general population (Devlin et al., 2003). To date, few studies have examined binge eating in non-clinical samples by sex and ethnicity. In one such study, prevalence rates of binge eating disorder, obesity, and depression were examined in Black and White adults (Smith, Marcus, Lewis, Fitzgibbon, & Schreiner, 1998). Results suggested that BED is common in the general population with BED rates of 2.2%, 2%, 1.2%, and 0.4% for African American women, White women, White men, and African American men, respectively. Clearly, Black men reported the lowest rates of BED.

In another study that used a non-clinical sample, the influence of race, gender, and socioeconomic status on binge-eating frequency was investigated. Results from this population-based sample (N=933) showed no Black/White differences in binge-eating frequency, but in general, adults under the age of 40 were more likely to engage in binge eating than were older adults (Reagan & Hersch, 2005). However, it is important to note that this study did not use DSM-IV-TR criteria in the assessment of binge eating. Rather, they used the following question to assess binge eating, “Now, we would like to ask you about your eating habits. How often do you have an eating binge in which you eat a lot of food

within a few hours?” This assessment of binge eating neglected to consider DSM-IV criteria of recurrent episodes and lack of control during the binge. Therefore, binge eating differences across groups may have emerged if DSM-IV criteria were used.

In a more recent study, using the Patient Health Questionnaire, prevalence and correlates of BED were examined in a community sample of diverse women and men (Grucza et al., 2007). Sex and race differences were not found. About 6.6% of the sample met criteria for BED. The authors attributed this high rate of BED to the high prevalence of obesity in the sample. However, even with current obesity rates similar to those reported in the study, other reports of BED rates are still not as high as 6.6%. Results from this particular study, however, indicated a strong relationship between BED and major depression (6-fold higher odds), general anxiety disorder (5-fold higher odds), panic attacks, a history of at least one suicide attempt (4-fold higher odds), and a moderate relationship between BED and nicotine dependence. As found in other studies (Barry et al., 2003; Fairburn et al., 2000; Telch & Agras, 1994), it is important to note that these relationships between BED and psychological factors were not mediated by obesity. Thus, BED individuals, regardless of weight, appeared to encounter greater psychological problems than non-BED individuals.

Although researchers have begun to explore the prevalence and correlates of binge eating by sex and ethnicity in population-based samples, predictors of binge eating have rarely been investigated in college-student populations (Mitchell & Mazzeo, 2004). However, a college-student population is well suited for this endeavor because problematic eating patterns are quite common among college students (DiGiacchino, Sargent, & Topping, 2001). The literature suggests that rates of disturbed eating behaviors increase with the transition to college (Heatherton & Polivy, 1992; Vohs, Heatherton, & Herrin, 2001). In

fact, the prevalence of eating disturbances among college students is quite high (Mutterperl & Sanderson, 2002). Specifically, the prevalence of binge eating in college women is approximately 41% (Vanderlinden, Dalle Grave, Vandereycken, & Noorduin, 2001). Binge eating has been described as an addictive and compulsive behavior in college populations (Stacy, Bentler, & Flay, 1994). Furthermore, Striegel-Moore and Bulik (2007) reported that while most eating disorders emerge among adolescents, BED often occurs in adults. Therefore, a college-student population will be an appropriate group to examine for binge-eating behaviors. Moreover, college men have reported similar eating attitudes such as undereating and overeating behaviors as college women (O'Dea, & Abraham, 2002). In fact, O'Dea and Abraham (2002) found that 22% of college men reported binge eating, emphasizing the need to investigate all who suffer from eating disturbances, including men who are commonly neglected in research related to eating disturbances.

One recent study examined predictors of binge eating, namely depression, anxiety, and alexithymia, (defined as “a condition in which an individual has difficulty identifying and describing his or her emotions,” p. 160), in a diverse group of White and Black undergraduate men and women (Mitchell & Mazzeo, 2004). Overall, women reported more binge-eating symptoms than did men. Depression was a significant predictor of binge eating for White women, whereas anxiety was a significant predictor of binge eating for Black women. The authors attributed this difference to body image concerns in White women, and sociocultural factors such as discrimination in Black women. However, none of these factors predicted binge eating for White men. The sample size was too small to test the effects for Black men (n=13). Moreover, there were no significant racial differences for binge eating severity in men or women, perhaps due to the underpowered sample size. Therefore, larger

and more diverse samples will be necessary to adequately investigate sex and racial differences in the predictors of binge eating.

The literature to date suggests that different factors may predict binge eating for men and women of various racial groups in a college-student population. Thus, the purpose of the proposed study is to expand on the previous study (Mitchell & Mazzeo, 2004) in multiple ways. First, given the lack of significant predictors of binge eating for college men in the previous study, the proposed study will examine more predictor variables, including depression, anxiety, body image concerns, smoking, BMI, and physical activity. Second, the sample size will be much larger, as the previous study included 259 participants, with 42 White men and only 13 Black men. Third, Bi/Multiracial participants will also be examined in the proposed study in contrast to the common White/Black dichotomy more commonly discussed in the literature.

Given the high rates of problematic eating patterns among college students, it will be important to target a college-student population to examine most efficiently the predictors of binge eating. Moreover, due to the negative effects of binge eating in relation to psychosocial (e.g., depression and body image dissatisfaction) and physical (e.g., obesity) outcomes, examining predictors of binge eating has important public health implications. With increased knowledge of the predictors of binge eating, future research may be able to develop and evaluate the efficacy of binge-eating treatment programs tailored to the unique needs of specific groups. Conversely, if predictors do not differ by sex and race, treatment providers can feel more confident about the appropriateness of standardized treatment programs. Thus, the main goal of this project is to identify the strongest predictors of binge eating for men and

women within various racial groups in a college student population where eating disturbances are common.

Hypotheses.

1. It was hypothesized that women would report higher rates of meeting BE symptom criteria and BED than men, but, in light of the recent work of Hudson et al. (2007), it was hypothesized that men might have equal rates of binge eating *behavior* (i.e., binge eating that is not accompanied by distress or a sense of loss of control).
2. Given that Mitchell and Mazzeo (2004) found no significant differences between White and Black college students in relation to binge eating, it was hypothesized that White and Black individuals would report similar binge eating behaviors and rates in this sample as well. Due to the limited number of participants in the remaining ethnic categories, exploratory analyses were conducted to assess the rates and frequency of binge eating patterns in the Bi/Multiracial group. Although the literature does not provide guidance on hypothesis development for the Bi/Multiracial group, a tentative hypothesis was that this group might engage in similar or greater BE as White and Black individuals, perhaps due to acculturation and/or identity issues, as Ricciardelli et al. (2007) described.
3. Overall, when examining sex/race differences of BE, it was hypothesized that Black college women would be equally likely to meet BE criteria as White women (Mitchell & Mazzeo, 2004). Again relative to White women, White men and Black men were expected to have a lower risk of meeting BE symptom criteria and BED criteria, but not necessarily binge eating behavior, per se.

4. It was hypothesized that different predictors of binge eating would emerge for different sex and racial groups. Based on the literature reviewed, it was expected that depression (Mitchell & Mazzeo, 2004), smoking, and poor body image (Pike, Dohm, Striegel-Moore, Wilfley, & Fairburn, 2001; Warren et al., 2005) would predict binge eating in White women, whereas anxiety (Mitchell & Mazzeo, 2004) would predict binge eating in Black women. It was also expected that body image would predict binge eating in White men, while physical activity would predict binge eating in Black men (Ricciardelli et al., 2007). Again, exploratory analyses were conducted to determine binge eating predictors for Bi/Multiracial women and men.

Method

Participants

Psychology students, 18 years of age and older, were recruited from a Midwestern University to participate in the present study. Participants volunteered to complete a web-based survey examining various psychological and physical health conditions. Although all students were eligible to participate in the study, only participants aged 18-30 who provided valid data were included in the data analyses. This age range was selected because the vast majority (91%) of participants fell within ages 18-30, with the remainder spread between ages 31-80. Given the possibility that binge eating may not only vary by sex and race but also as a function of age and cohort effects, we considered our approach to be relatively conservative yet one that would still yield a fairly heterogeneous sample. In addition, preliminary results from this study were presented at a national conference, where a leading BE researcher (Hrabosky) concurred with our approach.

Procedure

The present study used data collected through a web-based survey created using Survey Monkey, a web-based vendor for internet survey deployment (www.SurveyMonkey.com). Recruitment was a collaborative effort among the research team. Specifically, one member approached psychology professors for assistance in accessing student volunteers. All research team members, including the principal investigator, attended psychology courses, with approval from professors, to briefly explain the study.

Students voluntarily provided their email addresses during these classroom visits so that a member of the team could email each participant the URL to the survey website shortly thereafter. Participation was completely voluntary and data were kept strictly confidential. Because data were collected online, a detailed description of the study preceded the survey, and informed consent was implied by continuation of the survey. Moreover, in order to participate, participants elected to click on a “Next” button, indicating their consent to participate (See Appendix A). This procedure is common in online psychological research. Additionally, since participants were able to simply log off the website without penalty if they no longer wished to participate in the study, coercion was avoided.

Although there were no anticipated risks in the present study, participants may have experienced minimal psychological or emotional stress as a result of the nature of the questions. However, the research team is unaware of any such occurrences.

Upon completion of the study, participants had the option of entering their student ID number and professor’s name so that the instructor could be informed of their participation. A research team member was responsible for keeping track of the incoming data in order to

inform professors of which students participated for extra credit purposes. Once informed, course instructors awarded extra course credit per their particular course policies regarding research participation.

The following instruments were used in the survey in order to assess the variables that were important for the purpose of the present study. Although the reliability and validity of the following instruments are unknown for online administration, it is noteworthy that, in general, studies have demonstrated similar results for online administration versus paper-and-pencil questionnaires (Crawford, McCabe, & Pope, 2005; Huang, 2006).

Measures

Demographic information. Demographic information was obtained including gender, race, age, socioeconomic status, years of education, current marital status, current employment status, economic status of current household, and annual household income (See Appendix B).

Depression. Depression was assessed with the Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001). The PHQ-9 is a nine-item measure developed to measure depression severity over the past two weeks (e.g., “Feeling down, depressed, or hopeless”; See Appendix C). Respondents indicate agreement with items using a 4-point Likert-type scale. Items are scored as 0 (not at all), 1 (several days), 2 (more than half the days), and 3 (nearly every day). Thus, scores on this measure range from 0 to 27. Depression severity is determined by the following scores: 0-4 (none), 5-9 (mild), 10-14 (moderate), 15 - 19 (moderately severe), and 20-27 (severe). The PHQ-9 is reliable with high internal consistency ($\alpha = .86$; Pinto-Meza, Serrano-Blanco, Penarrubia, Blanco, & Haro, 2005) and excellent test-retest reliability, ranging from $r_{(ICC)} = .81-.96$ (Lowe, Unutzer, Callahan,

Perkins, & Kroenke, 2004). Note that alpha for the current sample was .85. The PHQ-9 has demonstrated good sensitivity and specificity for diagnosing Major Depressive Disorder (Sensitivity = .73, 95% CI: .59-.87; Specificity = .98, 95% CI: .96-.100; Spitzer, Kroenke, & Williams, 1999).

It is important to note that the PHQ-9 is a subscale of The Patient Health Questionnaire (PHQ), a self-report measure that is used to assess mental disorders in primary care patients (Spitzer, Kroenke, & Williams, 1999). Specifically, the PHQ is a self-report adaptation of the PRIME-MD, which assesses Somatoform Disorder, Mood Disorder, Anxiety Disorder, Eating Disorder, and Alcohol Disorder.

Although the PHQ-9 was developed for primary care settings, the instrument has also been validated for the assessment of depression and subthreshold depression in the general population (Martin, Rief, Klaiberg, & Braehler, 2006) and in a Nigerian college student population (Adewuya, Ola, & Afolabi, 2006). Although the Beck Depression Inventory (BDI) is the most commonly used measure for depression, correlations between the BDI and the PHQ have ranged from .79 to .95 (Rogers, Adler, Bungay, & Wilson, 2005). Moreover, the PHQ-9 also assesses for the functional health of individuals based on the severity of the symptoms reported (e.g., “How difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?”). This item is particularly important when assessing depression among college students. In fact, in the first study examining the importance of an integrated health care model in a college health clinic, Alschuler, Hoodin, and Byrd (in press) found that the functional health item was the most powerful predictor of discussion of behavior problems and psychotropic medications between students and medical doctors. Moreover, the functional health item was associated

with more referrals for psychological care. Therefore, the PHQ appears to be an appropriate measure for assessing depression among college students. Finally the PHQ is also cost-effective as it can be accessed free of charge. In conclusion, the PHQ-9 is an appropriate depression screening instrument for our purposes.

Anxiety. Anxiety was assessed with the GAD-7 (Spitzer, Kroenke, Williams, & Lowe, 2006), a seven-item measure used to assess anxiety severity over the past two weeks (e.g., “Feeling nervous, anxious or on edge”; See Appendix D). It is also a subscale of the PHQ, described above. Respondents indicate their agreement with items using a 4-point Likert-type scale. Items are scored as 0 (not at all), 1 (several days), 2 (more than half the days), and 3 (nearly every day). Thus, scores for this measure range from 0 to 21. Anxiety severity is determined by the following scores: 0-4 (none), 5-9 (mild), 10-14 (moderate), and 15-21 (severe). Further assessment is suggested when scores are greater than 9. The GAD-7 was also used in a recent study examining correlates of binge eating disorder in a community sample (Grucza et al., 2007). Note that alpha for the current sample was .89.

Body image. Several dimensions of body image were assessed using the Multidimensional Body Self-Relations Questionnaire-Appearance Scale (MBSRQ-AS; Cash, 2000). The MBSRQ is a self-report measure consisting of 69 items. The MBSRQ-AS is a 34-item subscale composed of five scales used to assess cognitive and affective components of appearance and body image. The five subscales of the MBSRQ-AS include Appearance Evaluation, Self-Classified Weight, Overweight Preoccupation, Appearance Orientation, and the Body Areas Satisfaction Scale (BASS). However, the survey included only the thirteen items of three subscales of most interest to the research team: Appearance Evaluation, Self-Classified Weight, and Overweight Preoccupation items (See Appendix E). The Appearance

Orientation and the BASS items were not used in the survey in order to help reduce participant burden. Also, these subscales were not used in this study because they focused on feelings and thoughts associated with specific body areas satisfaction, appearance orientation, and overall feelings about health and fitness, which are not variables of interest in the present study. It is important to note that the BASS is similar to the Appearance Evaluation subscale, except that the BASS examines specific aspects of the body in relation to appearance.

The Appearance Evaluation items measure feelings of physical attractiveness and level of satisfaction of appearance (e.g., “I like the way I look without my clothes on”). Respondents indicate their agreement with items using a 5-point Likert-type scale. According to the published manual, internal consistencies for the Appearance Evaluation subscale are .88 for males and .88 for females. Test-retest reliabilities are .81 for males and .91 for females. For the current study, alpha was .90. Note that greater dissatisfaction is measured by lower scores on Appearance Evaluation.

Self-Classified Weight items measure respondents’ perceptions of weight ranging from very underweight to very overweight (e.g., “I think I am very overweight”). Respondents indicate their agreement with items using a 5-point Likert-type scale. According to the published manual, internal consistencies for the Self-Classified Weight subscale are .70 for males and .89 for females. Test retest reliabilities are .86 for males and .74 for females. For the current study, alpha was .84 for self-classified weight. Note that greater dissatisfaction is measured by higher scores on Self-Classified Weight.

Overweight Preoccupation items measure fat anxiety, weight vigilance, dieting, and eating restraint (e.g., “I constantly worry about being or becoming fat”). Respondents indicate their agreement with items using a 5-point Likert-type scale. According to the

published manual, internal consistencies for the Overweight Preoccupation subscale are .73 for males and .76 for females. Test retest reliabilities are .79 and .89 for females. For the current study, alpha was .77 for Overweight Preoccupation. Note that greater dissatisfaction is measured by higher scores on Overweight Preoccupation.

Shape concerns, another dimension of body image, was operationalized using one item from the Questionnaire on Eating and Weight Patterns-Revised (QEWP-R), described below.

Binge eating. Binge eating was assessed by using the QEWP-R (Spitzer, Yanovski, & Marcus, 1993). The QEWP-R is a self-report screening measure for binge eating disorder, subthreshold levels of BED, and bulimia nervosa in accordance with DSM-IV criteria. The QEWP-R measures overeating, binge eating, and weight control behaviors such as purging behaviors, and feelings related to eating behaviors (e.g., “In general, during the past six months, how upset were you by the feeling that you couldn’t stop eating or control what or how much you were eating?”; See Appendix F). The QEWP-R also assesses eating history such as past weight, current weight, dieting, and weight cycling. Psychometric properties of the QEWP-R are based on data primarily from White samples. Nonetheless, Kashubeck-West, Mintz, and Saunders (2001) reported that researchers view the QEWP as a valid measure for identifying binge eating. Moreover, they reported that the QEWP-R correctly distinguished between clinical binge eaters and nonclinical binge eaters, and between those with high and low levels of binge eating. The QEWP-R has demonstrated adequate validity (Nangle, Johnson, Carr-Nangle, & Engler, 1994). Moreover, there was a high level of agreement between self-report on the QEWP and expert-rating through an interview with respect to the presence and absence of BED (Sensitivity = .78; Specificity = .80; De Zwann,

Mitchell, Specker, Pyle, Mussell, & Seim, 1993). Finally, the QEWP-R was used in place of the PHQ Eating Disorder subscale because the QEWP-R is widely used in studies assessing binge eating. Additionally, the QEWP-R is more detailed than the PHQ, which will be more useful given the primary focus of the proposed study. The scoring for the QEWP-R can be found in Appendix J.

Physical activity. Two variables were used in the analysis of physical activity levels: number of hours/week individuals exercised, and a categorical variable capturing whether participants met recommended levels of physical activity (See Appendix G). First, participants were asked, “During the PAST YEAR, about how many HOURS PER WEEK ON AVERAGE did you spend exercising or involved in sports? NOTE: Your estimate should include all activities which have involved sustained cardiovascular or respiratory endurance -- both the activities that you might do alone, e.g., using a treadmill, as well as those you might do with other people, e.g., playing a team sport that requires sustained physical activity.” This item was used to identify hours per week an individual exercised and to categorize whether participants met recommended levels of physical activity. Meeting recommended levels of physical activity was defined as engaging in 30 minutes/day of moderate activity at least five days/week (Pate et al., 1995). Using this definition, participants who engaged in at least 2.5 hours of exercise per week ([30 minutes multiplied by five days]/60 minutes) were categorized as meeting recommended levels of physical activity. Those who engaged in less than 2.5 hours of exercise per week were categorized as not meeting recommended levels of physical activity.

Originally, it was planned to assess physical activity levels by examining other physical activity items as well. For instance, participants were also asked to list the number

of days per week and the minutes per day they engaged in various physical activities such as running, playing football, yoga, and so on, during the last year. Perhaps due to the lengthy list of activities, many participants left these items blank. It is quite possible that they skipped these items due to increased response burden. However, it is impossible to infer whether blank responses indicate that participants did not engage in the activities or whether participants skipped those items due to heavy response burden. Thus, this source of data was considered invalid and was not used in the present study.

Smoking history. To assess smoking history, items were extracted from a Smoking History Questionnaire (SHQ), commonly used by the University of Michigan Nicotine Research Laboratory (See Appendix H). For the present study, a 4-category smoking variable was used to classify only those who described themselves as current smokers versus never smokers. Taking a conservative approach, those who endorsed intermittent patterns (e.g., ex-smokers and those who reported smoking a total of 100 cigarettes in his/her lifetime) were excluded from analyses involving smoking status.

Body mass index (BMI). BMI was calculated by using participants' self-reported height and weight (See Appendix I). The formula used is $\text{weight (lb)} / (\text{height (in)})^2 \times 703$. Adults with BMI's below 18.5 are considered underweight, while adults with BMI's ranging from 18.5 to 24.9 are considered normal. Adults with BMI's ranging from 25 to 29.9 are considered overweight, whereas adults with BMI's above 30 are considered obese (United States Department of Health and Human Services, 2007). BMI is a reliable way to measure body fat (Mei, Grummer-Strawn, Pietrobelli, Goulding, Goran, & Dietz, 2002). Moreover, individual BMI scores can be computed easily and compared to others in the general population. Self-report height and weight have also been reported as an adequate assessment

of BMI (Stunkard & Albaum, 1981). Moreover, Hendershot, Robinson, Roland, Vaziri, Rizzo, & Fakhry (2006) found that patient self-reports of height, weight, and BMI are actually more accurate than health-care providers' estimates of height, weight, and BMI. Further, most BED subjects were accurate in reporting their weight in a university-based outpatient eating disorders program (Masheb & Grilo, 2001). Overall, although there are other effective ways of measuring body fat, calculating BMI is most feasible when collecting data using a web-based survey.

Data Collection

The first wave and second wave of data were collected during the fall semester of 2006 and the winter semester of 2007, respectively. Members of the research team assisted in data collection, as previously mentioned. Rather than entering data, the data were automatically entered via Survey Monkey and exported onto a SPSS spreadsheet. This was advantageous because error in data entry was avoided. To protect confidentiality, student ID numbers and computer IP addresses were not exported, so participants could not be identified from the working database. Note that ID numbers were not necessarily required for the study, but were solely for extra credit purposes. Moreover, only one member of the research team had access to these data.

Data Analysis

SPSS Version 15.0 was used to conduct data analyses for the present study. Before embarking on formal data analyses, a thorough process of data cleaning was conducted. First, because some participants completed the survey more than once, the primary investigator sorted the data from each wave by student ID numbers. If there were duplicates within each wave, only the first set of responses was kept for each participant. If there were duplicates

across waves, data from the first wave were kept. Next, Wave 1 data were combined with Wave 2 data to create one merged data set.

Certain variables were recoded for convenience, because Survey Monkey automatically assigns a score of 1 to the first response choice of each item. To permit calculation of scores on the same metric as is typical for any particular measure, certain items were rescored, including the items on the PHQ. As previously mentioned, this is inconsistent with the scoring of the PHQ -9 and GAD-7 since scores should range from 0 to 3 to determine cut-off points.

Data were also cross-checked to ensure valid responses. Some participants provided nonsensical data, and their data were thus deleted. For example, a couple participants indicated that they exercised over 168 hours per week, which is impossible. There was also contradictory data for some participants, in that a participant would report that he/she did not engage in binge eating but would then answer other items that only BE should have answered.

Dependent variables. All analyses were repeated so as to examine binge eating behavior (BE-Beh), binge eating symptoms (BE-Sx; e.g., lack of control and feelings of distress), and the diagnostic criteria for BED. The BE variables are operationally defined in Table 1.

Table 1

Operational definition of BE variables

BE Variable	Operational Definition
BE-Beh	<p>“Yes” answer to the QEWP-R item: “During the past six months, did you often eat within any two hour period what most people would regard as an unusually large amount of food?”</p>
BE-Sx	<p>“Yes” to the previous behavioral question PLUS “Yes” to the QEWP-R item: “During the times when you ate this way, did you often feel you couldn’t stop eating or control what or how much you were eating?”</p>
BED	<p>“Yes” answers to the two previous items PLUS Endorsement of QEWP-R items querying:</p> <ul style="list-style-type: none"> • BE frequency (at least 2 days/week for the past six months) • Associated symptoms - any 3 or more of: <ul style="list-style-type: none"> * eating much more rapidly than usual * eating until uncomfortably full * eating large amounts of food when not physically hungry * eating alone because embarrassed by amount of food eaten * feeling disgusted, depressed, or very guilty after overeating • Psychological distress over binge eating

First, descriptive statistics were computed to examine demographic and psychological variables. Second, percentages were presented to compare all groups on BE-Beh, BE-Sx, and BED. It is important to note that due to small sample sizes in some racial groups in this sample, only three racial groups, namely White, Black, and Bi/Multiracial men and women were analyzed for the present study.

Next, 2 X 2 (Sex X Binge Eating Variable Presence/Absence) chi-square analyses were conducted to compare rates of binge eating between men and women. Note that the Fisher exact test of significance is presented in cases when cell sizes were too small to justify

reporting the Chi-square statistic. Second, three 3 X 2 (Race X Binge Eating Variable Presence/Absence) chi-square analyses were conducted to assess rates of binge eating among the various racial groups. Separate 2 X 2 (Group X BE Eating Variable Presence/Absence) chi-square analyses were conducted to further examine group differences, such as White versus Black, White versus Bi/Multiracial, and Black versus Bi/Multiracial.

Third, multinomial regression analyses were conducted to compare the relative risk of BE-Beh, BE-Sx, and BED of each group compared to White women, because it was hypothesized that White women would have the highest rates of BE in general. It is important to note that multinomial regression analyses were used in place of chi-square analyses due to unequal cell sizes across the groups. Since percentages from chi-square analyses would not be meaningful in this case, odds ratios are presented to provide information on the relative risk for each group compared to White women.

Similarly, for those who met BE-Sx criteria, multinomial regression analyses were conducted to assess the relative risk of associated symptoms, frequency of BE (at least 2 days/week for the past six months), and distress related to BE compared to White women. Again, odds ratios were presented rather than chi-squares due to small cell sizes.

Note that BE frequency was examined in two different ways for the present study. In the aforementioned analyses, BE frequency was categorized as participants who met the DSM-IV-TR recommended criterion for BE frequency (binge eat at least 2 days/week for the past six months) versus those who did not meet this criterion. In the following analysis, a variant of BE frequency, henceforth referred to as *BE frequency(2)*, was used to examine groups differences. Both variables, BE frequency and *BE frequency(2)*, were assessed by using item 9 on the QEWP-R: “During the past six months, how often, on average, did you

have times when you ate this way – that is, large amounts of food plus the feeling that your eating was out of control?” Response options included 1: less than one day a week, 2: one day a week, 3: two or three days a week, 4: four or five days a week, and 5: nearly every day. Thus, participants who responded with a 3, 4, or 5 met criteria for “BE frequency,” while the full range of responses (1, 2, 3, 4, or 5) were considered within the variable “BE frequency(2),” which was used in ANOVA to compare binge eating frequency(2) between sex/racial groups. Since the binge eating frequency(2) variable is quasi-interval, an ANOVA was deemed appropriate (rather than a Kruskal-Wallis nonparametric ANOVA).

Finally, for each group, a bivariate correlation matrix was examined in relation to the predictor variables, namely depression, anxiety, body image (appearance evaluation, overweight preoccupation, self-classified weight, and shape concerns), physical activity (hours/week exercising and meets recommended levels of physical activity), BMI, weight cycling, and current smoker. Variables that were significantly related to binge eating for each group were considered candidates for logistic regression models. Using this approach, significant predictors emerged for only White women. Thus, to address multicollinearity, if variables were highly correlated, $r > .40$ (e.g., the three MBSRQ scales, or Depression and Anxiety), only the variables that were most strongly related to binge eating were entered into the final model for each group. When BMI was significantly related to any of the BE variables at the bivariate level, it was entered on the first step of the logistic regression model, while other predictor variables were entered in the second step. This conservative approach was adopted because BMI was expected to account for a large amount of the variance in predicting BE. Additionally, the power of psychological variables was of primary

interest for the present study. Therefore it was essential to control for BMI in order to assess how much variance was accounted for by the other psychological variables.

Results

Participants

Participants included female and male undergraduate students at a Midwestern university. A total of 1120 students of 1426 who volunteered to participate for instructor-offered extra credit in a psychology course actually participated. However, there were 24 students who participated more than once, and 23 students who provided incomplete data. After accounting for duplicates across semesters and incomplete data, we determined that 1073 students participated in the study. Thus, it is estimated that the response rate is 77.8%. However, inclusion criteria for the present study included falling into the age range of eighteen and thirty years old ($n=959$) and identifying as White, Black, or Bi/Multiracial. Other racial groups were excluded only due to sample sizes that were too small to support statistical analyses. Thus, of the original sample, only 895 participants with valid BE data met the inclusion criteria for the analyses presented here.

This study sample was 72.1% White, 15.5% Black, and 5.7% Bi/Multiracial. Participants were 67.5% female, with a mean age of 20.44 years ($SD \pm 2.69$) and BMI of 25.11 ($SD \pm 5.56$). BMI did not differ across gender and racial groups. The demographic and predictor variables are summarized in Table 2 and Table 3, respectively.

Table 2

College participant characteristics^a

Demographic variables	Participants (n=896) ^b
Gender (% female)	67.5%
Race (% White)	77.2%
Age	20.44 (SD = 2.70)
Education (yrs)	13.66 (SD = 1.80)
Marital status	
Single, divorced, or separated	86.0%
Married or living with partner	14.0%
Employment status	
Employed at least part time	67.7%
Economic status	
Barely enough to get by	7.5%
Enough, but no more	29.4%
Solidly middle class	42.0%
Plenty of extras	17.5%
Luxuries	3.6%
Annual household income	
>150 thousand	6.3%
100-149 thousand	13.1%
75-99 thousand	18.0%
50-74 thousand	17.2%
25-49 thousand	21.4%
10-24 thousand	15.6%
< 9 thousand	8.3%

^aValues are expressed as n (%) or M±SD. ^bN=896 except for education (n=890), economic status (n=805), and annual household income (n=588).

Table 3

Descriptive statistics for predictor and dependent variables for gender/racial groups^a

	Total Sample (N=896)	White Women (n=451)	Black Women (n=113)	Bi/ Multiracial Women (n=40)	White Men (n=241)	Black Men (n=36)	Bi/Multiraci al Men (n=15)	F or Chi- Square
1. BE-Beh ^b	38.1%	37%	29.2%	35%	44.6%	30.6%	60%	12.15*
2. BE-Sx ^b	16.7%	22.2%	13.3%	20%	8.3%	8.3%	26.7%	26.04***
3. BED ^b	4.9%	6.9%	2.7%	7.5%	1.7%	5.6%	6.7%	11.07*
4. BMI	25.1 ± 5.56	24.67 ± 5.77	26.21 ± 6.17	24.99 ± 6.18	25.31 ± 4.91	25.51 ± 4.34	26.13 ± 4.11	1.67
5. Depression	6.13 ± 5.02	6.38 ± 5.08	5.73 ± 4.83	8.30 ± 5.52	5.49 ± 4.63	4.25 ± 3.98	10.33 ± 7.30	5.90***
6. Anxiety	6.16 ± 4.90	6.62 ± 4.99	6.00 ± 4.84	8.80 ± 5.32	5.01 ± 4.30	4.42 ± 3.68	9.33 ± 7.14	8.25***
7. Meets recommended activity levels ^b	72.1%	70.6%	63%	62.2%	78.6%	87.1%	69.2%	14.57*
8. Hours exercising	6.97 ± 7.54	6.15 ± 7.03	5.84 ± 6.48	5.69 ± 5.87	8.28 ± 7.30	13.92 ± 13.40	7.00 ± 10.35	8.45***
9. Appearance evaluation	3.38 ± 0.90	3.14 ± 0.88	3.85 ± 0.80	3.10 ± 0.82	3.60 ± 0.81	4.04 ± 0.72	2.82 ± 1.06	24.05***
10. Self-classified Weight	3.25 ± 0.70	3.34 ± 0.74	3.23 ± 0.67	3.33 ± 0.70	3.11 ± 0.63	2.92 ± 0.70	3.40 ± 0.69	5.20***
11. Overweight Preoccupation	2.44 ± 0.97	2.71 ± 0.94	2.18 ± 0.87	3.08 ± 1.05	2.06 ± 0.84	1.88 ± 0.91	2.28 ± 0.77	25.09***
12. Current smoker ^b	25.3%	26.8% (n=254)	6.3% (n=79)	28.6% (n=21)	35.8% (n=148)	0% (n=24)	42.9% (n=7)	33.35***
13. Weight cycle ^b	29.7%	32.8%	18.6%	32.5%	28.6%	27.8%	33.3%	9.23
14. Shape Concerns	2.25 ± 0.84	2.44 ± 0.82	2.07 ± 0.83	2.47 ± 0.82	1.97 ± 0.79	2.00 ± 0.97	2.29 ± 0.61	12.76***

^aValues are expressed as n (%) or M±SD. ^bPercent who met criterion.

Hypothesis 1: Do Rates of Binge Eating Vary Across Gender?

First, three 2 X 2 (Sex X BE Presence/Absence) chi-square analyses were conducted to compare the frequency of BE between men and women. BE behavior was reported by 38.1% of the sample, with higher rates for males than females (females, 35.4%; males 43.5%; $\chi^2(1, N = 896) = 5.43, p < .05$). As expected, BE symptom criteria was met by 16.7% of the sample, with higher rates for females than males (females, 20.4%; males, 9.2%; $\chi^2(1, N = 896) = 17.46, p < .001$). Finally, 4.9% of the sample met BED criteria, with higher rates for females than males (female, 6.1%; males, 2.4%; $\chi^2(1, N = 895) = 5.88, p < .05$). However, among those who met BE symptom criteria, rates of BED were not statistically different (females, 30.3%; males, 25.9%; $\chi^2(1, N = 149) = 0.21, p = .65$). Results are depicted in *Figure 1*.

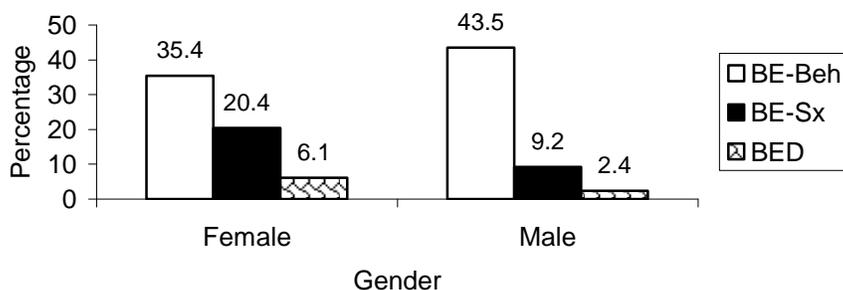


Figure 1. Rates of BE behavior, symptoms, and BED for females and males

Note. $N = 896$. Female, $n = 604$; Male, $n = 292$. All three 2 X 2 Gender by BE Chi-Square analyses depicted above were significant.

Hypothesis 2: Do Rates of Binge Eating Vary Across Racial Groups?

Second, three 3 X 2 (Race X BE Presence/Absence) chi-square analyses were conducted to assess the frequency of BE among White, Black, and Bi/Multiracial participants, which were not significant. BE behavior was reported by 39.7% of White participants, 29.5% of Black participants, and 41.8% of Bi/Multiracial participants. Next,

separate 2 X 2 (Race X BE Presence/Absence) chi-square analyses were conducted, with significantly higher rates for White participants than Black participants (White, 39.7%; Black, 29.5%; $\chi^2(1, N = 840) = 5.34, p < .05$). BE symptom criteria were met by 17.4% of White participants, 12.1% of Black participants, and 21.8% of Bi/Multiracial participants. Finally, 5.1% of White participants, 3.4% of Black participants, and 7.3% of Bi/Multiracial participants met BED criteria. Notably, there were not significant differences between these groups for BE-Sx or BED. Results are depicted in *Figure 2*.

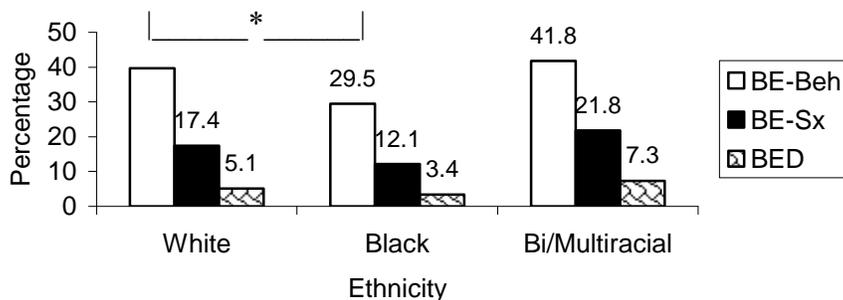


Figure 2. Rates of BE behavior, symptoms, and BED across White, Black, and Bi/Multiracial racial groups

Note. $N = 895$. White, $n = 691$; Black, $n = 149$; Bi/Multiracial, $n = 55$.

* Race (White, Black) by BE-Beh Chi-Square analysis depicted above was significant, $\chi^2(1, N = 840) = 5.34, p < .05$.

Hypothesis 3: Do Rates of Binge Eating Differ Across Gender and Racial Groups?

Third, multinomial regression analyses were conducted to examine odds ratios of BE-Beh, BE-Sx, and BED for each group relative to White women. Results indicate that odds ratios were significant for Black women and White men. Specifically, Black women were at a 46 percent reduced risk for endorsing BE-Sx than White women. Additionally, relative to White women, White men were at a 74 percent reduced risk for endorsing BE-Sx, and at a 77

percent reduced risk for meeting criteria for BED. Complete results are presented in Tables 4-6.

Table 4

Multinomial regression for risk of BE-Beh for each group relative to White women

	N	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Black women	113	-0.36	0.23	0.70	2.40	0.45-1.10
Bi/Multiracial women	40	-0.09	0.35	0.92	0.07	0.47-1.80
White men	241	0.31	0.16	1.36	3.56	0.99-1.87
Black men	36	-0.29	0.38	0.75	0.60	0.36-1.56
Bi/Multiracial men	15	0.94	0.54	2.55	3.05	0.89-7.29

Note. N=451 for the reference group, White women.

Table 5

Multinomial regression for risk of BE-Sx for each group relative to White women

	N	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Black women	113	-0.62	0.30	0.54	4.30*	0.30-0.97
Bi/Multiracial women	40	-0.13	0.41	0.88	0.10	0.39-1.97
White men	241	-1.15	0.26	0.32	19.52**	0.19-0.53
Black men	36	-1.14	0.61	0.32	3.47	0.10-1.06
Bi/Multiracial men	15	0.24	0.60	1.28	0.17	0.40-4.10

Note. N=451 for the reference group, White women. * $p < .05$. ** $p < .001$.

Table 6

Multinomial regression for risk of BED for each group relative to White women

	N	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Black women	112	-0.99	0.61	0.37	2.58	0.11-1.24
Bi/Multiracial women	40	0.09	0.63	1.10	0.02	0.32-3.77
White men	241	-1.48	0.54	0.23	7.54*	0.08-0.66
Black men	36	-0.23	0.75	0.80	0.09	0.18-3.47
Bi/Multiracial men	15	-0.03	1.05	0.97	0.00	0.12-7.60

Note. N=451 for the reference group, White women. * $p < .01$.

Additionally, using the subsample of those who met criteria for BE-Sx, multinomial regression analyses were conducted to examine odds ratios of associated symptoms (any 3 or more of the following: eating rapidly, eating until uncomfortably full, eating when not hungry, eating alone because embarrassed, and feeling disgusted, depressed, or guilty after

overeating), BE frequency (at least 2 days/week for the past six months), and psychological distress over BE for each group relative to White women. Note that except for White men, 100% of those in each other group met criteria for the associated symptoms variable; White men also approached 100%, thereby yielding the results shown in Table 7.

A significant odds ratio was obtained for White men's psychological distress, relative to White women. Specifically, White men were at a 74 percent reduced risk for endorsing distress related to BE. Complete results are presented in Tables 7-9.

Table 7

Multinomial regression for risk of associated symptoms for binge eaters relative to White women

	N	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Black women	15	0.00	0.00	1.00		1.00-1.00
Bi/Multiracial women	8	0.00	0.00	1.00		1.00-1.00
White men	20	-16.61	1064.61	6.11E008	0.00	0.00-
Black men	3	0.00	0.00	1.00		1.00-1.00
Bi/Multiracial men	4	0.00	0.00	1.00		1.00-1.00

Note. N=100 for the reference group, White women.

Table 8

Multinomial regression for risk of binge eating frequency for binge eaters relative to White women

	N	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Black women	15	-0.01	0.56	0.99	0.00	0.33-2.93
Bi/Multiracial women	8	0.63	0.76	1.88	0.69	0.43-8.29
White men	20	-0.08	0.49	0.92	0.03	0.35-2.42
Black men	3	0.81	1.24	2.26	0.43	0.20-25.68
Bi/Multiracial men	4	1.22	1.17	3.38	1.08	0.34-33.64

Note. N=100 for the reference group, White women.

Table 9

Multinomial regression for risk of distress related to binge eating relative to White women

	N	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Black women	14	-0.53	0.58	0.59	0.84	0.19-1.82
Bi/Multiracial women	8	-0.75	0.76	0.47	0.99	0.11-2.08
White men	20	-1.34	0.55	0.26	5.84*	0.09-0.78
Black men	3	0.45	1.24	1.57	0.13	0.14-17.90
Bi/Multiracial men	4	-1.34	1.17	0.26	1.31	0.03-2.61

Note. N=100 for the reference group, White women. * $p < .01$.

Secondary analyses were also conducted to compare frequency(2) of BE across groups. (See explanation above, under Data Analysis, for how this frequency(2) variable differs from previous analyses of BE “frequency”). Groups did not differ on frequency(2) of BE when they met BE-Sx criteria, White women ($M = 2.39$, $SD = 1.12$), Black women ($M = 2.40$, $SD = 0.83$), Bi/Multiracial women ($M = 2.88$, $SD = 1.25$), White men ($M = 2.05$, $SD = 1.05$), Black men ($M = 3.33$, $SD = 1.53$), and Bi/Multiracial men ($M = 2.75$, $SD = 1.26$). Also note that only 0.6% of the sample met criteria for bulimia.

Hypothesis 4: Do Predictors of Binge Eating Vary Across Gender and Racial Groups?

In order to examine unique predictors of BE for each group, a bivariate correlation matrix was examined in relation to the predictor variables. These correlation matrices are presented in Tables 10, 11, 12, 13, 14, and 15 for White women, Black women, Bi/Multiracial women, White men, Black men, Bi/Multiracial men, respectively. Variables that were significantly related to BE for each group were then considered candidates for logistic regression models. However, to address multicollinearity, when variables were highly correlated ($r > .40$, $p < .05$), only the variables that were most strongly related to BE were entered into the final model. Expected predictors were then entered for each step in accordance with the correlations using logistic regression analyses. It is important to note that

if BMI was significantly correlated to BE, BMI was then included in the first block of the logistic regression analyses because it was expected that BMI would account for the most variance in predicting BE, as previously explained in the data analysis section.

Table 10

Correlation coefficients for psychological and physical predictors of BE behavior, BE symptom criteria, and BED among White women

	BE- Beh	BE- Sx	BED	1	2	3	4	5	6	7	8	9	10	11
1. BMI ^a	0.11	0.18*	0.17*	--										
2. Anxiety	0.22*	0.22*	0.22*	0.13*	--									
3. Depression	0.24*	0.26*	0.26*	0.14*	0.72*	--								
4. Recommended levels	0.09	0.10		0.05	-0.02	0.02	--							
5. Hours exercising per week	-0.03	-0.12	-0.06	-0.09	-0.07	-0.08	-0.46	--						
6. Appearance evaluation	-0.15*	-0.28*	-0.23*	-0.50*	-0.35*	-0.40*	-0.08	0.10	--					
7. Overweight preoccupation	0.22*	0.34*	0.24*	0.24*	0.26*	0.30*	-0.03	0.02	-0.46*	--				
8. Self-classified weight	0.20*	0.29*	0.24*	0.75*	0.16*	0.19*	0.03	-0.10	-0.58*	0.40*	--			
9. Current smoker	-0.08	-0.07	0.11	-0.10	-0.16	-0.16*	-0.07	-0.05	0.04	-0.14	-0.11	--		
10. Weight cycle	0.18*	0.25*	0.22*	0.42*	0.27*	0.26*	0.02	-0.05	-0.33*	0.39*	0.42*	-0.19*	--	
11. Shape concerns	0.27*	0.29*	0.23*	0.19*	0.28*	0.31*	-0.01	0.04	-0.44*	0.59*	0.25*	-0.04	0.30*	--

Note. $N = 451$. $p < .05$, $*p < .01$. ^acovariate.

Table 11

Correlation coefficients for psychological and physical predictors of BE behavior, BE symptom criteria, and BED among Black women

	BE- Beh	BE- Sx	BED	1	2	3	4	5	6	7	8	9	10	11
1. BMI ^a	0.07	0.10	0.21	--										
2. Anxiety	0.33*	0.30*	0.17	0.16	--									
3. Depression	0.38*	0.39*	0.30*	0.27*	0.78*	--								
4. Recommended levels	0.15	0.17	-0.01	0.02	0.13	0.16	--							
5. Hours exercising per week	-0.17	-0.14	-0.03	-0.10	-0.06	-0.18	-0.58*	--						
6. Appearance evaluation	-0.08	-0.08	-0.16	-0.56*	-0.17	-0.35*	-0.19	0.20	--					
7. Overweight preoccupation	0.23	0.35*	0.27*	0.56*	0.25*	0.30*	-0.08	-0.07	-0.48*	--				
8. Self-classified weight	-0.00	0.16	0.27*	0.69*	0.02	0.16	0.03	-0.13	-0.51*	0.54*	--			
9. Current smoker	-0.08	-0.07	0.05	-0.08	-0.31*	-0.22	-0.25	0.10	0.00	0.06	0.12	--		
10. Weight cycle	0.04	0.22	0.20	0.33*	0.14	0.18	-0.02	-0.07	-0.17	0.37*	0.23	-0.13	--	
11. Shape concerns	0.26*	0.40*	0.26*	0.39*	0.26*	0.40*	-0.03	-0.14	-0.40*	0.54*	0.37*	0.15	0.27*	--

Note. $N = 113$. $p < .05$, $*p < .01$. ^acovariate.

Table 12

Correlation coefficients for psychological and physical predictors of BE behavior, BE symptom criteria, and BED among Bi/Multiracial women

	BE- Beh	BE- Sx	BED	1	2	3	4	5	6	7	8	9	10	11
1. BMI ^a	0.02	0.03	-0.09	--										
2. Anxiety	0.38	0.08	-0.12	0.06	--									
3. Depression	0.33	0.29	0.02	0.17	0.58*	--								
4. Recommended levels	0.24	0.05	0.06	-0.14	-0.26	-0.13	--							
5. Hours exercising per week	-0.07	0.00	-0.03	0.09	0.34	0.40	-0.62*	--						
6. Appearance evaluation	-0.32	-0.30	-0.04	-0.34	-0.26	-0.27	-0.26	0.01	--					
7. Overweight preoccupation	-0.13	0.16	0.18	0.14	-0.04	0.35	-0.03	0.19	-0.51*	--				
8. Self-classified weight	0.07	0.17	-0.07	0.81*	0.12	0.25	-0.13	0.25	-0.46*	0.39	--			
9. Current smoker	-0.16	-0.23		-0.30	-0.26	-0.30	0.25	0.04	0.19	-0.18	-0.38	--		
10. Weight cycle	0.16	0.32	0.21	0.18	0.12	0.31	0.06	0.06	-0.18	0.33	0.33	-0.30	--	
11. Shape concerns	-0.11	0.09	0.07	0.05	0.02	0.37	-0.30	0.46*	-0.23	0.64*	0.24	-0.11	0.12	--

Note. $N = 40$. $p < .05$, $*p < .01$. ^acovariate.

Table 13

Correlation coefficients for psychological and physical predictors of BE behavior, BE symptom criteria, and BED among White men

	BE- Beh	BE- Sx	BED	1	2	3	4	5	6	7	8	9	10	11
1. BMI ^a	0.04	0.17*	0.09	--										
2. Anxiety	0.18*	0.15	0.06	0.03	--									
3. Depression	0.24*	0.14	0.04	0.08	0.70*	--								
4. Recommended levels	0.11	0.18*	0.09	0.15	0.12	0.11	--							
5. Hours exercising per week	-0.08	0.12	-0.02	-0.15	-0.04	-0.17	-0.52*	--						
6. Appearance evaluation	-0.05	0.22*	-0.11	0.44*	-0.25*	0.33*	-0.20*	0.24*	--					
7. Overweight preoccupation	0.17	0.20*	0.21*	0.34*	0.23*	0.22*	0.02	-0.11	-0.42*	--				
8. Self-classified weight	-0.04	0.17*	0.13	0.72*	0.02	0.08	0.05	-0.10	-0.40*	0.36*	--			
9. Current smoker	-0.16	-0.04	0.09	-0.06	-0.10	-0.07	0.25*	0.02	-0.01	-0.06	0.01	--		
10. Weight cycle	0.04	0.11	0.06	0.48*	0.06	0.13	0.09	-0.11	-0.30*	0.39*	0.46*	-0.14	--	
11. Shape concerns	0.17	0.13	0.13	0.09	0.26*	0.23*	-0.11	0.08	-0.26*	0.45*	0.09	-0.00	0.13	--

Note. $N = 241$. $p < .05$, $*p < .01$. ^acovariate.

Table 14

Correlation coefficients for psychological and physical predictors of BE behavior, BE symptom criteria, and BED among Black men

	BE-Beh	BE-Sx	BED	1	2	3	4	5	6	7	8	9	10	11
1. BMI ^a	0.05	0.45*	0.59*	--										
2. Anxiety	0.14	0.30	0.37	0.28	--									
3. Depression	0.16	0.26	0.42	0.33	0.83*	--								
4. Recommended levels	-0.25	-0.13	-0.10	-0.25	-0.20	-0.25	--							
5. Hours exercising per week	0.12	-0.01	-0.02	0.11	0.07	0.08	-0.38	--						
6. Appearance evaluation	-0.00	-0.53*	-0.55*	-0.35	-0.39	-0.45*	0.10	-0.14	--					
7. Overweight preoccupation	0.12	0.43*	0.61*	0.65*	0.22	0.32	-0.13	0.30	-0.46*	--				
8. Self-classified weight	0.08	0.40	0.47*	0.73*	0.22	0.14	-0.23	0.18	-0.13	0.50*	--			
9. Current smoker												--		
10. Weight cycle	-0.01	0.26	0.39	0.47*	0.15	0.23	-0.25	0.34	-0.38	0.57*	0.39		--	
11. Shape concerns	0.32	0.43	0.52*	0.18	0.04	0.24	-0.08	0.17	-0.39	0.49*	0.15	0.33		--

Note. $N = 36$. $p < .05$, $*p < .01$. ^acovariate.

Table 15

Correlation coefficients for psychological and physical predictors of BE behavior, BE symptom criteria, and BED among Bi/Multiracial men

	BE-Beh	BE-Sx	BED	1	2	3	4	5	6	7	8	9	10	11
1. BMI ^a	0.38	0.32	0.63	--										
2. Anxiety	0.55	-0.16	-0.13	0.32	--									
3. Depression	0.64	-0.11	0.03	0.41	0.96*	--								
4. Recommended levels	-0.05	-0.08	0.43	0.16	-0.34	-0.27	--							
5. Hours exercising per week	0.23	0.35	-0.17	-0.11	0.31	0.09	-0.37	--						
6. Appearance evaluation	0.05	0.28	-0.14	-0.33	-0.21	-0.28	-0.09	0.58	--					
7. Overweight preoccupation	-0.15	-0.08	-0.19	0.25	0.38	0.26	-0.09	-0.00	-0.45	--				
8. Self-classified weight	0.08	0.09	0.24	0.53	0.20	0.24	0.05	-0.29	-0.18	0.26	--			
9. Current smoker	-0.55	-0.73	-0.47	-0.61	-0.14	-0.31	0.17	0.00	-0.13	0.31	-0.41	--		
10. Weight cycle	-0.00	0.21	0.38	0.59	-0.14	-0.03	0.28	-0.25	-0.11	0.11	0.43	-0.47	--	
11. Shape concerns	-0.07	-0.04	0.34	0.61	0.15	0.15	0.21	-0.29	-0.54	0.50	0.65	-0.26	0.50	--

Note. $N = 15$. $p < .05$, $*p < .01$. ^acovariate.

Binge eating behavior. For White women, all predictors that were significant on a bivariate level (BMI, anxiety, depression, appearance evaluation, overweight preoccupation, weight cycling, shape concerns, and self-classified weight) were entered into a logistic regression model. Shape concerns (OR=1.70) and self-classified weight (OR=1.98) were the only variables that emerged as significant predictors. This model accounted for twelve percent of the variance. When only the variables that were most strongly related to BE were entered into the final model, however, results differed. Significant predictors in that model included depression (OR=1.08) and overweight preoccupation (OR=1.43). BMI, which was significant at Step 1, reduced to nonsignificance in the final model (See Table 16), suggesting its effect was mediated by the contributions of depression and overweight preoccupation. This model accounted for only eight percent of the variance.

For Black women, depression (OR=1.17) was the only significant predictor as overweight preoccupation reduced to nonsignificance in the final model (See Table 17). This model accounted for fifteen percent of the variance. For Bi/Multiracial women, anxiety and appearance evaluation reduced to nonsignificance in the final model (See Table 18). For White men, significant predictors in the final model included depression (OR=1.12), months exercising (OR=1.01), and overweight preoccupation (OR=1.43) (See Table 19). For Black men, none of the predictors was significantly correlated with BE behavior. For Bi/Multiracial men, depression reduced to nonsignificance in the final model (See Table 20).

Table 16

Final model for prediction of BE behavior for White women

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
BMI	0.02	0.02	1.02	1.11	0.98-1.06
Depression	0.08	0.02	1.08	14.15***	1.04-1.13
Overweight preoccupation	0.36	0.12	1.43	9.50**	1.14-1.80

Note. n = 451. ** $p < .01$. *** $p < .001$.

Table 17

Final model for prediction of BE behavior for Black women

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Depression	0.16	0.05	1.17	10.87**	1.07-1.29
Overweight preoccupation	0.37	0.26	1.45	2.02	0.87-2.41

Note. n = 113. ** $p < .01$.

Table 18

Final model for prediction of BE behavior for Bi/Multiracial women

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Anxiety	0.14	0.08	1.16	3.69	1.00-1.34
Appearance evaluation	-0.83	0.54	0.44	2.40	0.15-1.28

Note. n = 40.

Table 19

Final model for prediction of BE behavior for White men

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Depression	0.10	0.03	1.11	10.32**	1.04-1.17
Overweight Preoccupation	0.30	0.17	1.36	3.42	0.98-1.87

Note. n = 241. ** $p < .01$.

Table 20

Final model for prediction of BE behavior for Bi/Multiracial men

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Depression	0.38	0.21	1.46	3.37	0.98-2.19

Note. n = 15.

BE symptoms. For White women, all predictors which were significant on a bivariate level (BMI, anxiety, depression, appearance evaluation, overweight preoccupation, weight cycling, recommended levels of physical activity, hours exercising per week, shape concerns, and self-classified weight) were entered into the final logistic regression model. BMI (OR=.92), depression (OR=1.08), self-classified weight (OR=2.82), and shape concerns (OR=1.82) emerged as significant predictors. This model accounted for 21% of the variance.

When only variables that were most strongly related to BE-Sx were entered into the final model, however, results somewhat differed. Significant predictors in the final model included BMI (OR=1.03), depression (OR=1.09), and overweight preoccupation (OR=2.20; See Table 21). This model accounted for sixteen percent of the variance.

For Black women, significant predictors in the final model included depression (OR=1.22) and overweight preoccupation (OR=2.69; See Table 22). This model accounted for nineteen percent of the variance. For Bi/Multiracial women, none of the variables were significantly correlated to BE symptoms. For White men, BMI, anxiety, appearance evaluation, and meets recommended levels of physical activity were reduced to nonsignificance in the final model (See Table 23). This model accounted for seven percent of the variance. For Black men, BMI and appearance evaluation reduced to nonsignificance in the final model (See Table 24). Finally, for Bi/Multiracial men, none of the variables was significantly correlated to BE symptoms for this group.

Table 21

Final model for prediction of BE symptoms for White women

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
BMI	0.03	0.02	1.03	1.46	0.98-1.07
Depression	0.09	0.03	1.09	11.41**	1.04-1.15
Hours exercising per week	-0.06	0.03	0.94	6.04*	0.89-0.99
Overweight preoccupation	0.79	0.16	2.20	24.62***	1.61-3.00

Note. n = 450. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 22

Final model for prediction of BE symptoms for Black women

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Depression	0.20	0.07	1.22	8.97**	1.07-1.39
Overweight preoccupation	0.91	0.38	2.49	5.78*	1.18-5.24
Weight cycle	-0.71	0.68	0.49	1.10	0.13-1.86

Note. n = 113. * $p < .05$. ** $p < .01$.

Table 23

Final model for prediction of BE symptoms for White men

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
BMI	0.03	0.05	1.03	0.47	0.94-1.13
Anxiety	0.10	0.06	1.10	3.04	0.99-1.23
Meets recommended physical activity	-0.85	0.52	0.43	2.65	0.16-1.19
Appearance evaluation	-0.64	0.34	0.53	3.57	0.27-1.02

Note. n = 241.

Table 24

Final model for prediction of BE symptoms for Black men

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
BMI	0.13	0.18	1.14	0.53	0.80-1.61
Appearance evaluation	-2.37	1.37	0.09	2.98	0.01-1.38

Note. n = 36

BED. For White women, all predictors which were significant on a bivariate level (BMI, anxiety, depression, appearance evaluation, self-classified weight, overweight preoccupation, weight cycling, and shape concerns) were entered into a logistic regression model. However, no variables emerged as significant. When only variables that were most strongly related to BED were entered into the final model, however, significant predictors emerged. BMI (OR=0.94), depression (OR=0.88), and overweight preoccupation (OR=0.47) were all significant in the final model (See Table 25). This model accounted for nine percent of the variance.

For Black women, BMI, depression, and overweight preoccupation were reduced to nonsignificance in the final model (See Table 26). For White men, overweight preoccupation (OR=0.14) was significant in the final model (See Table 27). This model accounted for four percent of the variance. Notably, the number of individuals with BED from the remaining three groups, Bi/Multiracial women, Black men, and Bi/Multiracial men, was too small to conduct such analyses.

Table 25

Final model for prediction of BED for White women

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
BMI	-0.07	0.03	0.94	6.15*	0.89-0.99
Depression	-0.13	0.04	0.88	12.09**	0.82-0.95
Overweight preoccupation	-0.76	0.23	0.47	10.73**	0.30-0.74

Note. n = 450. * $p < .05$. ** $p < .01$.

Table 26

Final model for prediction of BED for Black women

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
BMI	0.02	0.14	1.02	0.03	0.77-1.36
Depression	-0.42	0.24	0.65	3.03	0.41-1.06
Overweight preoccupation	-2.12	1.27	0.12	2.79	0.01-1.44
Weight cycle	3.50	2.63	33.01	1.77	0.19-5679.39

Note. n = 112.

Table 27

Final model for prediction of BED for White men

	B	S.E.	Odds ratio	Wald statistic	95% Conf. Interval
Overweight preoccupation	-1.96	.75	0.14	6.94*	0.03-0.61

Note. n = 241. * $p < .01$.

Discussion

The present study examined rates of BE-Beh, BE-Sx, and BED across gender and racial groups (White women, Black women, Bi/Multiracial women, White men, Black men, and Bi/Multiracial men) in a college student population. In addition, unique predictors of each BE variable were evaluated for each group. Results suggest that the phenomenon of BE is complex, as predictors vary considerably for the different groups.

Contrary to expectations, men reported higher rates of BE-Beh than women. However as hypothesized, women endorsed more BE-Sx and more often met criteria for BED than men. Thus, although men engaged in BE-Beh more than women, they did not frequently

meet BE-Sx criteria because they were less inclined to feel distressed about BE and did not generally feel a sense of loss of control. In fact, White men in the present study were at a 74 percent reduced risk for endorsing distress related to BE compared to White women. These findings coincide with Hudson et al.'s (2007) results, wherein rates of subthreshold BED were significantly higher among men than women. The distinguishing feature between subthreshold BED and clinical BED was "marked levels of distress." Taken together, results suggest that men may not feel as distressed when engaging in BE, even though they may binge eat at an equal or even at a higher rate than women. This finding has important implications given that BE is associated with negative health consequences regardless of feelings of distress or loss of control. That is, while men may not be emotionally vulnerable to negative consequences of BE per se, they may be at a higher risk for negative physical consequences of engaging in BE such as obesity, which is linked to coronary heart disease, type 2 diabetes, hypertension, stroke, respiratory problems, and some forms of cancer (United States Department of Health & Human Services, 2004). Accordingly, the present findings mirror recent research in emphasizing the importance of including men in BE research (Masheb & Grilo, 2006; Striegel-Moore & Bulik, 2007).

The present study also sought to examine racial differences in rates of BE-Beh, BE-Sx, and BED. Overall, as hypothesized, significant differences did not emerge between White, Black, and Bi/Multiracial students, except for a significant difference between White and Black college students on BE-Beh. Specifically, White participants reported more BE-Beh than Black participants. In addition, more fine-grained group comparisons were conducted to examine the relative risk of BE for Black women, Bi/Multiracial women, White men, Black men, and Bi/Multiracial men compared to White women. It was hypothesized

that Black college women would be equally likely to meet BE criteria as White women; however, White men and Black men were expected to have a lower risk of meeting BE-Sx criteria and BED criteria, but not BE-Beh. Partial support for these hypotheses was found.

When comparing rates of BE-Beh, BE-Sx, and BED across gender and racial groups, results indicated that Black women were at a 46 percent reduced risk for endorsing BE-Sx, relative to White women. Additionally, White men were at a 74 percent reduced risk for endorsing BE-Sx, and at a 77 percent reduced risk for meeting BED criteria, relative to White women. It is noteworthy that the groups were not at a significant increased or decreased risk for endorsing BE-Beh compared to White women, implying that participants from various groups are engaging in BE nearly as much as White women. Therefore, it is necessary for future research to include these underrepresented groups in BE research as well.

It is important to note, however, that rates of BED in this sample were higher than expected. In a study conducted by Grucza et al. (2007), about 6.6% of the sample met criteria for BED, which the authors believed was due to the high prevalence of obesity in their sample. However, although, on average, participants in the present study were verging on the overweight category (BMI > 25), there was not a high prevalence of obesity (BMI > 30) in the present sample.

Therefore, an alternate possibility is that more participants may have met BED criteria as a corollary of the unexpectedly low rates of bulimia/purging in the current sample. Notably, only 0.6% of the sample met criteria for bulimia/purge type, and none of the Black women or Bi/Multiracial men met criteria for bulimia. Based on established prevalence estimates for the general population, these low rates of bulimia among college student groups

seem highly unlikely. While binge eating was readily endorsed, it may be that participants underreported purging behavior, perhaps due to its more secretive nature. If this is the case, online assessment of bulimia may be invalid. On the other hand, it is possible that the current trend for college students may be shifting from bingeing/purging to bingeing due to social influence. In 1988, Crandall found that over time, new sorority members conformed to the bingeing patterns of their sorority sisters. Therefore, binge eating may, in part, be related to social factors such as following social norms on college campuses. For example, bulimia awareness efforts such as the National Eating Disorder Awareness week may be contributing to reduced rates of purging and other compensatory behaviors, but not necessarily binge eating, itself. Despite the conundrum of the low rate of bulimia and high rate of BED in the current sample, results indicate that BE remains a problem among some college students today.

Secondary analyses were also conducted to compare associated symptoms, BE frequency, and levels of distress for those who met criteria for BE-Sx, with White women serving as the reference group for all comparisons. Compared to White women, the other racial groups did not differ in endorsement of associated symptoms or BE at least twice a week for the past six months. However, White men were at a decreased risk of reporting distress relative to White women, as discussed above. Recall that associated symptoms included endorsement of any three or more of the following: eating rapidly, eating until uncomfortably full, eating when not hungry, eating alone because embarrassed, and feeling disgusted, depressed, or guilty after overeating. While the present study did not detect differences across groups, another study did find differences in levels of embarrassment and fear of losing control. Interestingly, Bennett and Dodge (2007) found that feeling

embarrassed and fear of losing control are separate constructs (supporting the idea of examining both loss of control and associated symptoms) and that racial differences exist among these variables. For instance, those authors found that Asian American women and Native American women actually endorsed more feelings of embarrassment than White women, but that Hispanics reported more fear of losing control than White and Black women in the study. Perhaps groups from the present study did not differ when comparing associated symptoms because of the small number of participants meeting BE-Sx criteria in each group. Similarly, groups may not have differed on BE frequency due to small sample sizes, yielding insufficient power to detect differences. Refer to Tables 7-9 for sample size descriptions.

Do Predictors of BE Vary Across Gender and Racial Groups?

“Clinicians and researchers (Arriaza & Mann, 2001, Smolak & Striegel-Moore, 2001 and Striegel-Moore et al., 2002) have recently called for a clarification of the risk factors for various ethnic groups for the practical reasons of recognizing and treating eating disorders in minorities” (Aruguete, DeBord, Yates, & Edman, 2005, p. 330). In light of this, the present study explored the unique predictors of BE across gender and racial groups. Results indicated that depression is a common predictor of BE-Beh across groups, primarily for White women, Black women, and White men. However, previous research showed that depression uniquely predicted BE for White college women, whereas anxiety predicted BE for Black college women, and none of the variables in that study predicted BE for White college men (Mitchell & Mazzeo, 2004). Mitchell and Mazzeo (2004) examined three predictors of binge eating, namely depression, anxiety, and alexithymia, in a diverse group of White and Black undergraduate men and women. Overall, women reported more binge eating symptoms than men, and depression was a significant predictor of binge eating for White women, whereas

anxiety was a significant predictor of binge eating for Black women. The authors speculated that the variables used in their study did not predict BE for the men because the sample size was too small. Nonetheless, predictors of BE for Black college women differed between the studies. These differences may have emerged due to different measures used to assess depression (Center for Epidemiological Studies Depression Scale versus PHQ-9), anxiety (State Trait Anxiety Inventory versus GAD-7), and binge eating (Binge Eating Scale versus QEWP-R). Specifically, the measures used by Mitchell and Mazzeo (2004) were more dimensional in nature -- capturing the range from normal to potentially pathological scores on depression, anxiety, and binge eating -- where our measures were designed to identify those who might meet clinical criteria for depression, anxiety, and binge eating.

Another important finding is that shape concerns and self-classified weight predicted BE-Beh for White women when all predictors that were significant on a bivariate level were entered in the regression analysis. However, when multicollinearity issues were addressed, depression and overweight preoccupation emerged as significant predictors of BE for this group, raising the need for mediation models in future research due to changing predictors. Future researchers should conduct more sophisticated analyses, such as structural equation modeling, to disentangle the complex relationships among these variables, as that approach was beyond the scope of the present study.

While changes in predictors of BE-Beh did occur for White women when using different methods of analysis, it is still clear that body image is a strong predictor for White women, as shape concerns, self-classified weight, and overweight preoccupation are all considered dimensions of body image. However, this begs the question: Which body image measure is the strongest predictor of BE? Saules et al. (in press) found that those who defined

themselves as overweight, as assessed by a body image item from the Self-Classified Weight subscale of the MBSRQ-AS, were more likely to engage in BE. This variable was a stronger predictor of binge eating than even gender, BMI, and depression in a college-student sample. Therefore, self-classified weight may be most crucial in identifying BE concerns. As further evidenced by findings from the present study, body image is a strong predictor of BE, especially for White participants and Black women.

In relation to BE-Sx, depression and overweight preoccupation were predictors for White women and Black women, indicating that body image may play more of a salient role for Black women when they feel that they lose control during a binge. In addition, exercise also predicted BE-Sx for White women. Specifically, less exercise predicted a greater likelihood of BE-Sx for this group. Therefore, incorporating physical activity into BE treatment programs may be particularly useful for White women.

When examining predictors of BED, significant predictors only emerged for White participants. Specifically, BMI, depression, and overweight preoccupation predicted BED among White women, whereas overweight preoccupation predicted BED among White men. Despite the documented link between binge eating and obesity, BMI reduced to nonsignificance in predicting BE for most groups, except when predicting BED in White women. Nonetheless, weight may not be as important as once perceived when other factors are considered, such as body image. In a study investigating predominantly overweight and obese White women, Wardle, Waller, and Rapoport (2001) found that women with higher rates of body dissatisfaction reported higher rates of BE, regardless of weight. Moreover, it is intriguing that when examined longitudinally, women who improved their body image also had reductions in binge eating, again irrespective of weight. Additionally, depression partly

mediated the relationship between body dissatisfaction and binge eating when examined at baseline and longitudinally, meaning that decreases in depression were linked to significantly improved binge eating and somewhat improved body image. Taken together, the research suggests that body image, and even depression, should be targeted in obesity treatments, at least for White women. Even more recent research has advocated for focusing on body image in relation to weight maintenance after weight loss by women enrolled in women's fitness programs (Collings, Saules, & Saad, 2008).

In sum, depression and overweight preoccupation are important areas to target in relation to BE for White women. Unfortunately, however, predictors for the other racial groups are less clear. For instance, overweight preoccupation is a concern for White men only when predicting BED. It may well be that although White men generally do not experience marked levels of distress associated with BE, body image is important among men who do experience distress. Therefore, in clinical settings, when White men report body image problems, it may be important to assess for BED.

Overall, it must be noted that the current sample endorsed only mild levels of depression and anxiety; however, the Bi/Multiracial participants still reported higher levels of depression, anxiety, and overweight preoccupation than White and Black participants. If the cell sizes were larger for the Bi/Multiracial groups, perhaps these variables would have predicted BE in this group. It is most likely that depression might predict BE among Bi/Multiracial college students since depression was related to BE-Beh at the bivariate level. If this is the case, treatment implications are warranted for this group. Because depressed Biracial college women have been found to seek mental health treatment (Constantine & Gainor, 2004), it may be important for clinicians to assess for BE if depressed Biracial

women present for treatment. However, further research is needed to support this speculation.

Taken together, results provide support for the affective model of BE as depression was a common predictor of BE for several groups. Although these cross-sectional data do not permit causal inferences, the strong connection between depression and BE is consistent with other results in the literature. For example, lower mood was found to be a precursor to binge episodes among treatment-seeking women with BED (Greeno et al., 2000), and a consequence of BE among college students (Wegner, Smyth, Crosby, Wittrock, Wonderlich, & Mitchell, 2002). Results from the present study suggest that low mood (depression) may also predict BE for some college students as well. Additionally, Womble et al. (2001) presented a more complex model of BE including weight cycling, body dissatisfaction, teasing, negative affect, and dietary restraint contributing to BE for both men and women, with some differences. However, weight cycling was not related to BE in the present sample. Moreover, dietary restraint and teasing were not measured in the present study. Likewise, the present study did not account for genetic factors, which may also play a role in differing predictors of BE. Clearly, there are a variety of factors contributing to binge eating, and none of these models can fully explain BE. Therefore, it will be important for future studies to create a model of BE that incorporates many facets including genetics, affective components, dietary restraint, body dissatisfaction, and social influences in order to better understand the complex phenomenon of BE.

Limitations of the Present Study

Several limitations of the present study should be noted. First, generalizability of findings may be limited to college student populations similar to the study sample. In

addition, because they are relatively unrepresented at EMU (at least in Psychology classes), participants from other racial minorities, such as Native Americans, could not be included in the study. Moreover, even among the Bi/Multiracial group that was examined, the sample of men from this group was quite small. Therefore, due to the small cell sizes of some of the groups, particularly the Bi/Multiracial groups, further research is necessary to replicate these findings. Finally, because it was impossible to include all possible covariates as predictors of BE, future research should consider including other variables that have some support in the literature, such as sexual orientation, anger, and acculturation and identity issues.

With respect to sexual orientation, it is notable that homosexual men often report more body dissatisfaction than heterosexual men, where the concern is related to gaining muscle mass. On the other hand, if they weigh more, they may desire to both lose weight, while increasing muscularity (Levesque & Vichesky, 2006). Therefore, it may be important to include sexual orientation as a variable in future BE research.

Second, anger has been found to predict eating disturbances among White college men (Aruguete, DeBord, Yates, & Edman, 2005) but not White college women or Black college students. Specifically, anger is associated with BE among obese men (Costanzo, Musante, Freidman, Kern, & Tomlinson, 1999). Therefore, had it been assessed, perhaps anger may have predicted BE among White men in the sample and among Bi/Multiracial men. Because depression was associated with BE for this group, and because anger/irritability is a relatively common symptom among depressed males, it is recommended that future research focus on the possible contribution of anger to BE among men.

Future research should also include variables tapping into acculturation and identity since the Bi/Multiracial college students, in particular, may be struggling with identity issues, as they identify with more than one racial group. Two theories related to binge eating, escape theory and functional theory, both include identity issues. Escape theory views BE as a consequence of avoiding identity issues, whereas functional theory views BE as an antecedent of avoiding identity issues (as was explained in Wheeler, Adams, & Keating, 2001). Therefore, identity issues may emerge as a salient feature in relation to BE for the Bi/Multiracial group.

Finally, it would be interesting to examine perceptions of binge eating across different groups in future research. Bennett and Dodge (2007) speculated that there may be cultural differences in acceptable portion sizes, which may lead to different BE rates.

Conclusion

Overall, findings highlight gender and racial differences in the predictors of binge eating, with depression a common predictor across groups. Results suggest that approaches to preventing BE among college students should focus on depression and overweight preoccupation among White students and Black women but not necessarily among Bi/Multiracial students and Non-White men. To our knowledge, this is the first study to examine BE among Bi/Multiracial groups. Although depression was not significant in the final model in predicting BE for this group, future research may elucidate this finding.

References

- Adewuya, A. O., Ola, B. A., & Afolabi, O. O. (2006). Validity of the patient health questionnaire (PHQ-9) as a screening tool for depression amongst Nigerian university students. *Journal of Affective Disorders, 96* (1-2), 89-93.
- Alschuler, K., Hoodin, F., & Byrd, M. (in press). The need for integrating behavioral care in a college health center.
- American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders (4th ed. Text Revision). Washington, DC: Author.
- Anderson, C. B., & Bulik, C. M. (2004). Gender differences in compensatory behaviors, weight and shape salience, and drive for thinness. *Eating Behaviors, 5*(1), 1-11.
- Anderson, D. A., Williamson, D. A., Johnson, W. G., & Grieve, C. O. (2001). Validity of test meals for determining binge eating. *Eating Behaviors, 2*(2), 105-112.
- Aruguete, M. S., DeBord, K. A., Yates, A., & Edman, J. (2005). Ethnic and gender differences in eating attitudes among black and white college students. *Eating Behaviors, 6*(4), 328-336.
- Barry, D. T., Grilo, C. M., & Masheb, R. M. (2002). Gender differences in patients with binge eating disorder. *International Journal of Eating Disorders, 31*(1), 63-70.
- Barry, D. T., Grilo, C. M., & Masheb, R. M. (2003). Comparison of patients with bulimia nervosa, obese patients with binge eating disorder, and non-obese patients with binge eating disorder. *Journal of Nervous and Mental Disease, 191*(9), 589-594.
- Bennett, S., & Dodge, T. (2007). Ethnic-racial differences in feelings of embarrassment associated with binge eating and fear of losing control. *International Journal of Eating Disorders, 40*(5), 454-459.

- Brody, M. L., Walsh, B. T., & Devlin, M. J. (1994). Binge eating disorder: Reliability and validity of a new diagnostic category. *Journal of Consulting & Clinical Psychology, 62*(2), 381-386.
- Bulik, C. M., Sullivan, P. F., & Kendler, K. S. (2003). Genetic and environmental contributions to obesity and binge eating. *International Journal of Eating Disorders, 33*(3), 293-298.
- Bulik, C. M., Sullivan, P. F., & Kendler, K. S. (2002). Medical and psychiatric morbidity in obese women with and without binge eating. *International Journal of Eating Disorders, 32*(1), 72-78.
- Cash, T. F. (1994). Body-image attitudes: Evaluation, investment, and affect. *Perceptual and Motor Skills, 78*(3), 1168-1170.
- Cash, T. F. (2000). *The multidimensional body-self relations questionnaire*.
- Cash, T. F. (2004). Body image: Past, present, and future. *Body Image: An International Journal of Research, 1*(1), 1-5.
- Cash, T. F., Santos, M. T., & Williams, E. F. (2005). Coping with body-image threats and challenges: Validation of the body image coping strategies inventory. *Journal of Psychosomatic Research, 58*(2), 191-199.
- Centers for Disease Control release data on smoking prevalence, attitudes.
<http://healthlink.mcw.edu/article/1014756220.html>.
- Collings, A. S., Saules, K. K., & Saad, L. R. (2008). A prospective study of predictors of successful weight maintenance by women enrolled in community-based weight-loss programs. *Eating and Weight Disorders, 13*(1), 38-47.
- Constantine, M. G., & Gainor, K. A. (2004). Depressive symptoms and attitudes toward

- counseling as predictors of biracial college women's psychological help-seeking behavior. *Women and Therapy*, 27, (1-2), 147-158.
- Cooke, E. A., Guss, J. L., Kissileff, H. R., Devlin, M. J., & Walsh, T. (1997). Patterns of food selection during binges in women with binge eating disorder. *International Journal of Eating Disorders*, 22(2), 187-193.
- Cooper, P. J., Taylor, M. J., Cooper, Z., & Fairburn, C. G. (1987). The development and validation of the Body Shape Questionnaire. *International Journal of Eating Disorders*, 6(4), 485-494.
- Corstorphine, E., Waller, G., & Ohanian, V. (2006). Changes in internal states across the binge-vomit cycle in bulimia nervosa. *Journal of Nervous and Mental Disease*, 194, 446-449.
- Costanzo, P. R., Musante, G. J., Friedman, K. E., Kern, L. S., & Tomlinson, K. (1999). The gender specificity of emotional, situational, and behavioral indicators of binge eating in a diet-seeking obese population. *International Journal of Eating Disorders*, 26(2), 205-210.
- Crandall, C. S. (1988). Social contagion of binge eating. *Journal of Personality and Social Psychology*, 55(4), 588-598.
- Crawford, S., McCabe, S. E., & Pope, D. (2005). Applying web-based survey design standards. *Journal of Prevention and Intervention in the Community*, 29(1-2), 43-66.
- Crisp, A., Sedgwick, P., Halek, C., Joughin, N., & Humphrey H. W. (1999). Why may teenage girls persist in smoking? *Journal of Adolescence*. 22(5), 657-672.
- Devlin, M. J., Goldfein, J. A., & Dobrow, I. (2003). What is the thing called BED? Current status of binge eating disorder nosology. *International Journal of Eating*

- Disorders, 34, S2-S18.*
- De Zwaan, M., Mitchell, J. E., Specker, S. M., Pyle, R. L., Mussell, M. P., & Seim, H. C. (1993). Diagnosing binge eating disorder: Level of agreement between self-report and expert-rating. *International Journal of Eating Disorders, 14*(3), 289-295.
- DiGiacchino, R. F., Sargent, R. G., & Topping, M. (2001). Body dissatisfaction among White and African American male and female college students. *Eating Behaviors, 2*(1), 39-50.
- Dunn, E. C., Larimer, M. E., & Neighbors, C. (2002). Alcohol and drug-related negative consequences in college students with bulimia nervosa and binge eating disorder. *International Journal of Eating Disorders, 32*(2), 171-178.
- Engelberg, M. J., Gauvin, L., Steiger, H. (2005). A naturalistic evaluation of the relation between dietary restraint, the urge to binge, and actual binge eating: A clarification. *International Journal of Eating Disorders, 38*(4), 355-360.
- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire. *International Journal of Eating Disorders, 16*(4), 363-370.
- Fairburn, C. G., & Cooper, Z. (1993). *The Eating Disorder Examination (12th edition)*. New York: Guilford Press.
- Fairburn, C. G., Cooper, Z., Doll, H. A., Norman, P., & O'Connor, M. E. (2000). The natural course of bulimia nervosa and binge eating disorder in young women. *Archives of General Psychiatry, 57*(7), 659-665.
- Fitzgibbon, M. L., Spring, B., Avellone, M. E., Blackman, L. R., Pingitore, R., & Stolley, M. R. (1998). Correlates of binge eating in Hispanic, Black, and White women. *International Journal of Eating Disorders, 24*(1), 43-52.

- Flegal, K. M., Carroll, M. D., Ogden, C. L., & Johnson, C. L. (2002). Prevalence and trends in obesity among US adults, 1999-2000. *Journal of the American Medical Association, 288*(14), 1723-1727.
- Garner, D. M., Olmstead, M. P., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders, 2*(2), 15-34.
- Greenberg, D. R., & LaPorte, D. J. (1996). Racial differences in body type preferences of men for women. *International Journal of Eating Disorders, 19*(3), 275-278.
- Greeno, C. G., Wing, R. R., & Marcus, M. D. (1995). Nocturnal eating in binge eating disorder and matched-weight controls. *International Journal of Eating Disorders, 18*(4), 343-349.
- Greeno, C. G., Wing, R. R., & Shiffman, S. (2000). Binge antecedents in obese women with and without binge eating disorder. *Journal of Consulting and Clinical Psychology, 68*(1), 95-102.
- Grilo, C. M., & Masheb, R. M. (2005). Correlates of body image dissatisfaction in treatment-seeking men and women with binge eating disorder. *International Journal of Eating Disorders, 38*(2), 162-166.
- Grilo, C. M., Masheb, R. M., Brody, M., Burke-Martindale, C. H., & Rothschild, B. S. (2005). Binge eating and self-esteem predict body image dissatisfaction among obese men and women seeking bariatric surgery. *International Journal of Eating Disorders, 37*(4), 347-351.

- Grucza, R. A., Przybeck, T. R., & Cloninger, R. C. (2007). Prevalence and correlates of binge eating disorder in a community sample. *Comprehensive Psychiatry*, *48*(2), 124-131.
- Guertin, T. L. (1999). Eating behavior of bulimics, self-identified binge eaters, and non-eating-disordered individuals: What differentiates these populations? *Clinical Psychology Review*, *19*(1), 1-23.
- Heatherton, T. E., & Polivy, J. (1992). Chronic dieting and eating disorders: A spiral model. In J. H. Crowther, S. E., Hobfall, M. A. P. Stephens, & D. L. Tennenbaum (Eds.), *The etiology of bulimia nervosa: The individual and familial context*, 133-155.
- Hedley, A. A., Ogden, C. L., Johnson, C. L., Carroll, M. D., Curtin, L. R. & Flegal, K. M. (2004). Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *Journal of the American Medical Association*, *291*(23), 2847-2850.
- Hendershot, K. M., Robinson, L., Roland, J., Vaziri, K., Rizzo, A. G., & Fakhry, S. M. (2006). Estimated height, weight, and body mass index: Implications for research and patient safety. *Journal of the American College of Surgeons*, *203*(6), 887-893.
- Hrabosky, J. I., & Grilo, C. M. (2007). Body image and eating disordered behavior in a community sample of Black and Hispanic women. *Eating Behaviors*, *8*(1), 106-114.
- Hrabosky, J. I., Masheb, R. M., White, M. A., & Grilo, C. M. (2007). Overvaluation of shape and weight in binge eating disorder. *Journal of Consulting and Clinical Psychology*, *75*(1), 175-180.

- Huang, H. (2006). Do print and web surveys provide the same results? *Computers in Human Behavior, 22*(3), 334-350.
- Hudson, J. I., Hiripi, E., Pope, H. G. Jr., & Kessler, R. C. (2007). The prevalence and correlates of eating disorders in the national comorbidity survey replication. *Biological Psychiatry, 61*(3), 348-358.
- Johnson, W. G., Carr-Nangle, R. E., Nangle, D. W., Antony, M. M., & Zayfert, C. (1997). What is binge eating? A comparison of binge eater, peer, and professional judgments of eating episodes. *Addictive Behaviors, 22* (5), 631-635.
- Johnson, W. G., Rohan, K. J., & Kirk, A. A. (2002). Prevalence and correlates of binge eating in White and African American adolescents. *Eating Behaviors, 3*(2), 179-189.
- Kashubeck-West, S., Mintz, L. B., & Saunders, K. J. (2001). Assessment of eating disorders in women. *The Counseling Psychologist, 29*(5), 662-694.
- Katzman, M. A., Wolchik, S. A., & Braver, S. L. (1984). The prevalence of frequent binge eating and bulimia in a nonclinical college sample. *International Journal of Eating Disorders, 3*(3), 53-62.
- Keeton, W. P., Cash, T. F., & Brown, T. A. (1990). Body image or body images?: Comparative, multidimensional assessment among college students. *Journal of Personality Assessment, 54*(1-2), 213-230.
- Kensinger, G. J., Murtaugh, M. A., Reichmann, S. K., & Tangney, C. C. (1998). Psychological symptoms are greater among weight cycling women with severe binge eating behavior. *Journal of the American Dietetic Association, 98*(8), 863-868.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*(9), 606-613.

- Langer, L. M., Warheit, G. J., & Zimmerman, R. S. (1991). Epidemiological study of problem eating behaviors and related attitudes in the general population. *Addictive Behaviors, 16*(3-4), 167-173.
- LaPorte, D. J. (1997). Gender differences in perceptions and consequences of an eating binge. *Sex Roles, 36*(7-8), 479-489.
- Leon, G. R., Carroll, K., Chernyk, B., & Finn, S. (1985). Binge eating and associated habit patterns within college student and identified bulimic populations. *International Journal of Eating Disorders, 4*(1), 43-57.
- Levesque, M. J., & Vichesky, D. R. (2006). Raising the bar on the body beautiful: An analysis of the body image concerns of homosexual men. *Body Image, 3*(1), 45-55.
- Lewinsohn, P. M., Seeley, J. R., Moerk, K. C., & Striegel-Moore, R. H. (2002). Gender differences in eating disorders symptoms in young adults. *International Journal of Eating Disorders, 32*(4), 426-440.
- Löwe B, Unützer J, Callahan C, Perkins A, Kroenke K. (2004). Monitoring depression treatment outcomes with the patient health questionnaire-9. *Medical Care, 42*(12), 1194-1201.
- Marcus, M. D., Wing, R. R., Ewing, L., Kern, E., Gooding, W., & McDermott, M. (1990). Psychiatric disorders among obese binge eaters. *International Journal of Eating Disorders, 9*(1), 69-77.
- Marcus, M. D., Wing, R. R., & Hopkins, J. (1988). Obese binge eaters: Affect, cognitions, and response to behavioral weight control. *Journal of Consulting and Clinical Psychology, 56*(3), 433-439.
- Martin, A., Rief, W., Klaiberg, A., & Braehler, E. (2006). Validity of the brief patient

- health questionnaire mood scale (PHQ-9) in the general population. *General Hospital Psychiatry*, 28(1), 71-77.
- Masheb, R. M., & Grilo, C. M. (2001). Accuracy of self-reported weight in patients with binge eating disorder. *International Journal of Eating Disorders*, 29(1), 29-36.
- Masheb, R. M. & Grilo, C. M. (2006). Eating patterns and breakfast consumption in obese patients with binge eating disorder. *Behavior Research and Therapy*, 44(11), 1545-1553.
- Masheb, R. M. & Grilo, C. M. (2006). Emotional overeating and its associations with eating disorder psychopathology among overweight patients with binge eating disorder. *International Journal of Eating Disorders*, 39(2), 141-146.
- Mei, Z., Grummer-Strawn, L. M., Pietrobelli, A., Goulding, A., Goran, M. I., & Dietz, W. H. (2002). Validity of body mass index compared with other body-composition screening indexes for the assessment of body fatness in children and adolescents. *American Journal of Clinical Nutrition*, 75(6), 978-985.
- Meyer, C., & Waller, G. (1998). Dissociation and eating psychopathology: Gender differences in a nonclinical population. *The International Journal of Eating Disorders*, 23(2), 217-221.
- Mitchell, K. S., & Mazzeo, S. E. (2004). Binge eating and psychological distress in ethnically diverse undergraduate men and women. *Eating Behaviors*, 5(2), 157-169.
- Mokdad, A. H., Marks, J. S., Stroup, D. F., & Gerberding, J. L. (2004). Actual causes of death in the United States, 2000. *Journal of the American Medical Association*, 291(10), 1238-1245.

- Mokdad, A. H., Marks, J. S., Stroup, D. F., & Gerberding, J. L. (2005). Correction: Actual causes of death in the United States, 2000. *Journal of the American Medical Association, 293*(3), 293-294.
- Monteleone, P., Tortorella, A., Castaldo, E., & Maj, M. (2006). Association of a functional serotonin transporter gene polymorphism with binge eating disorder. *American Journal of Medical Genetics Part B (Neuropsychiatric Genetics), 141B*(1), 7-9.
- Moreira, R. O., Marca, K. F., Appolinario, J. C., & Coutinho, W. F. (2007). Increased waist circumference is associated with an increased prevalence of mood disorders and depressive symptoms in obese women. *Eating and Weight Disorders, 12*(1), 35-40.
- 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 disorders among subjects seeking treatment for binge eating disorder. *International Journal of Eating Disorders, 17*(4), 395-401.
- Mussell, M. P., Petersen, C. B., Weller, C. L., Crosby, R. D., de Zwaan, M., & Mitchell, J. E. (1996). Differences in body image and depression among obese women with and without binge eating disorder. *Obesity Research, 4*(5), 431-439.
- Mutterperl, J. A., & Sanderson, C. A. (2002). Mind over matter: Internalization of the thinness norm as a moderator of responsiveness to norm misperception education in college women. *Health Psychology, 21*(5), 519-523.
- Nangle, D. W., Johnson, W. R., Carr-Nangle, R. E., & Engler, L. E. (1994). Binge eating disorder and the proposed DSM-IV criteria: Psychometric analysis of the Questionnaire of Eating and Weight Patterns. *International Journal of Eating Disorders, 16*(2), 147-157.

- O'Dea, J. A., & Abraham, S. (2002). Eating and exercise disorders in young college men. *Journal of American College Health, 50*(6), 273-278.
- Ogden, C. L., Carroll, M. D., Curtin, L. R., McDowell, M. A., Tabak, C. J., Flegal, K. M. (2006). Prevalence of overweight and obesity in the United States, 1999-2004. *Journal of the American Medical Association, 295*(13), 1549-1555.
- Ogden, C. L., Flegal, K. M., Carroll, M. D. & Johnson, C. L. (2002). Prevalence trends in overweight among US children and adolescents. *Journal of the American Medical Association, 288*(14), 1728-1732.
- Pate, R. R., Pratt, M., Blair, S. N., Haskell, W. L., Macera, C. A., Bouchard, C. et al. (1995). Physical activity and public health: A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *Journal of the American Medical Association, 273*(5), 402-407.
- Pike, K. M., Dohm, F-A., Striegel-Moore, R. H., Wilfley, D. E., & Fairburn, C. G. (2001). A comparison of Black and White women with binge eating disorder. *American Journal of Psychiatry, 158*(9), 1455-1460.
- Pinto-Meza, A., Serrano-Blanco, A., Peñarrubia, M. T., Blanco, E., & Haro, J. M. (2005). Assessing depression in primary care with the PHQ-9: Can it be carried out over the telephone? *The Journal of General Internal Medicine, 20*(8), 738-742.
- Raymond, N. C., Bartholome, L. T., Lee, S. S., Peterson, R. E., Raatz, S. K. (2007). A comparison of energy intake and food selection during laboratory binge eating episodes in obese women with and without a binge eating disorder diagnosis. *International Journal of Eating Disorders, 40*(1), 67-71.
- Raymond, N. C., Neumeyer, B., Warren, C. S., Lee, S. S., & Peterson, C. B. (2003).

- Energy intake patterns in obese women with binge eating disorder. *Obesity Research*, 11(7), 869-879.
- Reagan, P., & Hersch, J. (2005). Influence of race, gender, and socioeconomic status on binge eating frequency in a population-based sample. *International Journal of Eating Disorders*, 38, (3), 252-256.
- Reas, D. L., & Grilo, C. M. (2007). Timing and sequence of the onset of overweight, dieting, and binge eating in overweight patients with binge eating disorder. *International Journal of Eating Disorders*, 40, 165-170.
- Reas, D. L., White, M. A., & Grilo, C. M. (2006). Body checking questionnaire: Psychometric properties and clinical correlates in obese men and women with binge eating disorder. *International Journal of Eating Disorders*, 39(4), 326-331.
- Reichborn-Kjennerud, T., Bulik, C. M., Tambs, K., & Harris, J. R. (2004). Genetic and environmental influences on binge eating in the absence of compensatory behaviors: A population-based twin study. *International Journal of Eating Disorders*, 36(3), 307-314.
- Ricciardelli, L. A., McCabe, M. P., Williams, R. J., & Thompson K. J. (2007). The role of ethnicity and culture in body image and disordered eating among males. *Clinical Psychology Review*, 27(5), 582-606.
- Riener, R., Schindler, K., & Ludvik, B. (2006). Psychosocial variables, eating behavior, depression, and binge eating in morbidly obese subjects. *Eating Behaviors*, 7(4), 309-314.

- Roberts, A., Cash, T. F., Feingold, A., & Johnson, B. T. (2006). Are Black-White differences in females' body dissatisfaction decreasing? A meta-analytic review. *Journal of Consulting and Clinical Psychology, 74*(6), 1121-1131.
- Rogers, W. H., Adler, D. A., Bungay, K. M., & Wilson, I. B. (2005). Depression screening instruments made good severity measures in a cross-sectional analysis. *Journal of Clinical Epidemiology, 58*(4), 370-377.
- Sanchez-Johnsen, L. A. P., Dymek, M., Alverdy, J., & le Grange, D. (2003). Binge eating and eating-related cognitions and behavior in ethnically diverse obese women. *Obesity Research, 11*(8), 1002-1009.
- Saules, K. K., Collings, A. S., Hoodin, F., Angelella, N. E., Alschuler, K., Ivezaj, V., et al. (in press). The contributions of weight problem perception, BMI, gender, mood, and smoking status to binge eating among college students. *Eating Behaviors*.
- Schneider, J. A., & Agras, W. S. (1987). Bulimia in males: A matched comparison with females. *International Journal of Eating Disorders, 6*(2), 235-242.
- Smith, S. C. Jr. (2007). Multiple risk factors for cardiovascular disease and diabetes mellitus. *American Journal of Medicine, 120* (3 Suppl. 1), S3-S11.
- Smith, D. E., Marcus, M. D., Lewis, C., Fitzgibbon, M., & Schreiner, P. (1998). Prevalence of binge eating disorder, obesity, and depression in a biracial cohort of young adults. *Annals of Behavioral Medicine, 20*(3), 227-232.
- Sorbara, M., & Geliebter, A. (2002). Body image disturbance in obese outpatients before and after weight loss in relation to race, gender, binge eating, and age of onset of obesity. *International Journal of Eating Disorders, 31*(4), 416-423.

- Specker, S., de Zwann, M., Raymond, N., & (1994). Psychopathology in subgroups of obese women with and without binge eating disorder. *Comprehensive Psychiatry, 35*(3), 185-190.
- Spitzer, R. L., Kroenke, K., Williams, J. B. (1999). Validation and utility of a self-report version of PRIME-MD: The PHQ primary care study. *Journal of the American Medical Association, 282*(18), 1737-1744.
- Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Lowe, B. (2006). A brief measure for assessing generalized anxiety disorder. *Archives of Internal Medicine, 166*(10), 1092-1097.
- Spitzer, R., Yanovski, S., & Marcus, M. (1993). *The questionnaire of eating and weight patterns-revised (QEWP-R)*. New York: New York State Psychiatric Institute.
- Spitzer, R. L., Yanovski, S., Wadden, T., Wing, R., Marcus, M. D., Stunkard, A., et al. (1993). Binge eating disorder: Its further validation in a multisite study. *International Journal of Eating Disorders, 13*(2), 137-153.
- Stacy, A. Q., Bentler, P. M., & Flay, B. R. (1994). Attitudes and health behavior in diverse populations: Drunk driving, alcohol use, binge eating, marijuana use, and cigarette use. *Health Psychology, 13*(1), 73-85.
- Stein, R. I., Kenardy, J., Wiseman, C. V., Zoler Douchis, J., Arnow, B. A., & Wilfley, D. E. (2007). What's driving the binge in binge eating disorder?: A prospective examination of precursors and consequences. *International Journal of Eating Disorders, 40*(3), 195-203.

- Stice, E., Presnell, K., & Spangler, D. (2002). Risk factors for binge eating onset in adolescent girls: A 2-year prospective investigation. *Health Psychology, 21*(2), 131-138.
- Striegel-Moore, R. H., & Bulik, C. M. (2007). Risk factors for eating disorders. *American Psychologist, 62*(3), 181-198.
- Striegel-Moore, R. H., Franko, D. L., Thompson, D., Barton, B., Schreiber, G. B., & Daniels, S. R. (2005). An empirical study of the typology of bulimia nervosa and its spectrum variants. *Psychological Medicine, 35*(11), 1563-1572.
- Striegel-Moore, R. H., Wilson, T., Wilfley, D. E., Elder, K. A., & Brownell, K. D. (1998). Binge eating in an obese community sample. *International Journal of Eating Disorders, 23*(1), 27-37.
- Stunkard, A. J., & Albaum, J. M. (1981). The accuracy of self-reported weights. *American Journal of Clinical Nutrition, 34*(8), 1593-1599.
- Stunkard, A.J., Sorensen, T., Schulsinger, F. (1983). Use of the Danish Adoption Register for the study of obesity and thinness. In Kety S , Rowland LP , Sidman RL , Matthysse SW , eds. *The Genetics of Neurological and Psychiatric Disorders*, New York: Raven Press; 115-120.
- Sullivan, P. F., Bulik, C. M., & Kendler, K. S. (1998). The genetic epidemiology of bingeing and vomiting. *British Journal of Psychiatry, 173*(1), 75-79.
- Sysko, R., Devlin, M. J., Walsh, B. T., Zimmerli, E., & Kissileff, H. R. (2007). Satiety and test meal intake among women with binge eating disorder. *International Journal of Eating Disorders, 40*(6), 554-561.
- Tanofsky, M. B., Wilfley, D. E., Spurrell, E. B., Welch, R., & Brownell, K. D. (1997).

- Comparison of men and women with binge eating disorder. *International Journal of Eating Disorders*, 21(1), 49-54.
- Tanofsky-Kraff, M., & Yanovski, S. Z. (2004). Eating disorder or disordered eating? Non-normative eating patterns in obese individuals. *Obesity Research*, 12(9), 1361-1366.
- Telch, C. F., & Agras, W. S. (1994). Obesity, binge eating and psychopathology: Are they related? *International Journal of Eating Disorders*, 15(1), 53-61.
- United States Department of Health & Human Services (2001). *Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity*. Retrieved June 20, 2007, from <http://www.surgeongeneral.gov/topics/obesity/calltoaction/CalltoAction.pdf>.
- United States Department of Health & Human Services. (2004). Citing "Dangerous Increase" in deaths, HHS launches new strategies against overweight epidemic. News Release.
- United States Department of Health & Human Services (2007). BMI: Body Mass Index. Retrieved June 20, 2007 from http://www.cdc.gov/nccdphp/dnpa/bmi/adult_BMI/about_adult_BMI.htm.
- Vanderlinden, J., Dalle Grave, R., Vandereycken, W., & Noorduyn, C. (2001). Which factors do provoke binge eating? An exploratory study in female students. *Eating Behaviors*, 2(1), 79-83.
- Vohs, K. D., Heatherton, T. F., & Herrin, M. (2001). Disordered eating and the transition to college: A prospective study. *International Journal of Eating Disorders*, 29(3), 280-288.
- Walsh, B. T., & Boudreau, G. (2003). Laboratory studies of binge eating disorder. *International Journal of Eating Disorders*, 34(Suppl.), S30-S38.

- Wardle, J., Waller, J., & Rapoport, L. (2001). Body dissatisfaction and binge eating in obese women: The role of restraint and depression. *Obesity Research, 9*(12), 778-787.
- Warren, C. S., Gleaves, D. H., Cepeda-Benito, A., Carmen Fernandez, M., & Rodriguez-Ruiz, S. (2005). Ethnicity as a protective factor against internalization of a thin ideal and body dissatisfaction. *International Journal of Eating Disorders, 37*(3), 241-249.
- Webber, E. M. (1994). Psychological characteristics of bingeing and nonbinging obese women. *The Journal of Psychology, 128*(3), 339-351.
- Wegner, K. E., Smyth, J. M., Crosby, R. D., Wittrock, D., Wonderlich, S. A., & Mitchell J. E. (2002). An evaluation of the relationship between mood and binge eating in the natural environment using ecological momentary assessment. *International Journal of Eating Disorders, 32*(3), 352-361.
- Weltzin, T. E., Weisensel, N., Franczyk, K. B., Burnett, K., Klitz, C., & Bean, P. (2005). Eating disorders in men: Update. *Journal of Men's Health & Gender, 2*(2), 186-193.
- Wheeler, H. A., Adams, G. R., & Keating, L. (2001). Binge eating as a means for evading identity issues: The association between an avoidance identity style and bulimic behavior. *Identity, 1*(2), 161-178.
- Wilfley, D. E., Schwartz, M. H., Spurrell, E. B., & Fairburn, C. G. (2000). Using the eating disorder examination to identify the specific psychopathology of binge eating disorder. *International Journal of Eating Disorders, 27*(3), 259-269.
- Womble, L. G., Williamson, D. A., Martin, C. K., Zucker, N. L., Thaw, J. M., Netemeyer, R., Lovejoy, J. C., & Greenway, F. L. (2001). Psychosocial variables associated with binge eating in obese males and females. *International Journal of Eating Disorders, 30*(2), 217-221.

- Woodside, D. B., Garfinkel, P. E., Lin, E., Goering, P., Kaplan, A. S., Goldbloom, D. S., & Kennedy, S. H. (2001). Comparisons of men with full or partial eating disorders in the community. *American Journal of Psychiatry, 158*(4), 570-574.
- Yanovski, S. Z. (2003). Binge eating disorder and obesity in 2003: Could treating an eating disorder have a positive effect on the obesity epidemic? *International Journal of Eating Disorders, 34*(Suppl.), S117-S120.
- Yanovski, S. Z., Leet, M., Yanovski, J. A., Flood, M., Gold, P. W., Kissileff, H. R., & Walsh, T. B. (1992). Food selection and intake of obese women with binge-eating disorder. *American Journal of Clinical Nutrition, 56*(6), 975-980.
- Yanovski, S. Z., Nelson, J. E., Dubbert, B. K., & Spitzer, R. L. (1993). Association of binge eating disorder and psychiatric comorbidity in obese subjects. *The American Journal of Psychiatry, 150*(10), 1472-1479.

Appendix A Consent

Thank you for participating in this research project about the relationship between psychological factors and health behaviors. Before you agree to continue, you need to know why we are doing this research, what we will be asking you to do, and that your participation will be completely anonymous. Please read the following information carefully.

What will you have to do? In this study, you will be asked to fill out an online survey that will take about 15-20 minutes to complete. Questions on the survey will ask about your body image, your mood, your weight history, your physical activity levels, your smoking habits, your anxiety, and for women, your menopausal status. Additional demographic and background information such as your age, weight, marital status, and employment will also be asked.

Who are the researchers? This study is being conducted by Dr. Karen Saules and Dr. Flora Hoodin, and their graduate students David Scott, Kevin Alschuler, Nancy Angelella, and Amy Collings all of the Department of Psychology at Eastern Michigan University.

What do they hope to find out? The researchers are trying to understand how psychological factors may be related to specific health behaviors.

Why is this research important? The impact of psychological factors on certain health behaviors, such as successful weight maintenance, smoking habits, and physical activity are unclear. The research team is hopeful that the information obtained through this research will contribute to our understanding of what role psychological factors may play in certain health behaviors in order to help people live healthier lives.

Who can participate? To take part in this study, you must be at least 18 years old.

How will your privacy and confidentiality be respected? Your responses are confidential and will remain anonymous because no personally identifying information is included in the questionnaires. Your answers will be identified by a code number only. However, the Institutional Review Board at Eastern Michigan University or federal agencies with appropriate regulatory oversight may review the records.

What if you decide to stop? Taking part in this study is completely voluntary and you have the right to stop participating at any time. We appreciate as much information as you are comfortable providing.

What are the risks? There are no known or anticipated risks of participating in this study. If, however, answering this survey causes you distress for which you might

like some assistance, please note that low cost psychological services may be available through the EMU Psychology Clinic (734.487.4987). You may also call the Principal Investigator, Dr. Saules (at the same number), and she will be happy to speak with you about other referral sources that might be able to assist you.

Is there compensation? You will not be paid for taking part in the study.

What will be done with the results? The results will be sent to scientific journals for publication and to professional conferences for presentation to other professionals. As a participant, you are entitled to meet with the researchers to obtain the results of the study and for any other questions or concerns.

What if you feel that you know enough about the study and wish to take part? By completing and submitting the questionnaire, you will be giving informed consent for the researchers to use the information you provide.

Whom should you contact if you have questions about your rights as a research participant? You may contact the Eastern Michigan University Institutional Human Subjects Review Committee (Dr. Patrick Melia or Dr. Steven Pernecky at 734.487.0042).

Whom should you contact if you have questions about the study? Please contact Dr. Karen Saules (734.487.4987 or ksauls@emich.edu) or Dr. Flora Hoodin (734.487.1155 or fhoodin@emich.edu) of the Eastern Michigan University Department of Psychology if you have any questions or concerns.

If you have read all of the above and would like to take part in this study, click the NEXT button below. By doing so, you are giving informed consent for us to use your responses in this study.

If you do not wish to take part in this study, just close this window.

Appendix B Demographic Variables

1. How old are you? _____ years
2. Are you Male? Female Transgender
3. Some people identify themselves as belonging to one or more racial or ethnic groups. Please check the box(es) below which correspond to group(s) you belong to:
 - White or Caucasian
 - Black or African-American
 - Hispanic or Latino
 - American Native
 - Alaskan Native
 - Asian
 - Pacific Islander

Do you consider yourself to be of any other race or ethnic group? Yes No
If so, what is it? _____
4. How many years of education have you completed?
(Completing High school or its equivalent is 12 years) _____ years of education
5. What is your current marital status?
Please check one:
 - Married
 - Single
 - Divorced
 - Remarried
 - Widowed
 - Separated
 - Living with partner
 - Same Sex Partner
 - Opposite Sex Partner
6. What is your current employment status?
Please check one:
 - Full Time (>35 hrs/wk)
 - Part Time (Regular hours)
 - Part Time (Irregular hours)
 - Unemployed, full time student
 - Unemployed, part time student
 - Retired/Disability
 - Military Service
7. What is the economic status of your current household?
Please check one:
 - We have barely enough to get by
 - We have enough to get by, but no more
 - We are solidly middle class
 - We have plenty of “extras”
 - We have plenty of “luxuries”
 - Don’t know/unsure/prefer not to say

8. What is your annual household income?

(Circle One Answer)

- \geq \$150,000
- \$100,000-\$149,000
- \$75,000-\$99,000
- \$50,000-\$74,000
- \$25,000-\$49,000
- \$10,000-\$24,000
- \leq \$9,000
- Don't know, or prefer not to say

Appendix C
PHQ-9

Over the <u>last 2 weeks</u> , how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things.....	0	1	2	3
2. Feeling down, depressed, or hopeless.....	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much.....	0	1	2	3
4. Feeling tired or having little energy.....	0	1	2	3
5. Poor appetite or overeating.....	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down.....	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television.....	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving .around a lot more than usual.....	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way.....	0	1	2	3

(For office coding: Total Score ____ = ____ + ____ + ____)

If you checked off any problems (items B1-B9), how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult
at all

Somewhat
difficult

Very
difficult

Extremely
difficult

Appendix D
PHQ-7

Over the <u>last 2 weeks</u> , how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something might happen	0	1	2	3

Appendix E MBSRQ-AS

Below you will see a series of statements about how people might think, feel, or behave. Please indicate the extent to which each statement pertains to you personally. To preserve confidentiality, please do not write your name on any of the materials. Read each statement carefully and decide how much it pertains to you personally. Using a scale like the one below, indicate your answer by entering it to the left of the number of the statement.

EXAMPLE

_____ I am usually in a good mood.

In the blank space, enter a 1 if you definitely disagree with the statement;
 Enter a 2 if you mostly disagree;
 Enter a 3 if you neither agree nor disagree;
 Enter a 4 if you mostly agree;
 Or enter a 5 if you definitely agree with the statement.

There are no right or wrong answers. Just give the answer that is most accurate for you. Remember, your responses are confidential, so please be completely honest and answer all the items.

1	2	3	4	5
Definitely Definitely Disagree Agree	Mostly Disagree	Neither Agree Nor Disagree	Mostly Agree	

- _____ 1. My body is sexually appealing.
- _____ 2. I constantly worry about being or becoming fat.
- _____ 3. I like my looks just the way they are.
- _____ 4. I am very conscious of even small changes in my weight.
- _____ 5. Most people would consider me good-looking.
- _____ 6. I like the way I look without my clothes on.
- _____ 7. I like the way clothes fit me.
- _____ 8. I dislike my physique.
- _____ 9. I am physically unattractive.
- _____ 10. I am on a weight-loss diet.

For the remainder of the items use the response scale given with the item and enter your answer in the space beside the item.

11. I have tried to lose weight by fasting or going on crash diets. . _____
1. Never
 2. Rarely
 3. Sometimes

4. Often
5. Very Often

12. I think I am: _____

1. Very Underweight
2. Somewhat Underweight
3. Normal Weight
4. Somewhat Overweight
5. Very Overweight

13. From looking at me, most other people would think I am: _____

1. Very Underweight
2. Somewhat Underweight
3. Normal Weight
4. Somewhat Overweight
5. Very Overweight

Scoring Algorithm

Appearance Evaluation

Recode numbers: 8, 9 (1=5, 2=4, 3=3, 4=2, 5=1)

Total = $(ap1 + ap3 + ap5 + ap6 + ap7 + ap8r + ap9r) / 7$

Self-Classified Weight

No recoding

Total = $(ap12 + ap13) / 2$

Overweight Preoccupation

No recoding

Total = $(ap2 + ap4 + ap10 + ap11) / 4$

Appendix F Weight History

- 1(5). How tall are you? _____ feet _____ inches
- 2(6). How much do you weigh now? _____ pounds
- 3(7). What has been your highest weight ever (when NOT pregnant)? _____
4. How old were you when you first reached this weight? _____
- 5(8). Have you ever been overweight by at least 10 pounds as a child or 15 pounds as an adult (when NOT pregnant)? Yes No Not Sure
- IF YES: How old were you when you were first overweight (at least 10 pounds as a child or 15 pounds as an adult)? If you are not sure, what would be your best guess? _____ years
- 6(9). How many times (approximately) have you lost 20 pounds or more (when you weren't sick) and then gained it back?
- Never
 - Once or twice
 - Three or four times
 - Five times or more
- 7(10). During the past six months, did you often eat within any 2 hour period what most people would regard as an unusually large amount of food? Yes No
- IF NO: SKIP TO QUESTION → 12(15)
- 8(11). During the times when you ate this way, did you often feel you couldn't stop eating or couldn't control what or how much you were eating? Yes No
- IF NO: SKIP TO QUESTION → 12(15)
- 9(12). During the past six months, how often, on average, did you have times when you ate this way – that is, large amounts of food plus the feeling that your eating was out of control? (There may have been some weeks when it was not present – just average those in.)
- Less than one day a week
 - One day a week
 - Two or three days a week
 - Four or five days a week
 - Nearly every day
- 10(13). Did you usually have any of the following experiences during those occasions?
- a. Eating much more rapidly than usual?..... Yes No
 - b. Eating until you felt uncomfortably full?..... Yes No
 - c. Eating large amounts of food when you didn't feel physically hungry?..... Yes No
 - d. Eating alone because you were embarrassed by how much you were eating?..... Yes No

- e. Feeling disgusted with yourself, depressed,
or very guilty after overeating?..... Yes No

11(14). Think about a typical time when you ate this way – that is, large amounts of food plus the feeling that your

eating was out of control.

- a. What time of day did the episode start?
1. Morning (8am- 12 Noon)
 2. Early afternoon (12 Noon – 4pm)
 3. Late afternoon (4pm – 7pm)
 4. Evening (7pm-10pm)
 5. Night (After 10pm)
- b. Approximately how long did this episode of eating last, from the time you started to eat until when you stopped and didn't eat again for at least two hours?

_____ hours _____ minutes

- c. As best you can remember, please list everything you might have eaten or drank during that episode. If you ate for more than two hours, describe the food eaten and liquids drunk during the two hours when you ate the most. Please be specific – include brand names where possible, and amounts as best you can estimate (For example, 7 ounces Ruffles potato chips; 1 cup Breyer's chocolate ice cream with 2 teaspoons hot fudge; 2 8-ounce glasses of Coca-cola; 1 ½ ham and cheese sandwiches with mustard).

- d. At the time this episode started, how long had it been since you had previously finished eating a meal or snack?

_____ hours _____ minutes

12(15) In general, during the past six months, how upset were you by overeating (eating more than you think is best

for you)?

- Not at all
 Slightly
 Moderately
 Greatly
 Extremely

13(16) In general, during the past six months, how upset were you by the feeling that you couldn't stop eating or

control what or how much you were eating?

- Not at all
 Slightly
 Moderately
 Greatly
 Extremely

14(17). During the past six months, how important to you has your weight or shape been in how you feel about or

evaluate yourself as a person – as compared to other aspects of your life, such as how you do at work/school, as a parent, or how you get along with people?

1. Weight and shape were not very important
2. Weight and shape played a part in how you felt about yourself
3. Weight and shape were among the main things that affected how you felt about yourself
4. Weight and shape were the most important things that affected how you felt about yourself

15(18). During the past three months, did you ever make yourself vomit to avoid gaining weight after binge eating?..... Yes No

IF YES: How often, on average, was that?

1. Less than once a week
2. Once a week
3. Two or three times a week
4. Four or five times a week
5. More than five times a week

16(19). During the past three months, did you ever take more than twice the recommended dose of laxatives to avoid

gaining weight after binge eating?..... Yes No

IF YES: How often, on average, was that?

1. Less than once a week
2. Once a week
3. Two or three times a week
4. Four or five times a week
5. More than five times a week

17(20). During the past three months, did you ever take more than twice the recommended dose of diuretics (water

pills) to avoid gaining weight after binge eating?..... Yes No

IF YES: How often, on average, was that?

1. Less than once a week
2. Once a week
3. Two or three times a week
4. Four or five times a week
5. More than five times a week

18(21). During the past three months, did you ever fast – not eat anything at all for at least 24 hours -- to avoid gaining weight after binge eating?..... Yes No

IF YES: How often, on average, was that?

1. Less than one day a week
2. One day a week
3. Two or three days a week
4. Four or five days a week
5. Nearly every day

19(22). During the past three months, did you ever exercise for more than an hour specifically to avoid gaining weight after binge eating?..... Yes No

IF YES: How often, on average, was that?

1. Less than once a week
2. Once a week
3. Two or three times a week
4. Four or five times a week

5. More than five times a week

20(23). During the past three months, did you ever take more than twice the recommended dose of a diet pill to avoid gaining weight after binge eating?..... Yes No

IF YES: How often, on average, was that?

1. Less than once a week
2. Once a week
3. Two or three times a week
4. Four or five times a week
5. More than five times a week

21(24). During the past six months, did you go to any meetings of an organized weight control program? (like Weight Watchers, Optifast, Nutrisystem, Curves) or a self-help group (like TOPS, Overeaters

Anonymous,

etc.)?..... Yes No

IF YES: Name of program: _____

22(25). Since you have been an adult – 18 years old – how much of the time have you been on a diet, been trying to

follow a diet, or in some way been limiting how much you were eating to lose weight or to keep from regaining weight you had lost? Would you say...

1. None or hardly any of the time
2. About a quarter of the time
3. About half the time
4. About three-quarters of the time
5. Nearly all of the time

23(26). SKIP THIS QUESTION IF YOU NEVER LOST AT LEAST 10 POUNDS BY DIETING. How old were

you the first time you lost at least 10 pounds by dieting or in some way limiting the amount you ate? If

you are not sure, what is your best guess? _____ years old

24(27) SKIP THIS QUESTION IF YOU NEVER HAD EPISODES OF EATING UNUSUALLY LARGE AMOUNTS OF FOOD ALONG WITH A SENSE OF LOSS OF CONTROL. How old were you when

you first had times when you ate large amounts of food and felt that your eating was out of control? If you

are not sure, what is your best guess? _____ years old.

Note that numbers in parentheses correspond to the scoring algorithm previously described.

Appendix G Physical Activity

E1. During the PAST YEAR, about how many HOURS PER WEEK ON AVERAGE did you spend exercising or involved in sports? NOTE: Your estimate should include all activities which have involved sustained cardiovascular or respiratory endurance -- both the activities that you might do alone, e.g., using a treadmill, as well as those you might do with other people, e.g., playing a team sport that requires sustained physical activity.

_____ hours per week

E2. How long have you been exercising/playing sports at this level of involvement?

_____ Months OR _____ Years

E3. In the past 12 months, have you participated in any of the following activities?
Please check all that apply:

Aerobics	_____ days/week	for _____ minutes/day
Baseball/Softball	_____ days/week	for _____ minutes/day
Basketball	_____ days/week	for _____ minutes/day
Cycling	_____ days/week	for _____ minutes/day
Dancing	_____ days/week	for _____ minutes/day
Football	_____ days/week	for _____ minutes/day
Golf	_____ days/week	for _____ minutes/day
Gymnastics	_____ days/week	for _____ minutes/day
Hockey (field/ice)	_____ days/week	for _____ minutes/day
Martial Arts	_____ days/week	for _____ minutes/day
Racquet Sports	_____ days/week	for _____ minutes/day
Rowing (crew, canoe, kayak)	_____ days/week	for _____ minutes/day
Running	_____ days/week	for _____ minutes/day
Skiing (water, snow, x-c'ntry)	_____ days/week	for _____ minutes/day
Soccer	_____ days/week	for _____ minutes/day
Swimming	_____ days/week	for _____ minutes/day
Tennis	_____ days/week	for _____ minutes/day
Volleyball	_____ days/week	for _____ minutes/day
Walking	_____ days/week	for _____ minutes/day
Weight Training	_____ days/week	for _____ minutes/day
Wrestling	_____ days/week	for _____ minutes/day
Other: _____	_____ days/week	for _____ minutes/day

Appendix H Cigarette Smoking

1. Please indicate which statement best describes your smoking status and provide additional information as requested:

_____ I currently smoke cigarettes. I usually smoke _____ cigarettes/day on _____ days/week. I have smoked for a total of _____ years.

_____ I used to be a smoker. I smoked for a total of _____ years. At the time when I smoked the most, I smoked around _____ cigarettes/day on _____ days/week. The last time I smoked was _____

_____ I have never been a regular smoker, but I have smoked between 1 and 100 cigarettes in my life.

_____ I have never tried even one cigarette.

2. Have you smoked more than a total of 100 cigarettes in your lifetime?

Yes

No

*If you have smoked more than a total of 100 cigarettes in your lifetime,
please answer the following questions.*

2a. How long ago did you last quit (or try to quit) smoking?

- a) within the past 2 weeks
- b) within the past month
- c) within the past 3 months
- d) within the past 6 months
- e) within the past year
- f) over a year ago
- g) never

2b. After that quit attempt, how long did you remain a nonsmoker?

- a) I am still a nonsmoker
- b) Over one year
- c) Six months to less than one year
- d) Three months to less than six months
- e) Two months
- f) One month
- g) _____ days
- h) less than one day

2c-a. What is the longest period of time that you have ever gone without smoking?

- a) less than a day
- b) less than one week
- c) less than one month
- d) 1-3 months
- e) 3-6 months
- f) 6-12 months
- g) over one year

2c-b. When did that longest period of smoking abstinence BEGIN?

_____ (Month/Day/Year)

2c-c. When did that longest period of smoking abstinence END?

_____ (Month/Day/Year)

2d. How concerned are (were) you about gaining weight if you stopped smoking?

Please circle a number:

Not at all		Somewhat		Very Much		Extremely
1	2	3	4	5	6	7

2e. Are (were) you concerned that you might relapse to smoking because of gaining weight after you quit?

Please circle a number:

Not at all		Somewhat		Very Much		Extremely
1	2	3	4	5	6	7

2f. How many pounds are you (were you) willing to gain after quitting smoking? _____ pounds

2g. Did you wait to try to quit smoking until you had successfully lost weight and/or maintained weight loss?
(answer all that apply)

a) Yes, I waited until I lost _____ pounds before trying to quit smoking

b) Yes, I waited until I had maintained my weight loss for _____ weeks before trying to quit smoking.

c) No, I did not worry about gaining weight if I tried to quit smoking.

Note that items in bold were used for the data analyses.

Appendix I
BMI

1. How tall are you?
Feet:
Inches:
2. How much do you weigh now?
Pounds:

Appendix J
QEWP-R Scoring Algorithm

Decision Rules for Scoring the QEWP-R

Diagnosis of BED

Question Number	Response
10 AND 11	1 (Binge eating)
12	3, 4, or 5 (At least 2 days per week for six months)
13 (a through e)	3 or more items marked “Yes” (At least 3 associated symptoms during binge eating episodes)
15 OR 16	4 or 5 (Marked distress regarding binge eating)
<p>Diagnosis of BED requires all of the above along with the absence of purging or non-purging bulimia nervosa as described below.</p>	
18, 19, OR 20	ANY response 3, 4, or 5 (Purging at least 2 times per week for three months)

