Binge Eating Disorder and Its Relationship to Bulimia Nervosa and Obesity

Lara Schultz LaCaille
Utah State University

Follow this and additional works at: https://digitalcommons.usu.edu/etd
Part of the Psychology Commons

Recommended Citation
LaCaille, Lara Schultz, "Binge Eating Disorder and Its Relationship to Bulimia Nervosa and Obesity" (2002). All Graduate Theses and Dissertations. 6192.
https://digitalcommons.usu.edu/etd/6192

This Dissertation is brought to you for free and open access by the Graduate Studies at DigitalCommons@USU. It has been accepted for inclusion in All Graduate Theses and Dissertations by an authorized administrator of DigitalCommons@USU. For more information, please contact digitalcommons@usu.edu.
BINGE EATING DISORDER AND ITS RELATIONSHIP TO
BULIMIA NERVOSA AND OBESITY

by

Lara Schultz LaCaille

A dissertation submitted in partial fulfillment
of the requirements for the degree

of

DOCTOR OF PHILOSOPHY

in

Psychology

Approved:

UTAH STATE UNIVERSITY
Logan, Utah
2002
ABSTRACT

Binge Eating Disorder and Its Relationship to Bulimia Nervosa and Obesity

by

Lara Schultz LaCaille, Doctor of Philosophy

Utah State University, 2002

Major Professor: Dr. David M. Stein
Department: Psychology

Recent research indicates that 2% to 4% of the population meet diagnostic criteria for the newly proposed binge eating disorder, and that it is much more common (30%) among the treatment-seeking obese. Although recognized as a significant problem, binge eating disorder is not well understood, and there is debate about whether binge eating disorder is a distinct disorder. It has been argued that binge eating disorder is simply a variant or milder form of bulimia nervosa and not a separate and distinct disorder. Researchers have begun to study this population in greater depth in order to assess the characteristics of individuals with binge eating disorder, the similarities and differences between individuals with binge eating disorder, bulimia nervosa, and obese individuals who do not engage in binge eating, and the effectiveness of various treatments for binge eating disorder. Previous reviews of the literature (using non-meta-analytic strategies) have examined these areas and have yielded inconsistent conclusions. Therefore, a more comprehensive, current, and empirical integration of the data was conducted.

In total, 297 studies of individuals with binge eating disorder, bulimia nervosa and/or obese individuals who do not engage in binge eating were collected, coded, and statistically analyzed across studies (by calculating standardized mean difference effect sizes). The key characteristics
of individuals with binge eating disorder were assessed, diagnostic groups were systematically compared, and treatment outcomes (from 19 studies) were evaluated. The results indicated that individuals with binge eating disorder have a number of differences from both bulimia nervosa and obese nonbinge eating individuals. However, the extent of these differences was not great, and there was a general trend for binge eating disorder individuals to fall between the two groups on most measures of disturbed eating and psychopathology. These findings tend to support the continuum/variant conceptualization of binge eating disorder rather than that of a distinct disorder. In addition, data from primary research studies on the treatment of binge eating disorder indicated that, overall, psychosocial interventions were helpful in decreasing binge eating and psychopathological symptoms, but were less effective at reducing weight. The clinical implications of these findings are discussed, as are suggestions for future research.
ACKNOWLEDGMENTS

I would like to sincerely thank Dr. David Stein for his guidance throughout the multiple stages and drafts of this project. His insightful comments and careful edits helped to produce a dissertation that I hope will meaningfully contribute to the field of psychology. I also appreciate his continual support throughout my graduate school experience. I would also like to thank Dr. Kevin Masters, Dr. Mary Doty, Dr. Scott DeBerard, and Dr. Edward Heath for serving on my committee and for their assistance and thoughtful feedback on this project. Finally, I would like to thank my husband, Rick LaCaille, who is not only an exceptional editor and coder, but has also offered his unending support, encouragement, and enthusiasm throughout this project.

Lara Schultz LaCaille
CONTENTS

ABSTRACT ........................................................................................................................ iii

ACKNOWLEDGMENTS ...................................................................................................... v

LIST OF TABLES .............................................................................................................. viii

LIST OF FIGURES ........................................................................................................... x

CHAPTER

I. STATEMENT OF THE PROBLEM .................................................................................. 1

II. REVIEW OF THE LITERATURE ................................................................................ 5

 Babylon Eating Disorder: History, Diagnosis, and Prevalence ........................................ 5
 Critique of Previous Reviews .......................................................................................... 10
 Characteristics Examined in the Meta-Analysis ............................................................... 18
 Conclusions ..................................................................................................................... 32
 Purpose and Research Questions ...................................................................................... 32

III. METHODS .................................................................................................................. 34

 Design ................................................................................................................................ 34
 Locating Studies ............................................................................................................... 36
 Coding and Calculation of Effect Sizes for Within-Study Comparison of Groups ............ 41
 Analysis and Calculation of Between-Study Effect Sizes ............................................... 44

IV. RESULTS .................................................................................................................... 51

 Description of Analyzed Studies ..................................................................................... 51
 Intercoder Agreement ....................................................................................................... 55
 Comparison of Subjects from the “Other” Category Versus “Binge Eating Disorder” Category ...................................................................................................................... 55
 Descriptive Findings of Individuals with Binge Eating Disorder ..................................... 58
 Diagnostic Group Comparisons ....................................................................................... 61
 Other Measures of Psychopathology ................................................................................ 74
 Effect of Study Variables ................................................................................................. 75
 Treatment Study Findings ................................................................................................. 80
### V. DISCUSSION

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics of Individuals with BED</td>
<td>91</td>
</tr>
<tr>
<td>Diagnostic Group Differences</td>
<td>95</td>
</tr>
<tr>
<td>Binge Eating Disorder as a Distinct Disorder Versus a Variant of</td>
<td></td>
</tr>
<tr>
<td>Bulimia Nervosa</td>
<td>103</td>
</tr>
<tr>
<td>Summary of Findings Related to Decision Rules</td>
<td>106</td>
</tr>
<tr>
<td>Treatment Effectiveness for Binge Eating Disorder</td>
<td>107</td>
</tr>
<tr>
<td>Summary and Clinical Implications</td>
<td>110</td>
</tr>
<tr>
<td>Limitations and Future Research</td>
<td>112</td>
</tr>
</tbody>
</table>

### REFERENCES

**APPENDIXES**

<table>
<thead>
<tr>
<th>Appendix A:</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coding Sheet</td>
<td>128</td>
</tr>
<tr>
<td>Appendix B:</td>
<td></td>
</tr>
<tr>
<td>Conventions for Coding</td>
<td>133</td>
</tr>
<tr>
<td>Appendix C:</td>
<td></td>
</tr>
<tr>
<td>Studies Included in the Meta-Analysis</td>
<td>139</td>
</tr>
<tr>
<td>Appendix D:</td>
<td></td>
</tr>
<tr>
<td>Formulas</td>
<td>162</td>
</tr>
<tr>
<td>Appendix E:</td>
<td></td>
</tr>
<tr>
<td>Additional Tables</td>
<td>164</td>
</tr>
</tbody>
</table>

### CURRICULUM VITAE

169
LIST OF TABLES

Table | Page
-----|-----
1 | Summary of Previous Review of the Literature on Binge Eating Disorder | 11
2 | Decision Rules for Supporting a Continuum Versus a Distinctness Model of BED | 49
3 | Number of Samples and Subjects in the Meta-Analysis | 51
4 | Description of Study Characteristics | 53
5 | Intercoder Agreement of Study Variables | 55
6 | Comparison of Subjects Classified as BED Versus Those Classified as “Other” | 57
7 | Means and Standard Deviations of Subject Variables for Individuals with Binge Eating Disorder | 59
8 | Grand Mean Effect Size Comparisons of Diagnostic Groups on Personal Characteristics | 62
9 | Grand Mean Effect Sizes of Diagnostic Group Differences on Subject Variables | 63
10 | Comparison of Diagnostic Groups on Personal Characteristics | 69
11 | Grand Means and Standard Deviations of Subject Variables for Each Diagnostic Group and Standardized Mean Difference Effect Sizes | 70
12 | Standardized Mean Difference Effect Size Comparisons of Study Variables for Individuals with Binge Eating Disorder: Diagnostic Method, Diagnostic Criteria, and Study Quality | 76
13 | Standardized Mean Difference Effect Size Comparisons of Study Variables for Individuals with Binge Eating Disorder: Sample Type | 77
14 | Overall Mean Effect Sizes at Posttreatment | 81
15 | Effect Sizes at Posttreatment for Placebo-Controlled Pharmacological Studies | 82
16 | Effect Sizes at Posttreatment and Follow-Up for Uncontrolled (Pre-Post Only) Pharmacological or Medical Interventions | 82
17 | Effect Sizes at Posttreatment for Wait-List Controlled Psychosocial Studies | 83
<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 Within-Groups Effect Sizes at Posttreatment and Follow-Up for Uncontrolled Psychosocial Treatment Studies</td>
<td>84</td>
</tr>
<tr>
<td>19 Effect Sizes at Posttreatment for Uncontrolled (Pre-Post Only) Psychosocial + Pharmacological Studies</td>
<td>85</td>
</tr>
<tr>
<td>20 Within-Groups Effect Sizes for Controlled Studies</td>
<td>86</td>
</tr>
<tr>
<td>21 Differences in Treatment Outcome Between Studies of High Versus Fair Quality</td>
<td>90</td>
</tr>
<tr>
<td>22 Means, Standard Deviations, and Standardized Mean Differences of Key Subject Variables Based on Study Quality for Individuals with Binge Eating Disorder</td>
<td>165</td>
</tr>
<tr>
<td>23 Means, Standard Deviations, and Standardized Mean Differences of Key Subject Variables Based on Method of Diagnosis for Individuals with Binge Eating Disorder</td>
<td>166</td>
</tr>
<tr>
<td>24 Means, Standard Deviations, and Standardized Mean Differences of Key Subject Variables Based on Diagnostic Criteria for Individuals with Binge Eating Disorder</td>
<td>167</td>
</tr>
<tr>
<td>25 Means, Standard Deviations, and Standardized Mean Differences of Key Subject Variables Based on Sample Type for Individuals with Binge Eating Disorder</td>
<td>168</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DSM-IV diagnostic criteria for binge eating disorder</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>DSM-IV diagnostic criteria for bulimia nervosa</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Standardized mean difference for BN - BED on measures of eating pathology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and weight/shape concern</td>
<td>72</td>
</tr>
<tr>
<td>4</td>
<td>Standardized Mean difference for ONB - BED on measures of eating pathology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and weight/shape concerns</td>
<td>72</td>
</tr>
<tr>
<td>5</td>
<td>Standardized mean difference for BN - BED on measures of psychopathology</td>
<td>73</td>
</tr>
<tr>
<td>6</td>
<td>Standardized mean difference for ONB - BED on measures of psychopathology</td>
<td>73</td>
</tr>
</tbody>
</table>
CHAPTER I  
STATEMENT OF THE PROBLEM

It has long been recognized that there is a subset of the population with eating disorders that engages in frequent binge eating, but does not utilize compensatory purging behaviors (which typifies the individual with bulimia nervosa). However, it was only recently that this problem was codified as a potential mental disorder worthy of additional research by the American Psychiatric Association (APA; Diagnostic and Statistical Manual of Mental Disorders, 4th ed., 1994). This research diagnosis has been designated “binge eating disorder” (BED). Recent research indicates a relationship between BED and being overweight. Indeed, approximately 30% of adults receiving treatment for obesity meet diagnostic criteria for BED (deZwaan, Nutzinger, & Schoenbeck, 1992; Spitzer et al., 1992; Spitzer, Yanovski, et al., 1993). Although BED is less common in the nonclinical, community population, the prevalence rate has been found to be 2% to 4%, making it a significant problem that deserves attention.

As a research diagnosis, the criteria for BED are still under active discussion and refinement. One current point of debate is whether BED can truly be distinguished from bulimia nervosa (BN). Some investigators have suggested that BED is simply a milder form of BN, and therefore BED should not be viewed as a distinct disorder (e.g., Hay & Fairburn, 1998; Hudson et al., 1988; McCann & Agras, 1990). However, others feel that BN and BED do not merely fall on a continuum of binge eating behavior (of frequency or severity), but are separate disorders, that can be differentiated by characteristics of individuals with each of these disorders (e.g., Antony, Johnson, Carr-Nangle, & Abel, 1994; Spitzer, Stunkard, et al., 1993). A key feature differentiating BN and BED is whether compensatory behaviors (e.g., purging, laxative abuse) are used. The American Psychiatric Association (1994) has asserted that BED and BN are distinct disorders based, in part, on this behavioral difference. However, given the high degree of similarity of most other key symptoms, it is logical to ask whether BED is simply a variant (or
milder form) of BN, or whether there is substantive evidence that they have different etiologies (and thus only “appear” to be similar in presentation). Comparing possible etiological variables and characteristics of individuals with the proposed diagnosis of BED to persons with BN and other eating problems (i.e., obesity) is a step in determining whether BED is a distinct disorder.

In a number of recent studies, researchers have compared characteristics of individuals with BED, bulimia, and obese nonbinge eaters (ONB), and it is valuable to examine these findings collectively. Specifically, variables such as onset of eating-related behavior, eating-disordered behavior, weight and shape concerns, psychopathology, and family characteristics have all been examined in these populations, and may provide clues as to why some individuals engage in binge behavior while others refrain, and more importantly, why some use purging behaviors while others do not.

It is also noteworthy that many findings from individual studies that describe or compare the characteristics of individuals with BED versus those with bulimia and nonbinging obese persons have been inconsistent. For example, some researchers have found that persons with BED have no greater frequency of mental disorders than nonbinging obese persons (e.g., Brody, Walsh, & Devlin, 1994), whereas others have found significantly higher rates of psychopathology among BED individuals (e.g., Telch & Agras, 1994). There are likely a number of reasons for these inconsistencies, such as differences in the populations from which samples were selected, small sample sizes, biases of diagnostic methods (i.e., interview vs. questionnaire), and differences in diagnostic criteria.

By studying individuals with BED and correlated disorders, such as bulimia and obesity, it may become more apparent whether further refinements should be made in diagnostic criteria (i.e., perhaps BED should be codified as a variant of BN rather than a separate disorder). Such a differentiation has important implications for the treatment of individuals with these disorders.
For example, it is commonly thought that if the eating behavior of individuals with BED is “typical” of nonbinging obese persons, they should receive medical and nutritional treatment as opposed to psychological treatment (although traditional weight loss programs have been unsuccessful for most obese individuals without BED). Interestingly, it has been noted that individuals with BED do more poorly in, and are more likely to relapse and drop out of traditional weight loss programs than nonbinge eating obese individuals (Gormally, Rardin, & Black, 1980; Marcus, Wing, & Hopkins, 1988). Due to this especially poor response to traditional programs as well as indications that BED individuals have many characteristics similar to bulimics, it has been suggested that this population may benefit from treatment programs designed for persons with BN (Kirkley, Kolotkin, Hernandez, & Gallagher, 1992).

Clearly, understanding how individuals with BED are similar to and distinct from bulimics and nonbinging obese individuals should affect treatment recommendations. If it can be determined that BED is a milder variant of BN, clinicians have reason to implement treatments that have traditionally been successful with bulimics. If, on the other hand, BED appears distinct, it is important to understand the additional issues that may need to be considered and addressed in the treatment of these individuals.

Several researchers have offered literature reviews that attempt to integrate and compare characteristics of individuals with BN, BED, and obesity. However, certain limitations or methodological problems exist with these reviews (e.g., narrative in form, limited in scope). Further, there has been a substantial increase in the volume of research conducted since the time of most of these reviews.

The current meta-analytic study was conducted to address these limitations and thus better understand the degree to which BED, BN, and obesity may be separate and distinct disorders, or whether BED is simply a milder form of BN (with compensatory behaviors falling
along a continuum of severity). To this end, data from primary research studies on characteristics and treatments of persons with BED, BN, and obesity were collected, coded, and statistically analyzed across studies (i.e., comparing overall means for each diagnostic group for each subject characteristic and calculating effect sizes for differences between groups). Additionally, because findings between studies have been inconsistent, several study variables (e.g., diagnostic method, sample differences) were systematically examined in order to determine how they might influence research findings. Finally, outcomes of treatment studies were aggregated and compared (using effect sizes) in order to assess the effectiveness of various interventions for individuals with BED.
CHAPTER II
REVIEW OF THE LITERATURE

This literature review was conducted to examine the need for a comprehensive and empirical integration of the research comparing individuals diagnosed with BED versus those with BN and those who are obese but do not engage in binge eating (ONB). It was also conducted to determine which subject and study characteristics are considered key, when considering possible similarities and differences between populations defined as BED versus BN and ONB. The history and prevalence of BED will first be described, followed by a critique of previous literature reviews examining characteristics of individuals with BED. Each of the different subject and treatment characteristics that were selected to be analyzed in the current meta-analysis will also be discussed, as will the study variables that may explain different results across studies.

Binge Eating Disorder: History, Diagnosis, and Prevalence

Although binge eating was identified as a distinct eating disturbance over 40 years ago by Stunkard (1959), it has only recently received substantial attention. Prior to the DSM-IV (1994), the only recognized disorder involving binge eating was BN. Historically, to be diagnosed as "bulimic," the individual had to engage in some form of compensatory (purging) behavior following a binge episode (i.e., self-induced vomiting, excessive laxative or diuretic use, fasting, or excessive exercise). Over the years, many researchers and clinicians have gradually recognized that a number of individuals exist who do not fully meet criteria for BN, yet regularly engage in binge eating. This issue has presented problems for clinicians regarding how to best diagnose and treat these individuals.
Some researchers have referred to this population as "compulsive eaters," "nonpurging bulimics," or "obese binge eaters" (e.g., Lazarus & Galassi, 1994; Marcus et al., 1990). These labels have been inconsistently applied, though, which has further added to the confusion about disorders of binge eating. A review of the literature revealed that the term "compulsive eaters" seems to refer to any persons who engage in binge eating, while "obese binge eaters" denotes those who are obese, engage in binge eating, and may or may not have other criteria of BN. "Nonpurging bulimics" tends to refer to a more specific group of individuals who share all diagnostic criteria of BN, except for purging. What becomes more problematic is that the term "purging" has been inconsistently defined across studies. As noted previously, prior to the DSM-IV (1994), the APA considered all forms of serious compensatory behaviors, including fasting and excessive exercise as purging. However, many researchers strictly limit the term "purging" to vomiting and laxative use, and include individuals who engage in other forms of compensation in the "nonpurging" category.

The APA (DSM-IV, 1994) recently listed BED as a potentially distinct eating disorder, but one that merits further study. Therefore, it is not included among the formal listing of mental disorders in the DSM-IV (1994). Part of the hesitancy to fully incorporate this disorder, is the uncertainty of its distinctness. More specifically, some have suggested that BED is merely a less severe form of BN, and thus should not be considered a separate disorder (Castonguay, Eldredge, & Agras, 1995; Fairburn, Welch, & Hay, 1993; Fichter, Quadflieg, & Brandle, 1993; Garfinkel, Kennedy, & Kaplan, 1995; Hay & Fairburn, 1998; Hudson et al., 1988; McCann & Agras, 1990; Smith, Marcus, & Kaye, 1993; Telch, Agras, Rossiter, Wilfley, & Kenardy, 1990). For example, Garfinkel et al. (1995) concluded that studies comparing BN and BED show no consistent meaningful differences (except for sex ratio) and, therefore, support for inclusion of BED as a distinct disorder is not adequate. Further, these researchers suggested that these disorders might
be evident in the same person over time (i.e., during different developmental phases of BN).

Similarly, Castonguay et al. (1995) believed that BN and BED should be placed under the same classification system because binge eating is the central feature of both disturbances and not enough is known about the etiology to ascertain that these are two separate disorders. Thus, Castonguay et al. suggested that there should be one disorder “bulimia” subdivided into purging and nonpurging subtypes, with specifiers for type of purging and with or without obesity. It has also been argued that adding further categories of highly similar disorders to the DSM-IV (1994) risks “definitional overlap,” and potentially inappropriately increases levels of comorbidity among similar diagnoses (Pincus, Frances, Davis, First, & Widiger, 1992).

On the other hand, some researchers believe that BED is distinct from BN. The central basis of this idea is that individuals with eating problems have a number of demographic, physical, psychological, and behavioral characteristics that differentiate them (e.g., different weight and dieting histories, comorbid psychological problems, personality styles; Antony et al., 1994; deZwaan, Mitchell, Raymond, & Spitzer, 1994; Kirkley et al., 1992; Smith, Marcus, & Eldredge, 1994; Spitzer et al., 1991, 1992; Spitzer, Stunkard, et al., 1993). Brody et al. (1994) suggested that if individuals with BED can be reliably and meaningfully differentiated from those with BN and the nonbinging obese, and if clear boundaries exist that define BED as a distinct entity, then it should be considered a separate disorder.

The criteria for BED and BN are presented in Figures 1 and 2, respectively. The key similarity between the criteria for these diagnoses is the presence of binge eating episodes (at least twice weekly). Conversely, the major differences are that for BN, compensatory behaviors must also be used (at least twice weekly) and weight and shape concerns must significantly affect the individual’s self-evaluation. While the criteria for BED include more symptoms of binge eating, this does not appear to be an attempt to differentiate the binge behavior of persons with
A. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following:
   (1) eating, in a discrete period of time (e.g., within any 2-hour period) an amount of food that is significantly larger than most people would eat in a similar period of time under similar circumstances
   (2) a sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating)

B. The binge eating episodes are associated with three (or more) of the following:
   (1) eating much more rapidly than normal
   (2) eating until feeling uncomfortably full
   (3) eating large amounts of food when not feeling physically hungry
   (4) eating alone because of being embarrassed by how much one is eating
   (5) feeling disgusted with oneself, depressed, or very guilty after overeating

C. Marked distress regarding binge eating is present.

D. The binge eating occurs, on average, at least 2 days a week for 6 months.

E. The binge eating is not associated with the regular use of inappropriate compensatory behaviors (e.g., purging, fasting, excessive exercise) and does not occur exclusively during the course of anorexia nervosa or bulimia nervosa.

Figure 1. DSM-IV (APA, 1994) diagnostic criteria for binge eating disorder.

BED from those with BN, but instead, is meant to characterize binge eating behavior in general.

The APA has attempted to differentiate persons with BN by classifying their compensatory behavior following a binge episode. Specifically, the DSM-IV (1994) divides BN into purging and nonpurging bulimic types (i.e., those who use vomiting or laxative vs. those who use other methods of compensation), but researchers often using the term “nonpurging” to indicate no use of compensatory behaviors. This subdivision within the BN diagnosis presents a point of confusion in BED research, because it is often unclear whether a large proportion of study samples involves persons who have BED versus nonpurging BN. As researchers become more familiar with the DSM-IV, the reliability of researchers' diagnoses will likely increase.

To date, the most extensive epidemiological studies of BED have been conducted as part of the multisite field trial of the diagnostic criteria for BED (Spitzer et al., 1992; Spitzer,
A. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following:
   (1) eating, in a discrete period of time (e.g., within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances
   (2) a sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating)

B. Recurrent inappropriate compensatory behavior in order to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, enemas, or other medications; fasting; or excessive exercise.

C. The binge eating and inappropriate compensatory behaviors both occur on average, at least twice a week for three months.

D. Self-evaluation is unduly influenced by body shape and weight.

E. The disturbance does not occur exclusively during episodes of anorexia nervosa.

Specify type:
   Purging type: during the current episode of bulimia nervosa, the person has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas
   Nonpurging type: during the current episode of bulimia nervosa, the person has used other inappropriate compensatory behaviors, such as fasting or excessive exercise, but has not regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas

Figure 2. DSM-IV (APA, 1994) diagnostic criteria for bulimia nervosa.

Yanovski, et al., 1993). The trial involved three types of samples: nonclinical community samples, individuals in weight control programs, and Overeaters Anonymous groups. Prevalence rates for BED in these groups were found to be 2% - 4.6%, 30%, and 71.2%, respectively. These researchers found BED to be slightly more common in women than in men and equally prevalent in Caucasian and African American obese individuals. Bruce and Agras (1992) also examined prevalence rates of BED in a nonclinical, community sample and found that 1.8% of women reported meeting criteria for BED, and 3.8% reported subclinical levels of BED. Using the slightly more stringent DSM-IV (1994) criteria to diagnose BED, Brody et al. (1994) found a lower prevalence rate of 18.8% among individuals in weight loss groups.
Although it is apparent that this new diagnostic category includes a percentage of the population that would not fit into other eating disorder categories, the specific characteristics of individuals with BED remain unclear. Several researchers have attempted to review studies examining BED. These reviews were critiqued in order to better understand how researchers have conceptualized BED, and to determine whether there was a need for a meta-analysis before proceeding with further integration of the data.

Critique of Previous Reviews

A summary and critique of previous reviews on BED was conducted in order to: (a) determine the need for conducting another integrative review, (b) summarize researchers' conclusions about BED, and (c) gain insights into methodological limitations and issues prevalent in studies in this area.

Nineteen literature reviews pertaining to BED were located through searches of four databases (PsycLIT, Medline, ERIC, Dissertation Abstracts) and through reference lists of articles on BED. Of the 19, only one review included the use of statistical procedures to systematically summarize or compare data across primary studies. Unfortunately, this one meta-analytic review included only two studies. A list of the 19 reviews is presented in Table 1. Specifically, Table 1 outlines the categories used by each study and the subject characteristics that authors believed were relevant to BED. The number of primary research studies (involving BED subjects) included in each review is also provided. In addition, the authors' main conclusions, related to the proposed study, are summarized along with the main limitations of each review.

It should be emphasized that the limitations of the reviews presented in Table 1 serve to provide justification for conducting the current meta-analytic review. For example, most of the
<table>
<thead>
<tr>
<th>Study</th>
<th>Review type</th>
<th>Categories reviewed</th>
<th>Number of studies reviewed</th>
<th>Conclusions</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castonguay et al. (1995)</td>
<td>Narrative</td>
<td>• Prevalence&lt;br&gt;• Comorbidity&lt;br&gt;• Conceptual models&lt;br&gt;• Cognitive-behavioral approach&lt;br&gt;• Restrained eating patterns&lt;br&gt;• Weight and shape concerns&lt;br&gt;• Escape model&lt;br&gt;• Interpersonal approach&lt;br&gt;• Biological approach</td>
<td>37</td>
<td>• BN&gt;BED&gt;ONB on measures of psychopathology&lt;br&gt;• BED have less restricted eating patterns than ONB&lt;br&gt;• CBT, IPT, and antidepressants are effective in reducing binging in BED&lt;br&gt;• Findings in other areas are inconclusive</td>
<td>• No quantitative integration&lt;br&gt;• Vague conclusions&lt;br&gt;• Inclusion of samples that may not fit BED criteria&lt;br&gt;• Not current</td>
</tr>
<tr>
<td>deZwaan et al. (1994)</td>
<td>Narrative</td>
<td>• Diagnostic criteria&lt;br&gt;• Prevalence&lt;br&gt;• Course and frequency of binging&lt;br&gt;• Metabolic characteristic&lt;br&gt;• Food selection and intake&lt;br&gt;• Demographics&lt;br&gt;• Eating and weight history&lt;br&gt;• Associated psychopathology&lt;br&gt;• Treatment</td>
<td>41</td>
<td>• No physiological differences between ONB and obese BED&lt;br&gt;• BN, BED, and ONB differ in eating behavior &amp; attitudes&lt;br&gt;• Trend towards BN&gt;BED&gt;ONB in psychopathology, but mixed results&lt;br&gt;• CBT, BT, IPT, &amp; drug treatment may help with binging in short term</td>
<td>• No quantitative integration&lt;br&gt;• Inclusion of samples that may not fit BED criteria&lt;br&gt;• Not current</td>
</tr>
<tr>
<td>deZwaan &amp; Mitchell (1992)</td>
<td>Narrative</td>
<td>• Demographic characteristics&lt;br&gt;• Eating and weight related variables&lt;br&gt;• General psychopathology</td>
<td>17</td>
<td>• BED have earlier onset of obesity, dieting and worry about weight, and greater weight fluctuations that ONB&lt;br&gt;• BN&gt;BED&gt;ONB in psychopathology</td>
<td>• No quantitative integration&lt;br&gt;• None of the samples were BED as diagnosed by the DSM-IV&lt;br&gt;• Not current</td>
</tr>
</tbody>
</table>

(table continues)
<table>
<thead>
<tr>
<th>Study</th>
<th>Review type</th>
<th>Categories reviewed</th>
<th>Number of studies reviewed</th>
<th>Conclusions</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devlin &amp; Walsh (1995)</td>
<td>Narrative</td>
<td>• Medication treatment</td>
<td>4</td>
<td>• Relapse after discontinuation of meds is likely</td>
<td>• No quantitative integration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Results are inconclusive</td>
<td>• Not current</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Many studies missing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Inclusion of samples that may not fit BED criteria</td>
</tr>
<tr>
<td>Friedman &amp; Brownell (1995)</td>
<td>Meta-analysis &amp;</td>
<td>• General psychopathology</td>
<td>6</td>
<td>• Obese BED have greater psychopathology than ONB, but inconsistent results</td>
<td>• Only 2 studies included in meta-analysis</td>
</tr>
<tr>
<td></td>
<td>narrative</td>
<td></td>
<td></td>
<td></td>
<td>• Not current</td>
</tr>
<tr>
<td>Howard &amp; Porzelius (1999)</td>
<td>Narrative</td>
<td>• Dieting history</td>
<td>14</td>
<td>• BN&gt;BED=ONB on cognitive restraint measures</td>
<td>• No quantitative integration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Level of restraint</td>
<td></td>
<td>• Food and weight concerns correlate with binge eating severity</td>
<td>• Inclusion of samples that may not fit BED criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Effect of dieting on binge eating</td>
<td></td>
<td></td>
<td>• Some conclusions based on limited findings</td>
</tr>
<tr>
<td>Hudson, Carter, &amp; Pope (1996)</td>
<td>Narrative</td>
<td>• Antidepressant treatment</td>
<td>5</td>
<td>• Antidepressants are effective with many BED patients</td>
<td>• No quantitative integration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Not current</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Inclusion of samples that may not fit BED criteria</td>
</tr>
<tr>
<td>Johnson, Tobin, &amp; Dennis (1996)</td>
<td>Narrative</td>
<td>• Treatment</td>
<td>11</td>
<td>• CBT &amp; IPT effective in reducing binge eating but not weight loss</td>
<td>• No quantitative integration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Differences in weight loss &amp; relapse between BED and ONB unclear</td>
<td>• Inclusion of samples that may not fit BED criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Not current</td>
</tr>
</tbody>
</table>

(table continues)
<table>
<thead>
<tr>
<th>Study</th>
<th>Review type</th>
<th>Categories reviewed</th>
<th>Number of studies reviewed</th>
<th>Conclusions</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marcus (1997)</td>
<td>Narrative</td>
<td>- Characteristics of BED&lt;br&gt;- relationship to obesity&lt;br&gt;- eating psychopathology&lt;br&gt;- dieting behavior&lt;br&gt;- depression&lt;br&gt;- Depression</td>
<td>35</td>
<td>- Many factors discriminate BED from BN&lt;br&gt;- BN=BED in concern about eating, shape, and weight&lt;br&gt;- BED&gt;ONB in eating dyscontrol, fear of gaining weight, body dissatisfaction, preoccupation w/food&lt;br&gt;- BN&gt;BED in restraint, drive for thinness&lt;br&gt;- Antidepressants, CBT, IPT may be useful, but need more evidence</td>
<td>- No quantitative integration&lt;br&gt;- Inclusion of samples that may not fit BED criteria</td>
</tr>
<tr>
<td>Marcus (1993)</td>
<td>Narrative</td>
<td>- Prevalence&lt;br&gt;- Diagnostic considerations&lt;br&gt;- Binge behavior&lt;br&gt;- Purge behavior&lt;br&gt;- Dieting&lt;br&gt;- Shape and weight concerns&lt;br&gt;- Dietary attitudes and behavior&lt;br&gt;- Eating behavior&lt;br&gt;- Psychiatric status&lt;br&gt;- Response to treatment</td>
<td>28</td>
<td>- Compared to ONB, BED:&lt;br&gt;- are more preoccupied by thoughts of food&lt;br&gt;- are more likely to diet&lt;br&gt;- eat more food during binge and non-binge episodes&lt;br&gt;- The relationship among binge eating, dieting, and obesity is unclear</td>
<td>- No quantitative integration&lt;br&gt;- Inclusion of samples that may not fit BED criteria&lt;br&gt;- Not current</td>
</tr>
<tr>
<td>McElroy, Keck, &amp; Phillips (1995)</td>
<td>Narrative</td>
<td>- History &amp; clinical description&lt;br&gt;- Epidemiology &amp; course&lt;br&gt;- Associated psychopathology&lt;br&gt;- Biological studies&lt;br&gt;- Treatment response</td>
<td>11</td>
<td>- BED may be associated with mood and anxiety disorders&lt;br&gt;- BED may respond to antidepressant medication and behavior therapy</td>
<td>- No quantitative integration&lt;br&gt;- Not current&lt;br&gt;- Not comprehensive&lt;br&gt;- Inclusion of samples that may not fit BED criteria</td>
</tr>
</tbody>
</table>

(table continues)
<table>
<thead>
<tr>
<th>Study</th>
<th>Review type</th>
<th>Categories reviewed</th>
<th>Number of studies reviewed</th>
<th>Conclusions</th>
<th>Limitations</th>
</tr>
</thead>
</table>
| Mitchell, Crow, Peterson, Wonderlich, & Crosby (1998) | Narrative | • Feeding laboratory studies | 3 | • Food intake during binge episodes is greater in BN than BED | • No quantitative integration  
• Limited scope |
| Mitchell & Mussell (1995) | Narrative | • Psychiatric symptoms, Comorbid psychopathology | 12 | • BN ≥ BED > ONB in level of psychiatric distress, comorbidity, impulsiveness, low self-esteem | • No quantitative integration  
• Not current  
• Inclusion of samples that may not fit BED criteria  
• Vague conclusions  
• Reported findings for BN & BED separately w/o comparison  
• Not current |
| Smith, Marcus, & Eldredge (1994) | Narrative | • Epidemiology, Natural history of binging, Binge eating behavior, Dieting habits, Attitudes about weight & shape, Comorbid conditions, Treatment | 18 | • BED & BN may develop separately  
• BED & BN have high levels of psychiatric conditions & sexual victimization  
• CBT & IPT are promising treatments for BED | • No quantitative integration  
• Vague conclusions  
• Not current  
• Inclusion of samples that may not fit BED criteria  
• Vague conclusions  
• Not current |
| Walsh & Devlin (1995) | Narrative | • Pharmacotherapy | 5 | • Tricyclics and fluoxetine may suppress binge eating in BED, but do not lead to weight loss | • No quantitative integration  
• Not current  
• Inclusion of samples that may not fit BED criteria |
| Willey & Cohen (1997) | Narrative | • Psychological treatment, Pharmacological treatment | 13 | • CBT, IPT & BWLT are effective in reducing binge eating in BED  
• Drug treatments are not effective | • No quantitative integration  
• Inclusion of samples that may not fit BED criteria |

(table continues)
<table>
<thead>
<tr>
<th>Study</th>
<th>Review type</th>
<th>Categories reviewed</th>
<th>Number of studies reviewed</th>
<th>Conclusions</th>
<th>Limitations</th>
</tr>
</thead>
</table>
| Wilson (1999)     | Narrative   | Treatment                              | 6                         | • CBT, IPT, BWLT, & appetite suppressant medications are effective in reducing binge eating in BED  
• CBT does not produce consistent weight loss in BED  
• Antidepressant meds not effective | • No quantitative integration  
• Not all available studies were included |
| Wing & Greeno (1994) | Narrative   | Prevalence, Characteristics, Treatment outcome, New treatments | 18                        | • BED>ONB in psychological distress and psychopathology  
• BED=ONB in BWLT  
• CBT, IPT, Desipramine all reduce binge behavior in obese BED | • No quantitative integration  
• Includes samples that may not fit BED criteria  
• Not current |
| Yanovski (1993)   | Narrative   | Diagnostic criteria, Epidemiology, Etiology, Treatment | 49                        | • BED is associated with obesity, weight cycling, body shape disparagement, psychiatric disorders  
• Treatments have little efficacy with WL and modest success in long-term reduction of binge eating | • No quantitative integration  
• Not current  
• Vague conclusions  
• Inclusion of samples that may not fit BED criteria |

Note. BN = individuals with bulimia nervosa; BED = individuals with BED; ONB = individuals who are obese nonbingers; CBT = cognitive behavioral therapy; BT = behavior therapy; IPT = interpersonal therapy; BWLT = behavioral weight loss treatment.
reviews in Table 1 used studies with samples that failed to meet DSM-IV (1994) BED criteria. Additionally, at the time many of these reviews were conducted there was a dearth of studies on BED. Because significantly more research has since been completed, there is now sufficient data to separate studies in which these various populations were examined.

The major conclusions reported by authors of the reviews cited in Table 1 include the following:

1. Individuals with BN purportedly have greater or equal levels of psychopathology compared to individuals with BED. In turn, persons with BED tend to have greater psychopathology than ONB individuals. Although this trend was generally noted among reviewers, many reported that there was considerable inconsistency between studies.

2. Eating and weight-related variables tend to differ between these three groups, but conclusions varied between reviewers and individual studies.

3. Cognitive-behavioral, interpersonal, and psychopharmacological treatments may be helpful in reducing binge eating among persons with BED, at least in the short run, but again, results were mixed.

4. Overall, the results from studies published at the time these reviews were written appear to vary and, therefore, no firm conclusions could be drawn.

To date, efforts to review and integrate data on characteristics of individuals with BED have been less than satisfactory. In part, this is due to the recent development of this diagnostic category; however, there are other problems with the reviews themselves. All reviews, except one, have been narrative (rather than quantitative) in nature, and the single meta-analytic review included only two studies. Others have been incomplete in their coverage of available studies, and conclusions are frequently inconsistent or not clearly based on empirical evidence. Most of these reviews also do not indicate the magnitude of research findings. In addition, in almost all of the
reviews, studies were included that involved binge-eating samples who did not fully meet DSM-IV (1994) criteria for BED (i.e., studies did not differentiate between compulsive eating, nonpurging BN, and BED).

Although several reviewers commented on methodological problems of studies and/or study characteristics that may have led to differences between study findings, none of the reviewers systematically addressed the effect of these variables. Also, few of the reviewers examined differences between individuals with BN and BED, often limiting the scope of the review to only BED and sometimes, ONB individuals. It is also noteworthy that a great deal of research has been conducted since the time many of these reviews were published, and thus important data have not been integrated into the collective findings.

Based on these limitations, it was concluded that another, more comprehensive, current and quantitative integration of the data should be conducted. The goal of the current meta-analysis was to incorporate the positive aspects of some of these reviews (e.g., comprehensiveness, organizational plan), improve upon the methodological weaknesses which have limited the applicability of the conclusions, and incorporate new data on individuals with BED. More specifically, in this meta-analysis: (a) inclusion criteria were limited to studies involving persons meeting DSM-IV (1994) BED criteria, and DSM-III-R (Diagnostic and Statistical Manual of Mental Disorders, 3rd ed.-revised, APA,1987) and DSM-IV criteria for BN; (b) where possible, diagnostic groups were compared in terms of all variables thought to correlate with either or both of these eating disturbances; (c) as complete a set of studies as possible was obtained using exhaustive search methods; and (d) statistical procedures were used that allowed for systematic, quantitative integration of the data across studies.

Thus, the current study was conducted, utilizing meta-analytic techniques, in order to gather data regarding the characteristics of individuals with BED, compare the similarities and
differences between individuals with BN, BED, and ONB, and examine the effectiveness of various treatments being used with the BED population.

Characteristics Examined in the Meta-Analysis

Two general sets of characteristics were analyzed in the current integrative review. These included the characteristics of individuals with BED that have been examined in primary research studies, and the various study characteristics (e.g., method of diagnosis used, quality of study). It is essential to systematically address these study characteristics, as they may be partially responsible for different findings between studies.

Characteristics of Subjects with BED

Based on the examination of the literature reviews presented in Table 1 and a search of more recent research on BED, a number of categories that subsume various characteristics of individuals with BED have been identified and will be further discussed here. These categories include characteristics that have been noted by researchers as possible etiological or risk factors of binge-eating behavior and subsequently studied. In this regard, personal characteristics, eating and weight history, eating-related pathology, weight and shape concerns, psychopathology, family characteristics, and treatment responsiveness are relevant variables. The rationale for including these different characteristics, as well as how each variable is typically measured (e.g., types/names of specific measures), will now be presented.

Personal Characteristics

One set of variables typically reported by researchers and clinicians includes the personal characteristics of individuals with BED, including age, body mass index, and gender. It is likely that information about differences on these variables will provide little evidence regarding the
distinctness of these disorders, as researchers often select participants based on these characteristics. That is, BED subjects are often required to be overweight and female in order to participate in a particular study, and therefore these subjects may not represent the typical characteristics of the diagnostic group as a whole. However, these data will be collected as a means of establishing a profile of individuals with this disorder who have participated in research studies.

Eating and Weight History

It is also relevant to understand the developmental course of BED and the eating and weight-related factors that may differentiate this group from those with other types of eating problems. These factors include age of onset of dieting, binging, obesity, and the full eating disorder. Such information may assist researchers in uncovering the etiology and subsequent development of BED, as well as determining whether these patterns may be different from those of persons who binge-purge, and from overweight individuals who refrain from binge eating. For example, markedly different ages of onset of binging for BN versus BED would suggest that these disorders are developmentally different (and thus may have different etiologies). Such findings would support the hypothesis that BED is a distinct disorder.

Eating-Related Pathology

A number of behaviors identified as being directly or indirectly related to disturbed eating have been studied in the eating disorder population. It has been suggested that individuals with BN simply fall at the extreme end of an eating pathology continuum (Stice, 1994). Possibly, then, individuals with BED fall between those with BN and ONB in terms of degree of such eating dysfunction. Eating-related pathology includes the following variables: binge-eating behavior, dieting behaviors, dietary restraint, eating disinhibition, and hunger. Each of these
variables will be briefly discussed below, along with a description of instruments that have been developed to help researchers and clinicians assess eating behaviors.

**Binge-eating behavior.** For the purposes of both diagnosis and treatment it is valuable to assess the degree to which individuals with BED versus BN engage in binge-eating behavior. By definition, all BN and BED subjects engage in eating binges, but it is useful to compare them on this variable to determine if there are differences between groups. A significant difference may suggest that these groups are either distinct or perhaps lie along a continuum of the same disorder. Questionnaires such as the Eating Disorders Inventory--Bulimia subscale (EDI; Garner, 1991), the Binge Eating Scale (BES; Gormally, Black, Daston, & Rardin, 1982), and the Bulimia Test (BULIT; Smith & Thelen, 1984) provide self-report information about the symptomatology of disordered eating. Additionally, the Eating Disorders Examination (EDE; Fairburn & Cooper, 1993) is a semistructured interview that includes questions about overeating behavior, and yields a raw score that can be compared to those of other individuals. Scores from each of these measures can be used as a means of quantifying and comparing the number and severity of binge behaviors among different eating-disordered populations.

**Dieting behaviors and restraint.** Dieting practices and degree of dietary restraint (i.e., caloric restriction) may be critical aspects of the development and maintenance BED (Smith et al., 1994). In fact, patients with BN have shown higher levels of dietary restraint than nonpatients, which supports the hypothesis that dieting may play a central role in the development of binge eating (Polivy & Herman, 1985). Herman and Polivy (1980) proposed that a "restraint model" explains a significant amount of disordered eating. They suggested that when people diet excessively and deprive themselves, cognitive, affective, and physical changes occur that result in subsequent loss of control over eating (i.e., binge behavior). That is, dieting sets a person up to engage in overeating, and a cyclic diet/binge pattern can then be more easily established. Recent
evidence for this model was provided by Telch and Agras (1994), who followed a number of nonbinge-eating obese individuals through a weight loss program that involved a very low calorie diet. By the end of the strict diet portion of the plan, 30% of the subjects reported episodes of binge eating. At the conclusion of the entire program, after normal eating patterns had been restored, 62% of these individuals reported binge-eating episodes, and 15% met the criteria for BED.

Several measures have been used in attempts to assess degree of dietary restraint, including the EDE (Fairburn & Cooper, 1993) and the Three Factor Eating Questionnaire (TFEQ; Stunkard & Messick, 1985; formally known as the Eating Inventory; EI; Stunkard, 1981). These self-administered questionnaires provide useful information about individuals with BED, especially in comparison to ONB persons and those with BN. For instance, if individuals with BED show significant levels of restraint, there is evidence that binge behavior may result from or be exacerbated by dieting behavior. However, it is also possible that restraint may occur as a result of becoming overweight due to binge eating.

In order to assess the role of dietary restraint in the development of BED, it is also necessary to determine whether individuals with BED report a history of dieting prior to binging (or vice versa). Researchers have primarily used two methods to examine the role of developmental aspects of restraint; the first being to compare samples in terms of their mean age at initiating dieting versus binging behaviors and, the second, to determine the percentage of individuals who report having dieted before ever engaging in binging. If individuals with BED and BN report substantially different levels of dietary restraint, or if one group is significantly less likely to diet before binging, this may suggest that BED is etiologically distinct from BN. For example, data may show that persons with BED do not typically binge in response to calorie-
restriction, whereas persons with BN may frequently be found to initiate binge eating following a strict diet.

**Disinhibition and hunger.** Disinhibition and hunger are other eating-related factors that have been implicated in the development and maintenance of BED. Disinhibition is the tendency to lose control over eating, while hunger, as the term implies, refers to the degree of perceived hunger. Given the dysregulated nature of eating patterns among many individuals with BED, it is reasonable to hypothesize that these individuals experience greater levels of hunger and disinhibition than most people (Castonguay et al., 1995). In fact, research has found that if dieters believe they have violated their diet, their eating often becomes disinhibited and binge eating may occur (Herman & Polivy, 1980). Such behavior has been explained as either an overcompensation for previous food deprivation (Herman & Mack, 1975) or, as suggested by the counter-regulation model (Hibscher & Herman, 1977), as a rationalization that there is no purpose to attempting further restriction of intake, once the diet is “broken.” With respect to hunger, Bruce and Agras (1992) found that this variable was cited by 38% of binge eaters as a trigger to binge. Therefore, hunger and disinhibition may be factors related to binge eating, and may distinguish individuals who binge from those who do not and from those who also purge.

Measures commonly used to assess for these variables in eating-disordered individuals include the EI (Stunkard, 1981) and the TFEQ (Stunkard & Messick, 1985). If individuals with BED and BN score significantly different on measures of disinhibition and hunger, this may suggest that individuals in these diagnostic groups binge eat for different reasons and, thus, may be etiologically different from one another.

**Weight and Shape Concerns**

Body dissatisfaction and overconcern with weight and shape have been hypothesized to be highly influential in the development and maintenance of disordered eating (Grilo, Wilfley,
Jones, Brownell, & Rodin, 1994; Rosen, 1990). The cognitive-behavioral model hypothesizes that an overconcern with weight may drive a person to diet, which often results in later overeating. Interestingly, it appears that many individuals with BED are overweight (Bruce & Agras, 1992) and, by definition, do not engage in compensatory behaviors. Thus one may wonder whether they experience similar weight concerns and desires to be thin as those with BN. Perhaps this is an area that distinguishes persons with BED from those with BN, and potentially even ONB individuals. On the other hand, individuals with BED may have a strong drive for thinness, but may be unwilling to purge in order to achieve weight loss. If individuals with BED have markedly fewer concerns about their weight and shape, this may provide an explanation for why they do not purge. It is unlikely that such a finding would, alone, indicate these disorders are distinct. In terms of measurement of weight and shape concern, subscales from the EDI and EDE have both been used to appraise overconcern with weight in persons with disordered eating.

Psychopathology

Other characteristics commonly studied among individuals with BN include comorbid psychiatric disturbance, self-esteem, personality disorders, and sexual abuse history, among others. The following variables were included in the meta-analysis: depressive symptoms, anxiety symptoms, psychiatric distress, interpersonal problems, personality traits, personality disorders, psychiatric disorders, history of sexual abuse, substance abuse, and self-esteem. Several of these variables have been found to be relevant to understanding individuals with binge eating behavior. In fact, it may be that psychological variables distinguish individuals with BED from ONB and BN individuals. Specifically, comparisons between obese individuals who binge versus those who do not may help distinguish psychopathology associated with binge eating, rather than weight (Castonguay et al., 1995). It may be that psychological and/or personality disturbances increase the likelihood that a person will engage in binge eating (perhaps as a coping
mechanism), and that those with the greatest psychological distress subsequently engage in purging behavior. Yates (1989) suggested that purging may be viewed as an "attack on the body" (p. 815) and persons who engage in such self-harming behavior would likely demonstrate more severe psychopathology than those who refrain. In preliminary studies, researchers have noted a positive correlation between the number of purging strategies used, frequency of purging, and psychopathology (Tobin, Johnson, & Dennis, 1992; Williamson et al., 1987). It may be reasonable to predict, then, that individuals with BN would have a greater degree of psychological disturbance than those with BED, and nonbinging obese would demonstrate the least.

Depression and anxiety appear to be common comorbid conditions among eating-disordered individuals (APA, 1994). It has been suggested that these disorders are linked to some common underlying mechanism, such as negative affectivity or abnormalities in neurotransmitter functioning (Smith et al., 1994). The escape model (Heatherton & Baumeister, 1991) asserts that binge eating is a coping mechanism that allows the individual to escape from painful self-awareness and negative affectivity. Indeed, negative affective states have been found to trigger binge eating, and many individuals report that eating relieves their negative affective states (Abraham & Beumont, 1982; Cattanach, Malley, & Rodin, 1988; Davis, Freeman, & Garner, 1988; Moyer, Rodin, & Cummings, 1993; Wilson, Rossiter, Kleifield, & Lindholm, 1986).

Several measures have been utilized to explore depression and anxiety. Self-report questionnaires such as the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), the Hamilton Depression Rating Scale (Hamilton, 1960), and the Hamilton Anxiety Rating Scale (Hamilton, 1959) are frequently used to assess depressive and anxious symptoms in individuals with BED and BN, and in obese nonbingers.
Sexual abuse history has also been postulated by some to be etiologically related to disordered eating (Coovert, Kinder, & Thompson, 1989; Garfinkel et al., 1995). Garfinkel et al. have suggested that the experience of having been sexually abused may be correlated with use of purging methods among individuals who binge eat. That is, individuals who have been sexually abused may be at greater risk for vomiting and laxative abuse than those without such an abuse history. According to this notion, persons with BED would likely have lower rates of sexual abuse than those with BN.

Some researchers and clinicians view binge eating as an addictive behavior, like that of drug or alcohol dependence (Yanovski, 1993). Indeed, behavioral dyscontrol with food is increasingly being called “addictive eating.” This conceptualization of binge eating suggests that there is a common, possibly physiological, component underlying all such behavioral excesses. Accordingly, it would be expected that those individuals who binge eat would also have higher rates of substance dependence. In fact, substance abuse and dependence is a common comorbid condition for individuals with BN (APA, 1994; Wilson, 1991), and initial studies among obese binge eaters have found an increased prevalence in this group as well. Of interest is whether individuals with BED demonstrate a similar tendency towards other “addictive” behaviors (i.e., substance dependence) and if so, if they do so to a similar degree as those with BN.

It is also widely believed that personality disorder symptoms may be partially responsible for or predispose an individual to develop BED or other eating disorders. For example, it has been hypothesized that binge eating may be a sign of generalized impulsivity shared by certain personality disorders (Skodol et al., 1993). Researchers have consistently found that bulimics are likely to have a personality disorder and/or have elevated scores on measurements of disturbed personality (Pope & Hudson, 1989; Skodol et al., 1993). Understanding the link between personality and BED also has important treatment implications, as individuals with BED, like
those with other Axis I disorders, may have a poor prognosis when accompanied by a personality disorder (Johnson et al., 1996). Structured clinical interviews are typically used with BED individuals to assess for comorbid personality disorders.

Researchers have also hypothesized that low self-esteem may be related to BED and that, perhaps eventually, low self-esteem leads to both weight and shape overconcern and negative affectivity (Castonguay et al., 1995). It has been found that binge-prone women have lower self-esteem than normal controls (Beebe, Holmbeck, Albright, Noga, & Decastro, 1995), and that dieters have been found to increase food consumption, regardless of the food’s taste properties, when confronted with anxiety-provoking threats to self-esteem (Polivy, Herman, & McFarlane, 1994). Individuals with BN have scored lower on measures of self-esteem (Gross & Rosen, 1988), and it might be predicted that individuals with BED also have poor self-esteem. The instrument most commonly used to appraise self-esteem is the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965). In addition, the ineffectiveness subscale of the EDI also addresses self-esteem issues.

Interpersonal problems have also been examined in persons with BED, as many researchers and clinicians hypothesize that difficulties with relationships may lead to binge eating. The Inventory of Interpersonal Problems (IIP; Horowitz, Rosenberg, Baer, Ureno, & Villasenor, 1988), a self-report measure, has been used to describe and rate distress in interpersonal relationships.

Finally, there are a number of other psychological variables that have been measured in individuals with BED and are thought to be related to problems of binge eating. These include general psychiatric distress (most frequently assessed with the Symptom Checklist-90 [SCL-90]; Derogatis, Lipman, & Covi, 1973) and other comorbid psychiatric conditions (typically assessed through a diagnostic clinical interview). In addition, fears of maturity, excessive perfectionism,
and lack of interoceptive awareness are thought to be related to disturbed eating patterns. The EDI is commonly used to assess these variables. When studying the relationship between psychopathology and eating disturbances, it is necessary to keep in mind that “we do not know if having severe binge-eating problems causes increased psychological distress, or if the experience of greater psychological distress drives binge-eating problems in at-risk individuals” (Telch & Agras, 1994, p. 11).

Family Variables

Understanding the environmental impact of parental psychopathology and family dynamics on the development of BED (Hodges, Cochrane, & Brewerton, 1998) is also of interest. In particular, family variables may influence whether a person decides to binge eat and further decides to purge. Kagan and Squires (1985) examined eating patterns and family environmental factors among college students and noted that compulsive eating appeared to be related to deficiencies in family systems. In addition, studies on family characteristics of individuals with BN have identified certain common themes (e.g., high levels of conflict among family members; Johnson & Flach, 1985). If BED and BN are etiologically distinct, then significant differences in family dynamics would be predicted between these two groups. For example there is evidence that individuals with anorexia nervosa (AN) come from families that are enmeshed, overprotective, and rigid, whereas persons with BN often experience neglect, rejection, and blame from their parents (Yates, 1989).

Treatment Effectiveness

An additional point of interest in this study was to determine how individuals with BED respond to various interventions. Because traditional weight loss programs are generally not effective with this population (Gormally et al., 1980; Marcus et al., 1988), other treatments have
been implemented, such as pharmacotherapy, cognitive-behavioral therapy, and interpersonal therapy. Outcomes of these various treatments of BED potentially provide a probe into the nature of the disorder and the mechanisms of different treatments (Wilson & Fairburn, 1993).

In summary, a number of variables have been identified as being important to study in individuals with BED. Comparing individuals with BED versus those with BN and ONB on each of these characteristics may provide insight into the nature and causes of binge eating and the factors that may differentiate those who binge eat from those who binge-purge. Examination of these variables in a systematic, empirical manner will allow for such comparisons and may help to identify unique and similar characteristics among individuals with these various eating problems.

**Study Characteristics**

A growing body of literature is accumulating on the BED population. Yet many of the data have been somewhat inconsistent, leading researchers and clinicians to be uncertain of the characteristics of individuals with BED. It is likely that a number of differences between studies are partially responsible for these inconsistencies. These include the diagnostic criteria used to select the sample, method of diagnosis, population from which the sample was obtained, and overall quality of the study. Each of these will now be examined in further depth.

**Diagnostic Criteria**

The inconsistency among researchers on use of diagnostic criteria, especially in the definition of purging, has been previously discussed in this literature review. Because of these inconsistencies, there remains some uncertainty about the homogeneity across samples. It seems logical that in studies of BED in which nonpurging bulimics (those who use compensatory behaviors other than vomiting and laxative use) were included, greater differences may be found
among subjects than in studies in which nonpurging bulimics were excluded. Interpretations of existing studies of BED, then, are hampered by the use of different diagnostic criteria for BED (Castonguay et al., 1995; Wilson, Nonas, & Rosenblum, 1993). In addition, researchers often include in their BED samples individuals who purge, but do so on a less frequent basis than required to meet BN criteria. Thus, many individuals with BED do not completely refrain from purging behavior, and this may confound results. By systematically examining differences between samples or anomalies across studies based on whether or not DSM-IV (1994) criteria were used to diagnose subjects, it may become evident how the use of different diagnostic criteria impacts study findings.

Method of Diagnosis

Another difference between studies is the method by which subjects were diagnosed with BED. It has been argued that inconsistent findings between studies may be due to this factor (Skodol et al., 1993). Both self-administered questionnaires and diagnostic interviews have been used, but they do not appear to be equally valid for assessing the presence of an eating disorder. Cooper and Fairburn (1987), for instance, have argued that self-report measures do not adequately assess the complex psychopathology associated with eating disorders. Yet, two questionnaires have been commonly used in identifying BED individuals: the BES (Gormally et al., 1982) and the Questionnaire of Eating and Weight Patterns (QEWP; Spitzer et al., 1992). The BES contains 16 items that assess behavioral and cognitive/emotional aspects of binge eating, but they are not based on DSM-IV (1994) criteria. A score of 27 or higher has been used as the cutoff for identifying “binge eaters,” yet many researchers have classified these individuals as having BED based on these scores. It is likely that such samples would include subjects with BN as well as those with BED. The QEWP, on the other hand, is based on the DSM-IV criteria, and the results are meant to indicate whether an individual meets BED criteria. The agreement between
the BES and the QEWP in identifying binge eaters has been found to be only fair (kappa of .31 and .45; Brody et al., 1994; Gladis, Wadden, Foster, Vogt, & Wingate, 1998). Gladis et al. concluded that the QEWP was generally an effective method of diagnosing BED, and produced better results than the BES. However, the QEWP has only moderately better agreement with clinical interview-based diagnoses (kappa of .57; deZwaan et al., 1994). Researchers suggest that face-to-face clinical interviews conducted by experienced clinicians produce the most accurate diagnoses (Fairburn & Beglin, 1990; Spitzer, 1983). In such an interview, subjects can be questioned more thoroughly and responses can be clarified. The EDE, a clinical interview, is considered to be the current “gold standard” of clinical eating disorder diagnosis (Greeno, Marcus, & Wing, 1995).

Using the EDE to diagnose, Greeno et al. (1995) also assessed the validity of the BES. They found the BES to accurately identify nonbinge eaters (92.9%) but not binge eaters (51.8%). It appears that the BES leads to a high false-negative rate of BED diagnosis, and therefore, studies that rely on the BES to diagnose BED should be suspect. It is clearly important, then, to determine if differences between subject characteristics or contradictory results across studies are related to use of interview versus questionnaire method of diagnosis.

Population From Which Sample Was Obtained

Participants from studies of BED have been selected from a variety of populations, including those involved in weight loss treatment programs, eating disorder clinics, inpatient behavioral health programs, and the community. It seems likely that the severity of binge eating, psychiatric problems, and other variables may be substantially greater in the inpatient and eating disorder clinics samples than in weight loss programs or the community samples (Castonguay et al., 1995). Indeed, research has shown that obese individuals who seek treatment report greater
psychopathology and binge eating than those who did not seek treatment (Fitzgibbon, Stolley, & Kirschenbaum, 1993).

In addition, in most BED studies, only individuals who are considered obese have been included, as these studies used easily accessible samples of those seeking treatment for obesity. While it is generally believed that BED is a problem of the obese, this contention has not been substantiated. For instance, in Spitzer, Yanovski and colleagues' (1993) community sample, only 20 out of 48 individuals with BED were overweight (58% were not obese). Similarly, in their 1992 (Spitzer et al.) community sample of 19 individuals with BED, 42% were of normal weight. Bruce and Agras (1992), too, found that approximately 25% of their community sample was not considered overweight. Taken together, these findings suggest that limiting samples to only obese individuals excludes a substantial proportion of the BED population and may not accurately characterize individuals with BED.

Quality

A final factor to be considered in this review that may vary with subject characteristics is the overall quality of the study (Castonguay et al., 1995). Studies using interviewers who are nonblind to the hypotheses, questionnaire method of diagnosis, failing to follow DSM-IV (1994) criteria for diagnosis, small sample size, and including several exclusion criteria may reduce the overall internal and/or external validity of the respective study. Thus, studies need to be rated on overall quality in order to determine if subject characteristics across studies covary with quality of study.

In sum, there are a number of study variables that may contribute to the inconsistent results found among studies of individuals with BED. These variables include method of diagnosis, use of diverse diagnostic criteria, population from which sample was drawn, and
quality of study. Each of these study characteristics was systematically explored in the current meta-analysis.

Conclusions

Although BED is a recent addition to psychiatric nosology, researchers and clinicians have long been aware that many binge eaters do not purge, and subsequently do not meet the criteria for BN. Researchers have been asked by the APA to study individuals with BED and help identify characteristics common among those with BED as well as those characteristics that may differentiate individuals with BED from those with BN and from obese nonbingers. Dozens of studies have been attempts to do just that, and numerous reviewers have striven to integrate these data. Unfortunately, because of methodological problems with these reviews (particularly the lack of quantitative integration of data) and the more recent publication of studies in this area, a more current, comprehensive, and systematic analysis of the literature was needed.

A number of subject characteristics were identified as relevant to the study of BED and fit into the following categories: (a) personal characteristics, (b) eating and weight history, (c) eating-related pathology, (d) weight and shape concerns, (e) psychopathology, (f) family characteristics, and (g) treatment outcomes. In addition, because many results across studies have been inconsistent, there may be study characteristics responsible for these differences. Therefore, there was a need to systematically analyze the impact of these variables, which include: (a) diagnostic criteria used, (b) method of diagnosis, (c) population from which sample was obtained, and (d) overall quality.

Purpose and Research Questions

The purpose of this study was to conduct a meta-analysis of the data involving the newly
outlined BED. Of interest was describing the "typical" characteristics of individuals with BED and their responsiveness to various treatments. In addition, the identification of characteristics that may reliably differentiate individuals with BED from those with BN or from ONB was a fundamental goal. In this way, we may form better hypotheses about why some individuals binge eat and some purge (while others refrain). Quantitative integration of the data will help to answer these questions and also provide information on how BED best fits into the psychiatric diagnostic system (i.e., whether or not BED is a distinct eating disorder rather than a variant of BN).

There are several specific questions for which answers were sought in the current meta-analysis. These are as follows:

1. Descriptively, what are the chief characteristics of individuals with BED?

2. Do individuals with BED differ from those with BN and ONB, and if so, on what characteristics? In addition, are there factors (i.e., study variables such as method of diagnosis) that may make it difficult to detect, or conversely, might exaggerate actual differences between groups?

3. Does it appear that BED is actually a variant of BN, or is there evidence that BED is a distinct disorder? For example, do sample distribution of scores on important variables of interest tend to overlap significantly or very little?

4. How effective are different treatments for individuals with BED?
CHAPTER III
METHODS

This study is a meta-analysis of the literature regarding characteristics of individuals with BED versus those with BN and ONB. Meta-analysis is a technique that enables researchers to integrate data from multiple studies in a systematic and quantitative manner. Prior to conducting this study, a preliminary search of the literature was performed that indicated over 100 different studies in which the characteristics and/or treatment responsiveness of individuals with BED have been examined. Thus, considerable information could be gathered from past research and meta-analytic methods were deemed appropriate. A discussion of the design and the specific procedures of the meta-analysis will now be presented.

Design

Meta-analysis, or integrative analysis, was used as the design for this study. Meta-analytic methods involve quantification of data across multiple studies as a means of summarizing, integrating, and interpreting a particular domain of research (Lipsey & Wilson, 2001; Rosenthal, 1995). By pooling data across multiple studies, the researcher produces integrated effect estimates that have considerably more statistical power than individual studies (Lipsey & Wilson). Meta-analytic methods are more sophisticated than conventional review procedures that tend to rely on “vote-counting” based on statistical significance, or on qualitative/narrative summaries of the research findings (Lipsey & Wilson). In addition, examination of data through meta-analytic techniques allows for quantification and thorough scrutiny of the differences between studies and related differences in their findings (Schmidt, 1992). The researcher conducting such an analysis codes relevant research findings as well as potential moderator variables (i.e., study variables) from multiple empirical studies and converts
each of these findings into an effect size (a common metric that can then be compared across studies).

There are several techniques for estimating effect size. One of the most widely referenced is the standardized mean difference effect size (SMD), which is simply the mean difference between two groups on a particular measure, divided by their pooled standard deviation (SD). The result is essentially a z-score, in which a SMD of zero suggests no difference exists between groups, while a score of 0.5 indicates that group means differ by 0.5 SD. It is noteworthy that a group mean difference of 0.5 SD indicates that approximately 33% of the combined area covered by two populations (that are normally distributed) is not overlapping. Conventions for interpreting the magnitude of effect sizes, as proposed by Cohen (1988), are as follows: SMDs ranging from 0.20 to 0.49 are “small,” 0.50 to 0.79 are “moderate,” and 0.80 or greater are “large.” Certainly, however, Cohen acknowledged these guidelines as somewhat arbitrary and suggested that the clinical significance of differences between groups in a particular field of study also needs to be considered.

The use of meta-analytic research methods has rapidly increased and expanded in recent years. Modern meta-analytic methods were first proposed and utilized by Glass (1976) as a means of examining effectiveness of different psychotherapy treatments. Since then, meta-analysis has not only been used to synthesize findings from treatment interventions, but has expanded to include the study of relationships between variables of interest (e.g., correlation between employment tests and productivity) and to synthesize opinion survey results (Cook et al., 1992). Schmidt (1992) suggested that an important purpose of meta-analysis was to aid in theory development. In order to construct a good theory, according to Schmidt, “one must know some of the basic facts, such as the empirical relations among variables” (p. 1177). In fact, he went on to
assert that the relationships revealed by meta-analysis can be used to test causal theories, even when the delineated relationships are observational, rather than experimental.

Although no literature is currently available describing the use of meta-analytic methods for making taxonomic distinctions between psychiatric disorders, the use of such an approach seems logical. In a cogent discussion of taxometrics (the study of methods for investigating whether two conditions differ quantitatively or qualitatively), Meehl (1995) proposed that if diagnostic groups could be differentiated by distributions whose means were separated by at least 1.25 SD (or 1.5 to 2.0 SDs, to be more conservative; Meehl & Yonce, 1994), there would be evidence of the distinctiveness of groups (rather than groups falling on a continuum). Meta-analytic methods provide a useful means of aggregating data for groups across multiple studies, which could then be used in comparing different diagnostic groups in a manner that would indicate the distributions of these various groups.

Thus, meta-analysis was chosen for the present study because it allowed for the synthesizing of data across multiple studies and the exploration of each of the current research questions, including: (a) identification of the key characteristics of individuals with different eating patterns, (b) comparison of the mean differences between these groups and potential moderating variables, (c) appropriate classification of groups, and (d) the effectiveness of various interventions for BED.

Locating Studies

Methods to Search for Research Documents

Binge Eating Disorder

The first step in the data collection process involved obtaining primary research studies
on the characteristics and treatment of individuals with BED. Three main methods of search were utilized to locate these studies:

1. An on-line search of four databases--PsycLIT, ERIC, Medline, and Dissertation Abstracts International--from the years 1959 (when binge eating in absence of purging was first recognized in the literature) to the present was conducted. Key words or phrases included "binge eating disorder," "obese and bing*," "obese and eating disorder," "compulsive eating," and "nonpurg ing bulimia."

2. Potentially relevant studies were also identified through examination of references found in the sources located by the method 1 stated above.

3. In order to include the most recent research in this area, the latest copies of certain journals that publish the majority of research on BED (International Journal of Eating Disorders, Addictive Behaviors, Journal of Consulting and Clinical Psychology, and Abnormal Psychology) were manually searched to locate additional, relevant articles.

Bulimia Nervosa

The second step was to obtain data on characteristics of individuals with BN. Three methods of locating studies were used:

1. An on-line search of PsycLIT, ERIC, and Medline databases, from the years 1987 to the present was conducted. The year 1987 was selected because the DSM-III-R was published at this time and listed different diagnostic criteria for BN than the previous version (Diagnostic and Statistical Manual of Mental Disorders, 3rd ed.; DSM-III; APA, 1980). The diagnostic criteria of the DSM-III likely classified many individuals as having bulimia whom would now fit BED criteria. Key words or phrases included "bulimi* or eating disorder*" in combination with one of the identified characteristics of BED (e.g., "depression," "restraint") or in combination with the terms "review" or "meta-analysis" (for use of reference lists).
2. Using methods 2 and 3 described above for BED.

Obese Nonbingers

Finally, studies of ONB subjects were identified. Given that a large percentage of obese individuals meet criteria for the proposed BED diagnosis, it was important to include only studies in which participants were specifically identified as nonbinge eaters. Thus, using studies of obese persons that did not explicitly exclude binge eaters would confound this meta-analysis. An initial literature search of studies examining obesity published between 1992 and 1998 was conducted. Using Medline and PsycLIT databases, hundreds of abstracts were identified as containing the keyword “obes*” and, at the same time, did not contain the keywords listed above in the BED search. A sample of approximately 40 primary research studies, which could be easily located in a nearby university library, were reviewed in order to determine whether researchers assessed and reported binge eating behavior in their samples. Of the 40 studies reviewed, only one made such an assessment. Based on these findings, it did not seem reasonable to collect and review all studies on obesity, in order to locate the few studies in which the rare distinction between binging and nonbinging individuals was made. Instead, the samples of ONB subjects identified and assessed in the BED studies (as controls or comparisons) were used. In at least 50 of the BED studies, ONB subjects were included as a comparison group; therefore, adequate data was collected using this method. In addition, any studies of ONB individuals identified in report reference lists were gathered.

Criteria for Inclusion

In order to be selected for inclusion in the proposed meta-analysis, a study was required to meet the following criteria:

1. It was a primary research study for which characteristics (other than merely age and
body mass index; BMI) were reported for individuals with BED, BN, or ONB, or treatment response of persons with BED. These characteristics had to fit into one of the seven major subject variable categories (personal characteristics, eating and weight history, eating-related pathology, weight and shape concerns, psychopathology, family characteristics, treatment responsiveness). There also needed to be at least one other study in which any given characteristic was examined by a particular measure (meta-analysis can be applied to as few as two studies; Rosenthal, 1995). It is important to note that some characteristics studied in the BN population have yet to be examined in persons with BED. Therefore, only those variables that had been reported by at least two BED studies were also coded for the BN and ONB studies. The variables/measures that were included in the final analyses will be presented along with the results in Chapter IV.

2. The report of the study was required to provide sufficient data for computation of means and standard deviations or proportions (percentages), or if it involved a comparison of two or more diagnostic groups, reported enough data to calculate a standardized mean difference effect size.

3. Subjects in each BED study had to essentially meet BED criteria as outlined by the DSM-IV (1994). Because several studies were conducted before actual DSM-IV criteria were released, some subjects may not have met these exact criteria. However, in many of these studies, criteria were used that were nearly identical to DSM-IV criteria, and likely diagnosed a very large proportion of the subjects correctly; therefore, these subjects could be considered to have BED. For example, in clinical field trials of BED, Spitzer and colleagues' (1991, 1992) diagnostic criteria included an additional behavioral indicator of loss of control ("eating large amounts of food throughout the day with no planned mealtimes") that was later dropped from the DSM-IV criteria. In addition, some studies used duration criteria that were similar to BN (i.e., binge eating occurs for 3 months rather than 6 months). Such slight variations in the diagnostic criteria for
BED probably did not misdiagnose most subjects, and therefore subjects diagnosed under these criteria were included in the BED category. However, samples that involved these slightly different diagnostic criteria were coded as such and were later compared to those meeting current DSM-IV criteria, in order to assess whether there are actual differences between groups.

On the other hand, reports of many studies did not specify that DSM-IV (1994) criteria were met and the samples likely included a percentage of individuals who were either nonpurging bulimics or had subclinical BED. These studies were, therefore, coded as a separate group. They were only to be included in overall analyses if little difference (less than 0.20 SMD effect size on 90% of the variables/measures included in the meta-analysis) existed between the characteristics of individuals in these samples and those studies using more strict criteria. This criteria (less than 0.20 SMD) was selected based on Cohen's (1988) guidelines for signifying no meaningful differences between groups. Conventions regarding specific selection criteria can be found in Appendix B.

4. In studies of individuals with BN, subjects had to have been diagnosed with this disorder based on criteria from the DSM-III-R (APA, 1984) or DSM-IV (APA, 1994), which are considered to be very similar.

5. Studies written in languages other than English were excluded.

6. Case studies involving fewer than five subjects were excluded.

Multiple Studies of the Same Sample

It was noted that authors often generate several publications using the same data set, and either present data on different measures or the same data while altering the relationships examined. In the present meta-analysis, considerable effort was made to identify such cases and not include a particular subject's data on a measure more than once. For example, studies were grouped together by author and site of research, and if selection procedures were identical and
sample size and subject demographics were either highly similar or identical, the study was considered to have reported on the same sample. In such cases, if a study had no new data to offer (i.e., the same data had been published elsewhere), it was not included in the meta-analysis. If studies offered different data from the same sample, each study was included, but overlapping data were coded only for one of the studies. Although the reports of studies were carefully reviewed for overlap, it was evident that several researchers probably included some, but not all subjects, across more than one study (i.e., a study likely reported data on a subset of subjects used in another study, in addition to several more subjects). Unless the researchers were clear about this, however, it could not be assumed that samples overlapped, and therefore were not excluded. It should be noted that few authors reported how their data had previously been presented. The studies included in the present meta-analysis are listed in Appendix C.

Coding and Calculation of Effect Sizes for Within-Study Comparison of Groups

A preliminary coding sheet was developed based on the results from previous reviews. This coding sheet was applied to a sample of approximately 40 articles. As additional insight into variables commonly of interest to researchers was gleaned, the coding sheet was revised (see Appendix A). Studies were first coded for each of the study variables (see Appendix B for conventions sheet). Then, for each of the measures of subject characteristics examined in a particular study, the mean and standard deviation (if available) were recorded for each group in that study (BED, BN, and/or ONB). If a study examined at least two of the three diagnostic groups, and there were sufficient data to calculate an effect size, the SMD was computed to quantify differences between both BED and BN groups and BED and ONB groups within each study.
Standardized mean difference effect sizes between BED and BN, and BED and ONB groups were computed for each characteristic using the Meta-Analysis Programs, Version 5 (Schwarzer) computer software program. Traditionally, the SMD effect size $g$ has been estimated by subtracting the mean of one group from the mean of the other group, and dividing the difference by the pooled standard deviation of the two groups (e.g., Glass, 1977). However, according to Hedges and Olkin (1985), the effect size estimator $g$ has a small sample bias. Thus, they defined a new unbiased effect size estimator $d$, which was used to calculate SMD throughout the present study (see Appendix D for formulas).

As has been noted, an additional goal of this meta-analysis was to examine the effects of various treatments on individuals with BED. Thus, treatment variables and outcome measures were also coded for this subgroup of studies (see Appendix A for coding sheet, Appendix B for conventions). Treatment studies were coded for type of treatment (e.g., cognitive behavior therapy [CBT], IPT) as well as for design type, which included: (a) treatment versus control group, (b) treatment versus alternative treatment, (c) treatment versus treatment plus an adjunct to the treatment (e.g., CBT versus medication in addition to CBT), (d) simple pre-post changes within a group, (e) treatment versus placebo, and (f) treatment versus treatment versus control.

In addition, treatment studies were coded for whether or not groups were randomly assigned as well as for overall validity of research findings. A system was developed whereby seven potential threats to internal validity were assessed (maturation, testing, history, regression, instrumentation, selection, and mortality). These threats have been described in depth throughout the research methods literature (e.g., Campbell & Stanley, 1963). Each of these validity threats was rated on a 0 to 3 scale (0 = not a threat; 1 = minor threat; 2 = plausible threat; 3 = by itself could explain the research findings). A logarithm was developed that would generate a total value
(based on a 5-point Likert scale) for study validity by considering the impact of each threat to validity (see coding conventions, Appendix B).

Standardized mean difference effect sizes were calculated to assess both within- and between-group differences in degree of change after treatment and at follow-up, if available. If means and standard deviations were not provided, SMDs were still calculated if sufficient information was available (e.g., $t$ or $F$ values, percentages). Several researchers have provided guidelines and formulas for calculating effect sizes based on these other statistics (e.g., Hedges & Olkin, 1985; Wolf, 1986).

It was important to ascertain that studies were coded consistently, according to predetermined conventions. While the coding of subject characteristics was straightforward and objective (recording means and standard deviations), this was less true for study characteristics. Therefore, a second person coded 15% of the reports for study characteristics, and interrater agreement was assessed. The second coder was also a doctoral candidate in psychology who had previously received training in meta-analytic design and coding procedures. This individual was trained according to the coding conventions for this study (Appendix B), and continued to code practice studies until three in a row corresponded with those of the primary researcher (unless the primary coder had been in error). The second coder then double coded a random sample of the studies (totaling 15%). The percent agreement between the two coders was assessed by dividing the total number of congruent observations by the total number of observation and multiplying by 100). If the agreement were to have fallen below 80% on any one of the six study variables (or four study variables in the treatment studies), discussion was to be used to clarify coding criteria and resolve differences, and interrater coding would be continued until this standard was met.
Analysis and Calculation of Between-Study Effect Sizes

Aggregating Subject Characteristics Across Studies

When aggregating data (be it means or effect sizes) across multiple studies, several critical analysis issues arise. The manner in which these issues are handled can have a significant impact on the results and upon the interpretation that follows. The first of these issues is determining the unit of analysis to be used (the individual subjects or the study itself). It is necessary to keep in mind that in conducting a meta-analysis, the parameter of interest is the population standardized mean difference (Hedges, 1980). In a discussion of this topic, Bangert-Drowns (1986) indicated that for cases in which a meta-analyst is data pooling, effect size procedures are subject sensitive, and thus the subject may be regarded as the unit of analysis. As such, it becomes important to use the data that best reflect the distribution of individual subject scores in a given population. Therefore, when aggregating mean scores or SMDs across studies in the present meta-analysis, the mean within-study variability was used in calculating overall between-group differences. That is, when computing SMDs between diagnostic group means on a given variable (e.g., BDI scores), the mean within-group SD was used in the calculation rather than the significantly smaller, between-group SD that resulted from averaging a group of means.

The issue of unit of analysis also impacts the decision to weight grand means by sample size. Because the individual subject is considered the unit of analysis in the present study, all aggregated scores were weighted by sample size. Throughout the present study, the frequency weighted mean or effect size was used, which is considered to adequately approximate the optimally weighted mean of the effect size (Hunter, Schmidt, & Jackson, 1982).

Proponents of weighting for sample size and using the subject as the unit of analysis indicate that weighting is important because the number of participants varies widely across
samples. Because studies with large sample sizes provide more accurate estimates of the population effect magnitude than studies with small sample sizes they should be given greater weight (Abrami, Cohen, & d’Apollonia, 1988). Abrami et al. also noted that when the number of studies (or study outcomes) to be aggregated is smaller than the average sample size per study, the power of the unweighted procedures to test the significance of the main relationship of interest…will be less than the power of the same test within a study. (p. 171)

Thus, by using the sample size of the total number of subjects across studies, weighted procedures for tests of mean effect magnitude tend to be more powerful and are recommended (Hedges & Olkin, 1985; Hunter et al., 1982).

By making the decision to use the subject as the unit of analysis, the use of many well-known statistical procedures (such as ANOVAs) becomes inappropriate, as there is no way of uniquely estimating the sample variance across studies (Abrami et al., 1988). Using inferential statistics, then, is unreliable when applied to this type of aggregated data, and would pose a substantial threat to the statistical validity of the meta-analysis (Bangert-Drowsn, 1986). Therefore, when aggregating (weighted) data across studies, only effect sizes should be used and not tests of statistical significance (Schmidt, 1992).

In the present meta-analysis, descriptive statistics (i.e., means and standard deviations) were calculated for each subject characteristic or measure across all studies for the BED, BN, and ONB eating groups, separately. Grand means were composed of study means weighted for sample size.

**Comparing Individuals with Binge Eating Disorder Versus Bulimia Nervosa and Obese Nonbinge Eaters**

Comparisons between individuals with BED, BN, and ONB were made in two ways. The first method of comparing group differences was to combine (across studies) all **within-study**
effect sizes, reflecting particular diagnostic group comparisons. The grand mean effect size for each subject variable was weighted for sample size. Because there were occasionally a number of different measures of the same construct (e.g., cognitive restraint) within studies, an effect size that reflected an average group difference was also calculated. For instance, if a study used both the EDE (Fairburn & Cooper, 1993) and the TFEQ (Stunkard & Messick, 1985) to measure dietary restraint, the two SMDs were averaged so that only one effect size (for pairs of particular diagnostic groups) from this study contributed to the grand effect size for restraint. This method of comparing diagnostic group differences is particularly valuable in that groups are compared within a study involving the same methodology (and often the same selection process).

However, a significant amount of usable data would be excluded from the meta-analysis if only these group comparison studies were included. Therefore, those studies involving only one diagnostic group were also included in the analysis using another approach. This second approach was to compare overall group means for each variable or measure across studies. This was done by computing SMDs involving BED and BN groups (on each variable) as well as SMDs between BED and ONB groups. For example, when making these comparisons on a measure, such as the BDI (Beck et al., 1961), the overall means for each diagnostic group were calculated. Next, SMDs for the differences between groups (i.e., BED vs. BN, and BED vs. ONB) on the measure were calculated and compared. Some researchers (e.g., Mansfield & Buss, 1977; Smith, Glass, & Miller, 1980) have suggested that only one or two data points should be contributed by any given study, thereby preventing studies with multiple results from having undue influence on the overall combined results across studies. However, in this portion of the meta-analysis, it was decided to include all possible data, as one of the primary goals of this study was to obtain a more complete picture of the characteristics of individuals with different eating problems, and omitting data would not be conducive to achieving this goal.
Influence of Study Characteristics

Once subject characteristics were coded and averaged across all studies, the relation between different study characteristics and SMDs was explored. Descriptive statistics for key subject characteristics were first computed separately for each of the study variables. For example, a grand mean was calculated for key variables using all studies that involved a nonclinical community sample, versus weight loss treatment samples, versus inpatient samples, and versus eating disorder treatment samples. Standardized means difference effect sizes were then calculated to determine whether subject characteristics differed based on these study variables. Because comparisons of each subject variable by each study variable would yield hundreds of effect sizes, only a few of the key subject variables (those that were examined in numerous studies and/or best represent a particular construct) were selected. The subject characteristics of interest included: age, body mass index (BMI), TFEQ--Restraint, BDI, EDI--Bulimia, EDI--Drive for Thinness, EDI--Body Dissatisfaction, SCL--90, history of sexual abuse, and personality disorder diagnosis.

Binge Eating Disorder’s Place in the Psychiatric Diagnostic System

A goal of this study was to collect data that would help provide insights into the most appropriate manner to describe and classify individuals evidencing binging and correlated symptoms. A potential confounding factor in comparing groups is body weight. Almost every study of BED required subjects to be overweight (as the two tend to be moderately correlated). Unfortunately, it is not possible to determine which characteristics were influenced by weight and which by binge eating status from the present study. A number of researchers have, however, examined characteristics of obese individuals and generally failed to find differences between obese and nonobese individuals on measures of adjustment, personality, and psychological
functioning (Friedman & Brownell, 1995). Thus, when examining differences in psychological variables between groups in the present study, it is probable that these findings are due to group status rather than weight per se. Quite possibly, other factors may more likely be influenced by weight. For example, it would not be especially pathological for obese individuals to have high levels of body dissatisfaction; however, extreme body dissatisfaction among underweight, binge-eating, adolescent girls would be of clinical concern. It was decided a priori that the hypothesis that BED is a distinct and separate disorder would be supported if:

1. The literature shows that there are distinct differences in the age of onset of these disorders. That is, age of onset differences between disorders would need to be greater than seven years, as this period of time represents the mean age difference for onset of AN and BN (which are considered distinct disorders).

2. Means on measures of psychological/psychiatric symptoms for the three diagnostic groups differ by a SMD of 1.5 or greater. Because DSM-IV (1994) fundamentally requires binge eating in both BED and BN, it is not expected that these groups will necessarily differ significantly on measures of binge eating. Similarly, minimal differences might be expected on disinhibition measures. If mean differences for binge eating and disinhibition score distributions are greater than 1.5 SMDs for BED and BN groups, this might suggest dramatic differences in severity. Thus, very extreme mean score differences on these variables would be needed to contribute to an overall body of evidence suggesting distinct disorders. Further support for this criterion comes from Meehl and Yonce (1994) who indicated that a SD of 1.5 between groups is a conservative indication for diagnostic group distinctiveness. While no absolute number of variables should show such extreme differences in means, the suggestion that BED and BN are truly distinct is supported if this degree of difference occurs on four or more key psychological variables.
3. There is little evidence in the literature that individuals with one disorder transition to the other disorder (i.e., less than 25% of individuals with BED also met diagnostic criteria for BN at some point in their lives, and vice versa).

On the other hand, the hypothesis that BED is a variant of BN or belongs on a continuum of binge eating disturbance would be supported if:

1. There fail to be distinct differences in mean age of onset of the disorders (see above).
2. BN and BED groups score within 1.5 SMDs of one another on these characteristics.
3. Greater than 25% of individuals with one disorder also met diagnostic criteria for another of these disorders in their lifetimes.

The decision rules for determining whether evidence better supports a “continuum” or a distinct category model are summarized in Table 2. It should be noted that some of these decision rules are subjective and may be deemed by some researchers as arbitrary; however, it was

Table 2

Decision Rules for Supporting a Continuum Versus a Distinctness Model of BED

<table>
<thead>
<tr>
<th>Type of data</th>
<th>Support for a continuum/variant model</th>
<th>Support for a distinctiveness model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Onset age of dieting, binging, BED, BN</td>
<td>Mean difference &lt; 7 years</td>
<td>Mean difference ≥ 7 years</td>
</tr>
</tbody>
</table>
| 2a. Scores on continuous measures of eating pathology, weight and shape overconcern (except body dissatisfaction), psychopathology, family variables | Mean differences:
1. BN-BED < 1.5 SMD, and;
2. BED-ONB < 1.5 SMD | Mean differences:
1. BN-BED ≥ 1.5 SMD, and;
2. BED-ONB ≥ 1.5 SMD |
| 2b. Percentage of subjects with history of or comorbid psychopathology | Rate is less than two times greater for one group than the other | Rate is two times or more greater for one group than the other |
| 3. Percentage of subjects who have met criteria for both BED and BN in lifetime | ≥25% | <25% |

Note. BN = individuals with bulimia nervosa; BED = individuals with binge eating disorder; ONB = obese nonbinge eaters.
necessary to propose a replicable basis for assessing whether the data best support a continuum versus distinctness model. Future researchers and scholars can certainly debate and critique the validity of this operational definition.

**Treatment Outcomes**

As noted previously, both within- and between-study SMDs were calculated for each outcome study if possible. It seemed likely that studies investigating single groups using before versus after (pre-post) designs have effect sizes that were generally larger than those of controlled studies, as the magnitude of these effect sizes was likely enhanced by the mere passage of time. That is, it is typical that a significant proportion of individuals with a given disorder will improve over time, without treatment. Thus, the outcome results of those studies using within- versus between-study designs were analyzed separately.

In both types of studies (i.e., controlled and uncontrolled), outcome findings within a study were collapsed so that a maximum of three effect sizes were contributed by any given study. Three separate constructs that have been used most frequently across studies assessing individuals with BED include: (a) weight/BMI, (b) binge eating or other eating-related pathology, and (c) psychopathology or psychological distress. If a study measured one of these constructs using more than one measure, the SMDs were averaged for that particular construct. The mean SMDs (weighted for sample size) were then calculated across outcome studies for each construct.
CHAPTER IV
RESULTS

The results of the meta-analysis will be presented according to the following sections: (a) description of sample of studies, (b) intercoder agreement ratings, (c) comparison of subjects from "Other" category versus BED category, (d) descriptive findings of subjects with BED, (e) comparisons of the diagnostic groups, (f) relationships between study variables and effect sizes, and (g) general treatment outcome and comparative treatment study findings.

Description of Analyzed Studies

Over 2,000 were reviewed for possible inclusion in this meta-analysis; of these, a total of 297 met inclusion criteria. The total number of samples and subjects for each diagnostic group are presented in Table 3. Sixty-one of these studies included more than one diagnostic group; thus, from these, within-study comparisons between groups were made. There were also 19 treatment studies among the 97 BED samples that met inclusion criteria.

Table 3
Number of Samples and Subjects in the Meta-Analysis

<table>
<thead>
<tr>
<th>Diagnostic group</th>
<th>Total number of samples</th>
<th>Total number of subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulimia nervosa</td>
<td>219</td>
<td>12,844</td>
</tr>
<tr>
<td>Binge eating disorder</td>
<td>97</td>
<td>4,822</td>
</tr>
<tr>
<td>Nonbinging obese</td>
<td>55</td>
<td>4,352</td>
</tr>
<tr>
<td>Other</td>
<td>24</td>
<td>439</td>
</tr>
<tr>
<td>Total</td>
<td>395</td>
<td>22,457</td>
</tr>
</tbody>
</table>
All studies included in the meta-analysis were published between 1988 and the present (see Table 4 for presentation of other study characteristics). Given the recent inclusion of BED in the DSM-IV (1994), it is not surprising that the earliest BED study included in the meta-analysis was published later, in 1992. Similarly, group comparisons of the median year of publication indicate that BED studies included in this meta-analysis are the most recent ($\text{Mdn} = 1997$) compared to other diagnostic groups. Conversely, those samples categorized as “Other” tended to have earlier publication dates ($\text{Mdn} = 1992$). This difference likely reflects that studies not using DSM-IV or near DSM-IV criteria to diagnose subjects with BED (even though they likely included a majority of BED individuals) were included in this “Other” category. Since the publication of the DSM-IV, researchers have more frequently utilized these “official” criteria in selecting their samples.

Mean sample size also varied between diagnostic groups, ranging from 26 to 79 (as shown in Table 4). However, the median sample size was smaller and varied less (range 21-47), suggesting that there were one or more studies in each diagnostic group that had substantial sample sizes, which skewed the distribution. Samples of obese nonbinging (ONB) subjects tended to be the largest ($\text{Mdn} = 47$, typically recruited from weight loss programs), while samples assigned to the “Other” category contained the fewest subjects ($\text{Mdn} = 21$).

In all diagnostic groups, the majority of subjects were diagnosed by means of a clinical interview, though questionnaire was used more often with ONB individuals and subjects in the “Other” category, than in the BN and BED groups. This finding is not surprising, given that one of the reasons samples were categorized as “Other” was because the researchers utilized a measure that employed a simple cutoff score (without regard to specific symptomology) to assign subjects to a binge-eating group. Because of this strategy, the integrity of a BED diagnosis could not be established, and the samples were not included in the BED group.
Table 4
Description of Study Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>BN</th>
<th>BED</th>
<th>ONB</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean sample size (SD)</td>
<td>58.8 (68.0)</td>
<td>49.7 (56.5)</td>
<td>79.1 (159.3)</td>
<td>25.8 (17.3)</td>
</tr>
<tr>
<td>Median sample size</td>
<td>35</td>
<td>35</td>
<td>47</td>
<td>21</td>
</tr>
<tr>
<td>Method used for diagnosis (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview</td>
<td>78.5</td>
<td>76.3</td>
<td>59.3</td>
<td>58.3</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>21.5</td>
<td>23.7</td>
<td>40.7</td>
<td>41.7</td>
</tr>
<tr>
<td>Sample type (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight loss program</td>
<td>0.0</td>
<td>21.6</td>
<td>49.1</td>
<td>45.8</td>
</tr>
<tr>
<td>Eating disorder clinic</td>
<td>33.8</td>
<td>15.5</td>
<td>7.3</td>
<td>20.8</td>
</tr>
<tr>
<td>Inpatient unit</td>
<td>16.0</td>
<td>7.2</td>
<td>7.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Community volunteers</td>
<td>8.7</td>
<td>17.5</td>
<td>21.8</td>
<td>16.7</td>
</tr>
<tr>
<td>Outpatient therapy clinic</td>
<td>25.1</td>
<td>27.8</td>
<td>3.6</td>
<td>4.7</td>
</tr>
<tr>
<td>Combination</td>
<td>16.0</td>
<td>7.2</td>
<td>9.1</td>
<td>12.5</td>
</tr>
<tr>
<td>Unknown/other</td>
<td>0.5</td>
<td>3.1</td>
<td>1.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Mean quality rating(^a) (SD)</td>
<td>5.6 (1.0)</td>
<td>4.7 (1.3)</td>
<td>4.3 (1.9)</td>
<td>3.1 (1.4)</td>
</tr>
</tbody>
</table>

Note. Means are not weighted for sample size. BN = individuals with bulimia nervosa; BED = individuals with binge eating disorder; ONB = individuals who are obese nonburgers.

\(^a\)Quality rating based on a 7-point Likert scale (7 = highest quality).
There were substantial differences between diagnostic groups in terms of the type of sample from which subjects were recruited. For instance, 49% of ONB samples and 46% of "Other" samples were recruited from weight loss programs, yet this was a limited source of subjects for the BED (22%) and BN (0%) samples. In contrast, a majority of BN and BED subjects were drawn from eating disorder or general outpatient mental health clinics (BED = 44%, BN = 59%). In addition, BN samples were much more frequently recruited from inpatient hospital settings than any other group (BN = 16%, BED = 7%, ONB = 7%, Other = 0%). Given that all subjects in the BED and BN samples, by definition, have an Axis I psychiatric disorder, whereas those in the obese nonbinging and "Other" category may not, such differences between groups are not surprising. Individuals with psychiatric disorders are probably more likely to receive mental health treatment than those without a disorder.

The methodological quality rating of studies also varied as a function of diagnostic group. The studies of BN were rated as generally having the highest quality, while the studies involving "Other" were the lowest. In part, these differences were influenced by the varying inclusion criteria of the meta-analysis applied to different diagnostic groups. For example, BN subjects had to meet strict DSM-III-R (1987) or DSM-IV (1994) criteria in order to be included in the meta-analysis, whereas the "Other" subjects were placed in this group specifically because subjects may not have met DSM-IV criteria for BED. As studies' strict use of DSM criteria was one of the variables considered in the quality rating, such differences in quality rating between diagnostic groups would be expected.

Overall, the study characteristics reported in Table 4 indicate that samples from the different diagnostic groups tended to vary substantially on several variables. The relationships between these study characteristics and specific subject variables will be presented later in this chapter.
Intercoder Agreement

As a reliability check, 15% of the studies were independently coded by the primary researcher and a psychology doctoral candidate with experience in meta-analysis. However, only the codings for study variables (rather than subject variables) were duplicated to check for accuracy, as these tended to involve greater subjectivity and/or were more difficult to locate within the study report. Percent of interrater agreement, as previously mentioned, was calculated in order to assess the reliability of ratings. Interrater agreement ranged from 87% to 100% with an average agreement of 97.6%. The results of these statistical analyses are presented in Table 5.

Comparison of Subjects from the “Other” Category Versus Binge Eating Disorder Category

As has been discussed in previous chapters, there has been confusion about how diverse

Table 5

Intercoder Agreement of Study Variables

<table>
<thead>
<tr>
<th>Study variable</th>
<th>Intercoder agreement %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Descriptive studies</strong></td>
<td></td>
</tr>
<tr>
<td>Sample size</td>
<td>100</td>
</tr>
<tr>
<td>Sample type</td>
<td>93</td>
</tr>
<tr>
<td>Method of diagnosis</td>
<td>96</td>
</tr>
<tr>
<td>Use of DSM-IV criteria</td>
<td>100</td>
</tr>
<tr>
<td>Study quality</td>
<td>87</td>
</tr>
<tr>
<td>Assessment of psychopathology</td>
<td>100</td>
</tr>
<tr>
<td><strong>Treatment studies</strong></td>
<td></td>
</tr>
<tr>
<td>Type of study</td>
<td>100</td>
</tr>
<tr>
<td>Type of treatment</td>
<td>100</td>
</tr>
<tr>
<td>Random assignment</td>
<td>100</td>
</tr>
<tr>
<td>Internal validity rating</td>
<td>100</td>
</tr>
</tbody>
</table>
variants of disorders of binge eating are designated in the literature (e.g., "obese binge eaters,” “compulsive eaters"); indeed, subject selection criteria have varied widely across studies. An intent of this study was to examine differences between individuals who met criteria (or very nearly so) for BED according to the DSM-IV (1994), versus those considered “obese binge eaters,” or “compulsive eaters”—not necessarily satisfying DSM-IV criteria. Samples from studies in which subjects were not assessed using these more standard and rigorous diagnostic criteria, were included in a group labeled “Other.” It was decided that if these “Other” subjects displayed characteristics that were highly similar to those with BED, the groups could be combined for further analysis. Of course, combining the groups reliably increases the size of the overall research population, and this could lend additional external validity to findings.

As was noted earlier, the present researcher established a priori criteria for considering whether diagnostic groups should be considered to be equivalent i.e., less than 0.20 SMD effect size (i.e., “no meaningful difference” based on Cohen’s 1988 standards), on at least 90% of the subject variables. It should be noted that there were significantly fewer studies included in the “Other” category (24), than in the BED category (97). As a result, fewer variables/measures included in the larger meta-analyses were examined in the studies using subjects diagnosed as “Other.” Therefore, only those variables for which at least two studies measured the variable were included in effect size calculations examining the similarity between BED and “Other” category.

Of the 25 variables included in this analysis, diagnostic groups were significantly different for 12 of them (i.e., SMD ≥ 0.20; see Table 6). That is, almost half of the measures examined were considered to meaningfully differentiate the BED group from those who were variously diagnosed as “obese binge eaters,” “compulsive eaters,” and/or those for whom diagnostic criteria for BED were not thoroughly assessed. Consequently, subjects designated as belonging to the
<table>
<thead>
<tr>
<th>Variable</th>
<th>n BED samples</th>
<th>n &quot;Other&quot; samples</th>
<th>BED subjects</th>
<th>Other subjects</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>68</td>
<td>17</td>
<td>3,202</td>
<td>439</td>
<td>3.96 (9.2)</td>
</tr>
<tr>
<td>Body mass index</td>
<td>72</td>
<td>10</td>
<td>3,424</td>
<td>284</td>
<td>3.66 (7.0)</td>
</tr>
<tr>
<td>% Female</td>
<td>84</td>
<td>21</td>
<td>3,895</td>
<td>546</td>
<td>93.9</td>
</tr>
<tr>
<td>Eating and weight history</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onset age of dieting</td>
<td>17</td>
<td>3</td>
<td>1,277</td>
<td>129</td>
<td>19.0 (7.4)</td>
</tr>
<tr>
<td>% with history of anorexia</td>
<td>7</td>
<td>2</td>
<td>507</td>
<td>112</td>
<td>2.5</td>
</tr>
<tr>
<td>% diet before binge</td>
<td>7</td>
<td>2</td>
<td>896</td>
<td>129</td>
<td>42.8</td>
</tr>
<tr>
<td>Eating related pathology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Binge Eating Scale</td>
<td>18</td>
<td>8</td>
<td>558</td>
<td>159</td>
<td>30.4 (6.9)</td>
</tr>
<tr>
<td>Bulimia Test</td>
<td>3</td>
<td>5</td>
<td>67</td>
<td>125</td>
<td>105.5 (13.3)</td>
</tr>
<tr>
<td>TFEQ – Restraint</td>
<td>25</td>
<td>4</td>
<td>1,155</td>
<td>127</td>
<td>8.2 (4.0)</td>
</tr>
<tr>
<td>TFEQ – Disinhibition</td>
<td>25</td>
<td>4</td>
<td>1,155</td>
<td>127</td>
<td>13.0 (2.1)</td>
</tr>
<tr>
<td>TFEQ – Hunger</td>
<td>25</td>
<td>4</td>
<td>1,155</td>
<td>127</td>
<td>9.3 (3.3)</td>
</tr>
<tr>
<td>Weight &amp; shape concern</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDE – Weight Concern</td>
<td>9</td>
<td>2</td>
<td>606</td>
<td>24</td>
<td>3.5 (1.1)</td>
</tr>
<tr>
<td>EDE – Shape concern</td>
<td>9</td>
<td>2</td>
<td>606</td>
<td>24</td>
<td>4.0 (1.2)</td>
</tr>
<tr>
<td>EDI – Drive for thinness</td>
<td>13</td>
<td>3</td>
<td>439</td>
<td>65</td>
<td>9.1 (4.9)</td>
</tr>
<tr>
<td>EDI – Body dissatisfaction</td>
<td>15</td>
<td>3</td>
<td>509</td>
<td>65</td>
<td>21.4 (5.2)</td>
</tr>
<tr>
<td>Body Shape Questionnaire</td>
<td>3</td>
<td>2</td>
<td>194</td>
<td>26</td>
<td>140.1 (27.4)</td>
</tr>
<tr>
<td>Psychopathology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td>33</td>
<td>15</td>
<td>1,393</td>
<td>321</td>
<td>15.1 (8.5)</td>
</tr>
<tr>
<td>% Lifetime substance abuse</td>
<td>21</td>
<td>2</td>
<td>1,533</td>
<td>125</td>
<td>21.0</td>
</tr>
<tr>
<td>Rosenberg Self-Esteem Scale*</td>
<td>9</td>
<td>2</td>
<td>539</td>
<td>31</td>
<td>27.3 (5.4)</td>
</tr>
<tr>
<td>EDI – Ineffectiveness</td>
<td>12</td>
<td>2</td>
<td>359</td>
<td>45</td>
<td>6.1 (6.0)</td>
</tr>
<tr>
<td>EDI – Maturity fears</td>
<td>12</td>
<td>2</td>
<td>359</td>
<td>45</td>
<td>3.9 (3.1)</td>
</tr>
<tr>
<td>EDI – Interpersonal distrust</td>
<td>12</td>
<td>2</td>
<td>359</td>
<td>45</td>
<td>3.5 (3.3)</td>
</tr>
<tr>
<td>EDI – Interoceptive awareness</td>
<td>12</td>
<td>2</td>
<td>359</td>
<td>45</td>
<td>5.8 (5.2)</td>
</tr>
<tr>
<td>EDI – Perfectionism</td>
<td>12</td>
<td>2</td>
<td>359</td>
<td>45</td>
<td>6.1 (4.2)</td>
</tr>
</tbody>
</table>

Note. BED = binge eating disorder; EDI = Eating Disorder Inventory; EDE = Eating Disorder Examination; TFEQ = Three Factor Eating Questionnaire; *Higher scores reflect higher self-esteem; direction of effect size reflects this. b Indicates a SMD that reflects significant group differences.
“Other” category were not combined with the BED samples, and thus, were excluded from the central analyses of the present study.

Descriptive Findings of Individuals with Binge Eating Disorder

A goal of this meta-analysis was to summarize the most consistent characteristics of individuals with BED identified by researchers to date. To this end, grand mean scores or percentages for variables/measures of interest across multiple studies were calculated. All measures used by researchers studying individuals with BED were included in this summary (providing at least two different studies reported data on the measure). Unfortunately, family characteristics (one of the key constructs of interest) could not be assessed, as no two BED studies utilized the same measures, or even assessed similar family-related constructs. Consequently, this variable was dropped from the analysis.

The results of this data aggregation are provided in Table 7. It was beyond the scope of this study to compare these means and standard deviations with those obtained from community populations or standardization samples published in the test construction manuals of each measure. Rather, the data are presented simply as a means of displaying typical BED characteristics and to provide descriptive statistics that may be used for future research. Nonetheless, a number of conclusions can be drawn. First, it is notable that the BED subjects included in these samples tended to be women (94%) who were quite a bit older (M = 40 years) than most individuals with AN or BN, and were largely overweight (BMI; M = 36.6). However, it is noteworthy that samples varied widely; the BMI of some samples fell within normal limits (23.6), while others consisted of morbidly obese women (56.2).
Table 7

Means and Standard Deviations of Subject Variables for Individual with Binge Eating Disorder

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of samples</th>
<th>Number of subjects</th>
<th>M (SD)</th>
<th>Range of sample means</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subject characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>68</td>
<td>3,202</td>
<td>39.6 (9.2)</td>
<td>24.5 – 47.6</td>
</tr>
<tr>
<td>Body mass index</td>
<td>72</td>
<td>3,424</td>
<td>36.6 (7.0)</td>
<td>23.6 – 56.2</td>
</tr>
<tr>
<td>% Female</td>
<td>84</td>
<td>3,895</td>
<td>93.9</td>
<td>50.0 – 100</td>
</tr>
<tr>
<td><strong>Eating and weight history</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onset age of dieting</td>
<td>17</td>
<td>1,277</td>
<td>19.0 (7.4)</td>
<td>14.1 – 25.0</td>
</tr>
<tr>
<td>Onset age of binging</td>
<td>17</td>
<td>1,025</td>
<td>19.3 (10.0)</td>
<td>10.9 – 29.0</td>
</tr>
<tr>
<td>Onset age of eating disorder</td>
<td>14</td>
<td>669</td>
<td>21.4 (9.2)</td>
<td>16.5 – 25.3</td>
</tr>
<tr>
<td>Onset age of obesity</td>
<td>22</td>
<td>1,520</td>
<td>16.2 (9.4)</td>
<td>8.3 – 25.0</td>
</tr>
<tr>
<td>% with history of BN</td>
<td>11</td>
<td>746</td>
<td>12.1</td>
<td>2.0 – 54.0</td>
</tr>
<tr>
<td>% with history of anorexia</td>
<td>7</td>
<td>507</td>
<td>2.5</td>
<td>0 – 11.0</td>
</tr>
<tr>
<td>% diet before binge</td>
<td>7</td>
<td>896</td>
<td>42.8</td>
<td>25.0 – 65.0</td>
</tr>
<tr>
<td><strong>Eating related pathology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Binge frequency</td>
<td>13</td>
<td>637</td>
<td>5.1 (2.6)</td>
<td>2.2 – 7.8</td>
</tr>
<tr>
<td>Binge Eating Scale</td>
<td>18</td>
<td>588</td>
<td>30.4 (6.9)</td>
<td>21.0 – 47.3</td>
</tr>
<tr>
<td>Bulimia Test</td>
<td>3</td>
<td>67</td>
<td>105.5 (13.3)</td>
<td>95.5 – 117</td>
</tr>
<tr>
<td>EDI – Bulimia</td>
<td>12</td>
<td>359</td>
<td>7.9 (4.0)</td>
<td>5.2 – 9.9</td>
</tr>
<tr>
<td>EDE – Eating concern</td>
<td>8</td>
<td>543</td>
<td>2.4 (1.2)</td>
<td>1.7 – 3.5</td>
</tr>
<tr>
<td>EDE – Restraint</td>
<td>9</td>
<td>606</td>
<td>2.1 (1.2)</td>
<td>1.6 – 2.5</td>
</tr>
<tr>
<td>TFEQ – Restraint</td>
<td>25</td>
<td>1,155</td>
<td>8.2 (4.0)</td>
<td>4.8 – 11.5</td>
</tr>
<tr>
<td>TFEQ – Disinhibition</td>
<td>25</td>
<td>1,155</td>
<td>13.0 (2.1)</td>
<td>8.1 – 14.2</td>
</tr>
<tr>
<td>TFEQ – Hunger</td>
<td>25</td>
<td>1,155</td>
<td>9.3 (3.3)</td>
<td>6.9 – 11.7</td>
</tr>
<tr>
<td><strong>Weight &amp; shape concern</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDE – Weight concern</td>
<td>9</td>
<td>606</td>
<td>3.5 (1.1)</td>
<td>2.9 – 4.2</td>
</tr>
<tr>
<td>EDE – Shape concern</td>
<td>9</td>
<td>606</td>
<td>4.0 (1.2)</td>
<td>3.3 – 4.8</td>
</tr>
<tr>
<td>EDI – Drive for thinness</td>
<td>13</td>
<td>439</td>
<td>9.1 (4.9)</td>
<td>7.2 – 12.7</td>
</tr>
<tr>
<td>EDI – Body dissatisfaction</td>
<td>15</td>
<td>509</td>
<td>21.4 (5.2)</td>
<td>17.0 – 23.1</td>
</tr>
<tr>
<td>Body Shape Questionnaire</td>
<td>3</td>
<td>194</td>
<td>140.1 (27.4)</td>
<td>136 – 142</td>
</tr>
</tbody>
</table>

(table continues)
Examination of eating and weight histories among BED subjects is also of interest. Subjects with BED tended to report being obese or overweight before initially engaging in dieting or binging (self-reported mean age of onset of obesity was 16.2 years). Although the reported average age of initiating dieting behavior among subjects only slightly preceded the age they began binging (19.0 vs. 19.3 years of age), only 42.8% of subjects actually avowed they dieted before ever binge eating. This conclusion is based on seven studies that assessed this temporal relationship. The percentage varied between studies, however, ranging from 25% to 65% of individuals retrospectively reporting that they dieted prior to initiating binging. Additionally, of the 507 BED subjects questioned about AN, a mere 2.5% acknowledged such a history. Similarly, of the 746 BED subjects questioned, only 12.1% reported a prior history of BN. These findings
suggest that relatively few individuals develop BED after meeting criteria for another eating disorder.

The BES (Gormally et al., 1982) has frequently been used to diagnose BED. It is important to note that the mean BES score varied a great deal between samples. This finding is particularly relevant because, typically, a cutoff score of 27 has been used by many researchers to identify subjects with BED. Although the overall mean of 30.4 for BED subjects (based on 588 subjects in 18 studies) is above this cutoff, sample means ranged from 21 to 47, indicating that a number of individuals with “true” BED may have been overlooked with the typical cutoff score.

Diagnostic Group Comparisons

Method 1: Comparison of Grand Mean Effect Sizes

As previously noted, diagnostic groups were compared (BN vs. BED, BED vs. ONB) using two methods. First, a number of studies reported data on more than one of the diagnostic groups; this allowed effect size calculations to be based on within-study data. However, only those variables/measures that were examined in at least two studies for any diagnostic group, were included in the present assessment of within-study effect sizes. The mean SMDs (weighted for sample size) and the ranges for within-study group comparisons are presented in Tables 8 and 9. In planning the present review, it was decided that SMDs less than 0.20 should be considered to reflect no meaningful difference between groups (consistent with Cohen’s 1988 guidelines). On the other hand, SMDs of 1.5 or greater would be considered to be evidence of probable diagnostic group distinctiveness. Caution must be taken when interpreting SMDs based on effect sizes aggregated from only two to three studies (regardless of the number of subjects), as results may be less valid and generalizable than statistics compiled from many studies. These results will be presented according to the key categories outlined in the literature review.
Table 8

Grand Mean Effect Size Comparisons of Diagnostic Groups on Personal Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Subjects N</th>
<th>Effect size BN - BED</th>
<th>Range</th>
<th>Effect size ONB - BED</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>4,096</td>
<td>-1.40</td>
<td>(-6.95 - -0.03)</td>
<td>0.17</td>
<td>(-0.30 - 0.56)</td>
</tr>
<tr>
<td>Body mass index</td>
<td>4,368</td>
<td>-1.85</td>
<td>(-4.39 - -0.12)</td>
<td>-0.28</td>
<td>(-0.60 - 0.45)</td>
</tr>
</tbody>
</table>

Note. BN = individuals with bulimia nervosa; BED = individuals with binge eating disorder; ONB = obese non binge eaters.

Personal Characteristics

Examination of effect sizes revealed that subjects with BED were markedly older than those with BN (SMD = -1.40), but similar in age to ONB individuals. Not surprisingly, BED subjects were much heavier than BN subjects (SMD = -1.85), but only slightly more overweight than ONB individuals (SMD = -0.28; see Table 8).

Eating and Weight History

In terms of lifetime eating and weight patterns, individuals with BED tended to begin dieting and binging at an earlier age than BN subjects (SMD = 0.29 and 0.57, respectively), and dieted at a younger age than ONB subjects (SMD = 0.39; see Table 9). However, bulimics tended to meet full criteria for an eating disorder slightly earlier than those with BED (SMD = -0.33). The comparisons also indicated that bulimics were considerably more likely than those with BED to have had a history of AN (SMD = 1.03), whereas there was no observable difference between those with BED and ONB. Although a history of obesity was not examined in the studies on BN, comparisons between the BED and obese nonbinger groups indicate that individuals with BED became overweight at an earlier age than obese individuals who do not binge eat (SMD = 0.30). However, because there was a substantial range of effect sizes (-0.67 to -0.93), these data were examined more closely. In seven of the studies, BED subjects reported a younger age of onset of
Table 9

Grand Mean Effect Sizes of Diagnostic Group Differences on Subject Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of samples</th>
<th>Number of subjects</th>
<th>Effect size BN - BED</th>
<th>Range</th>
<th>Effect size ONB - BED</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating and weight history</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onset age of dieting</td>
<td>8</td>
<td>2,367</td>
<td>0.29</td>
<td>(0.28 – 0.30)</td>
<td>0.39</td>
<td>(-0.02 – 0.71)</td>
</tr>
<tr>
<td>Onset age of binging</td>
<td>2</td>
<td>113</td>
<td>0.57</td>
<td>(0.33 – 0.68)</td>
<td>-0.02</td>
<td>---</td>
</tr>
<tr>
<td>Onset age of eating disorder</td>
<td>6</td>
<td>513</td>
<td>-0.33</td>
<td>(-0.78 – 0.28)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Onset age of obesity</td>
<td>12</td>
<td>2,420</td>
<td>-0.33</td>
<td>(-0.78 – 0.28)</td>
<td>0.30</td>
<td>(-0.67 – 0.93)</td>
</tr>
<tr>
<td>% with history of anorexia</td>
<td>4</td>
<td>558</td>
<td>1.03</td>
<td>(0.50 – 1.38)</td>
<td>-0.04</td>
<td>(-0.09 – 0.00)</td>
</tr>
<tr>
<td>Eating disordered behavior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Binge frequency</td>
<td>2</td>
<td>110</td>
<td>0.41</td>
<td>(0.37 – 0.50)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Binge Eating Scale</td>
<td>11</td>
<td>1,030</td>
<td>---</td>
<td>---</td>
<td>-2.14</td>
<td>(-5.20 – 0.96)</td>
</tr>
<tr>
<td>Bulimia Test</td>
<td>2</td>
<td>94</td>
<td>1.30</td>
<td>(1.13 – 1.50)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>EDI – Bulimia</td>
<td>14</td>
<td>1,056</td>
<td>0.49</td>
<td>(0.33 – 1.12)</td>
<td>-1.55</td>
<td>(-2.20 – 0.63)</td>
</tr>
<tr>
<td>EDE – Eating concern</td>
<td>3</td>
<td>289</td>
<td>0.56</td>
<td>(0.42 – 1.04)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>EDE – Restraint</td>
<td>5</td>
<td>509</td>
<td>1.00</td>
<td>(0.77 – 1.64)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>TFEQ – Restraint</td>
<td>22</td>
<td>1,426</td>
<td>0.89</td>
<td>(0.52 – 1.26)</td>
<td>0.12</td>
<td>(-1.32 – 0.90)</td>
</tr>
<tr>
<td>TFEQ – Disinhibition</td>
<td>22</td>
<td>1,426</td>
<td>0.06</td>
<td>(-0.76 – 0.71)</td>
<td>-1.17</td>
<td>(-2.55 – 0.72)</td>
</tr>
<tr>
<td>TFEQ – Hunger</td>
<td>22</td>
<td>1,426</td>
<td>0.24</td>
<td>(-0.61 – 1.21)</td>
<td>-0.85</td>
<td>(-2.65 – 0.14)</td>
</tr>
<tr>
<td>Overall binge ES</td>
<td>31</td>
<td>2,569</td>
<td>0.47</td>
<td>(0.00 – 1.13)</td>
<td>-1.92</td>
<td>(-5.20 – 0.63)</td>
</tr>
<tr>
<td>Overall restraint ES</td>
<td>25</td>
<td>2,204</td>
<td>1.00</td>
<td>(0.64 – 1.64)</td>
<td>-0.09</td>
<td>(-1.70 – 0.90)</td>
</tr>
</tbody>
</table>

(table continues)
<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of samples</th>
<th>Number of subjects</th>
<th>Effect size BN – BED</th>
<th>Range</th>
<th>Effect size ONB – BED</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight &amp; shape concern</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDE – Weight concern</td>
<td>9</td>
<td>1,048</td>
<td>0.08</td>
<td>(-0.26 - 0.49)</td>
<td>-1.00</td>
<td>(-1.26 - 0.87)</td>
</tr>
<tr>
<td>EDE – Shape concern</td>
<td>9</td>
<td>1,048</td>
<td>0.05</td>
<td>(-0.29 - 0.68)</td>
<td>-1.05</td>
<td>(-1.48 - 0.77)</td>
</tr>
<tr>
<td>EDI – Drive for thinness</td>
<td>14</td>
<td>1,120</td>
<td>0.69</td>
<td>(0.13 - 0.91)</td>
<td>-0.66</td>
<td>(-1.13 - 0.09)</td>
</tr>
<tr>
<td>EDI – Body dissatisfaction</td>
<td>16</td>
<td>1,235</td>
<td>-0.46</td>
<td>(-0.96 - 0.47)</td>
<td>-0.30</td>
<td>(-1.09 - 0.28)</td>
</tr>
<tr>
<td>Overall weight &amp; shape</td>
<td>24</td>
<td>2,232</td>
<td>0.09</td>
<td>(-0.30 - 0.69)</td>
<td>-0.66</td>
<td>(-1.18 - 0.06)</td>
</tr>
<tr>
<td>Psychopathology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td>25</td>
<td>1,956</td>
<td>0.51</td>
<td>(-0.06 - 0.86)</td>
<td>-0.78</td>
<td>(-1.48 - 0.17)</td>
</tr>
<tr>
<td>Hamilton Depression Scale</td>
<td>2</td>
<td>88</td>
<td>0.17</td>
<td>(0.09 - 0.26)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Hamilton Anxiety Scale</td>
<td>2</td>
<td>120</td>
<td>0.46</td>
<td>(0.35 - 0.52)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>SCL-90</td>
<td>11</td>
<td>1,116</td>
<td>0.45</td>
<td>(0.27 - 0.75)</td>
<td>-0.84</td>
<td>(-1.45 - 0.49)</td>
</tr>
<tr>
<td>% Lifetime axis I disorder</td>
<td>6</td>
<td>584</td>
<td>---</td>
<td>---</td>
<td>-0.78</td>
<td>(-1.90 - 0.50)</td>
</tr>
<tr>
<td>% Lifetime axis II disorder</td>
<td>8</td>
<td>602</td>
<td>0.50</td>
<td>(0.15 - 0.75)</td>
<td>-0.71</td>
<td>(-0.89 - 0.60)</td>
</tr>
<tr>
<td>% Lifetime affective disorder</td>
<td>6</td>
<td>410</td>
<td>0.37</td>
<td>(0.08 - 0.37)</td>
<td>-0.77</td>
<td>(-1.71 - 0.48)</td>
</tr>
<tr>
<td>% Lifetime depression</td>
<td>12</td>
<td>3,798</td>
<td>0.47</td>
<td>(-0.18 - 0.74)</td>
<td>0.60</td>
<td>(-1.24 - 0.39)</td>
</tr>
<tr>
<td>% Lifetime anxiety disorder</td>
<td>3</td>
<td>268</td>
<td>---</td>
<td>---</td>
<td>-0.33</td>
<td>(-1.10 - 0.03)</td>
</tr>
<tr>
<td>% Lifetime substance abuse</td>
<td>14</td>
<td>3,973</td>
<td>0.27</td>
<td>(-0.09 - 0.43)</td>
<td>-0.35</td>
<td>(-0.85 - 0.02)</td>
</tr>
<tr>
<td>% History of sexual abuse</td>
<td>9</td>
<td>2,811</td>
<td>0.32</td>
<td>(0.22 - 0.79)</td>
<td>-0.27</td>
<td>(-0.30 - 0.00)</td>
</tr>
<tr>
<td>Rosenberg Self-Esteem Scale(^a)</td>
<td>5</td>
<td>578</td>
<td>---</td>
<td>---</td>
<td>-0.85</td>
<td>(-0.97 - 0.51)</td>
</tr>
<tr>
<td>EDI – Ineffectiveness</td>
<td>14</td>
<td>1,056</td>
<td>0.49</td>
<td>(0.11 - 0.95)</td>
<td>-0.87</td>
<td>(-1.52 - 0.65)</td>
</tr>
<tr>
<td>EDI – Maturity fears</td>
<td>14</td>
<td>1,056</td>
<td>0.29</td>
<td>(-0.02 - 0.55)</td>
<td>-0.37</td>
<td>(-0.86 - 0.21)</td>
</tr>
<tr>
<td>EDI – Interpersonal distrust</td>
<td>14</td>
<td>1,056</td>
<td>0.63</td>
<td>(-0.11 - 1.59)</td>
<td>-0.25</td>
<td>(-0.67 - 0.04)</td>
</tr>
<tr>
<td>EDI – Interoceptive awareness</td>
<td>14</td>
<td>1,056</td>
<td>0.69</td>
<td>(0.33 - 0.69)</td>
<td>-0.79</td>
<td>(-1.26 - 0.49)</td>
</tr>
<tr>
<td>EDI – Perfectionism</td>
<td>14</td>
<td>1,056</td>
<td>0.36</td>
<td>(-0.14 - 0.76)</td>
<td>-0.36</td>
<td>(-0.77 - 0.14)</td>
</tr>
<tr>
<td>Overall depression</td>
<td>38</td>
<td>5,646</td>
<td>0.48</td>
<td>(-0.18 - 1.00)</td>
<td>-0.66</td>
<td>(-1.71 - 0.21)</td>
</tr>
<tr>
<td>Overall psychopathology</td>
<td>44</td>
<td>6,294</td>
<td>0.38</td>
<td>(-0.06 - 0.82)</td>
<td>-0.59</td>
<td>(-1.57 - 0.00)</td>
</tr>
</tbody>
</table>

Note: BN = individuals with bulimia nervosa; BED = individuals with binge eating disorder; ONB = individuals who are obese nonbingers; EDI = Eating Disorder Inventory; SCL-90 = Symptom Checklist – 90.

\(^a\) Higher scores on the RSES reflect higher self-esteem; direction of effect sizes reflect this.
obesity than obese nonbinge eaters (range = 0.19 to 0.93), whereas the other four found the reverse relationship (range = -0.16 to -0.67).

Eating Disordered Behavior

Overall, the greatest degree of health-threatening eating behavior and symptoms was found among individuals with BN, while ONB subjects demonstrated considerably less pathology than either individuals with BED or BN. Bulimics were found to binge eat more frequently than subjects with BED (SMD = 0.41, two studies made such within-study comparisons). On the BES (Gormally et al., 1982), a measure frequently used to assess binge eating behavior, those subjects with BED received substantially higher scores than the ONB subjects (SMD = -2.14). On the BULIT (Smith & Thelen, 1984), a measure used more often in diagnosing BN, subjects with BN scored much higher on average, than those with BED (SMC = 1.30). A similar pattern was found on the EDI--bulimia subscale; bulimics scored moderately higher than those with BED (SMD = 0.49), who, in turn, scored substantially higher than ONB (SMD = -1.55). When all binge-eating measures were collapsed into a single effect size (with only one effect size per group comparison contributed by any one study), the findings reflected a modest-to-moderate difference between BN and BED subjects (SMD = 0.47); however, a marked difference was evident between BED and ONB (SMD = -1.92). That is, bulimics reported only somewhat greater binge-eating behaviors and symptoms than those with BED, who exhibited considerably more binge-eating problems than ONBs.

Other symptoms of disordered eating examined in this study include general eating concern, dietary restraint (i.e., chronic dieting), disinhibition, and hunger. Bulimics reported greater concern about their eating behaviors than those with BED (SMD = 0.56), and on two separate measures of dietary restraint, bulimics scored much higher than individuals with BED (SMDs = 1.00 and 0.89). It should be emphasized that available overall measures of dietary
restraint are similar in emphasizing food restriction and struggles with disinhibition or binging. There was no difference between the BED and ONB groups on a measure of dietary restraint, though there was a wide range of effect sizes (-1.32 to 0.90) across studies. If two outlier SMDs (-1.32 and -0.77) are dropped, the mean effect size for ONB versus BED subjects is 0.27. This suggests a small difference between groups, with ONBs reporting greater dietary restraint than those with BED. It is important to note that bulimics and BED individuals did not differ on a measure of eating disinhibition, whereas those who were ONBs demonstrated substantially less disinhibition when eating (SMD = -1.17). That is on average, ONBs avow greater control over food intake than both of the other diagnostic groups. Bulimics reported only slightly more subjective hunger than those with BED (SMD = 0.24), while those with BED reported considerably more hunger than ONBs (SMD = -0.85).

Weight and Shape Concern

With the exception of degree of body dissatisfaction, there was a general trend for BN and BED individuals to express similar levels of concern for weight and shape. However, those with BED endorsed much greater concern about body appearance than ONBs. This pattern was especially true for the EDE--weight concern and shape concern subscales (ONB-BED, SMD = -1.00 and -1.05, respectively). The bulimics, however, expressed a moderately greater drive for thinness than those with BED (SMD = 0.69), while those with BED had more of a desire to be thin than ONBs (SMD = -0.66). In terms of subjects’ current level of dissatisfaction with their bodies, those with BED expressed higher levels of dissatisfaction than both BN (SMD = -0.46) and ONB (SMD = -0.30) subjects.

Other Measures of Psychopathology

There was a trend for individuals with BN to endorse slightly greater current and past
symptoms of psychopathology than those with BED, whereas BED subjects endorsed moderately greater symptoms than ONB individuals. Table 12 shows that this pattern of differences was true for measures of depression (e.g., BDI), general psychological distress (e.g., SCL-90), lifetime history of psychiatric disorders (including depression, affective disorders, substance abuse, and personality disorders), general feelings of ineffectiveness, and fears of maturity. The range of SMDs for BN versus BED on these variables was 0.27 to 0.51, while the range for BED versus ONB was -0.84 to -0.35.

For three variables related to psychological functioning (sexual abuse history, interoceptive awareness, perfectionism), there was a similar pattern for BN individuals to exhibit modestly to moderately greater problems/concerns than those with BED, and those with BED to report greater problems than ONB subjects. However, on these three variables, BED subjects fell equidistant between the other two groups (rather than closer to bulimics). This pattern was formed for acknowledged history of sexual abuse (BN-BED, SMD = 0.32; ONB-BED, SMD = -0.27), lack of interoceptive awareness (BN-BED, SMD = 0.69; ONB-BED, SMD = -0.79), and perfectionism (BN-BED, SMD = 0.36; ONB-BED, SMD = -0.36). On a widely used measure of interpersonal distrust, individuals with BED were more similar to the ONB eating subjects than bulimics, but the general pattern persisted (BN-BED, SMD = 0.63; ONB-BED, SMD = -0.25).

Method 2: Between-Study Comparisons of Grand Means: Binge Eating Disorder Versus Bulimia Nervosa Versus Obese Nonbinge Eating

In addition to summarizing the results of within-study group comparisons on variables of interest, the overall group means for variables of interest were computed (incorporating values from all studies); and these means were used to compute SMD scores. Specifically, the grand means for each diagnostic group were then compared by calculating SMDs (i.e., separate SMDs
for BN vs. BED; and ONB vs. BED). If there were fewer than two studies examining a particular variable in any diagnostic group, SMDs were not calculated. As this second method of comparing groups incorporated many more studies than the within-study approach, it was of interest whether the SMD values for the two methods would be similar. The results will be presented according to the subject variable categories of interest, and substantial differences between these methods will be noted. The data are offered in Tables 10 and 11, and graphically in Figures 3 - 6.

Personal Characteristics

In examining all studies that reported subjects’ age, individuals with BED were considerably older than bulimics (M = 39.6 vs. 25.3 years; SMD = -2.10) but similar in age to obese nonbinge eaters. Those with BED also had substantially greater BMIs than bulimics (M = 36.6 vs. 22.1; SMD = -2.76), but were not different in degree of obesity from the ONB subjects. In all groups, the vast majority of subjects were female, with bulimics having the greatest percentage (99.2%), followed by BED samples (93.9%), and ONB samples (90.6%). These comparisons are presented in Table 10.

Eating and Weight History

The findings from this analysis provided a somewhat contradictory pattern of lifetime eating and weight histories compared to the within-study analysis of data (see Table 11). Overall mean ages of both dieting and binging were found to be earlier for bulimics than those with BED (15.2 vs. 19.0 years, and 17.9 vs. 19.3 years, respectively). It should be noted that the within-study analysis included only two studies in the BN-BED comparison. Similar to the within-study findings, the subjects with BED began dieting at an earlier age than ONB individuals (SMD = 0.55). BED individuals also reported an earlier age of becoming overweight than ONB
Table 10

Comparison of Diagnostic Groups on Personal Characteristics

<table>
<thead>
<tr>
<th>Subject characteristics</th>
<th>Subjects n</th>
<th>BN (M, SD)</th>
<th>BED (M, SD)</th>
<th>ONB (M, SD)</th>
<th>Effect size BN - BED</th>
<th>Effect size ONB - BED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>15,005</td>
<td>25.3 (5.8)</td>
<td>39.6 (9.2)</td>
<td>41.3 (10.7)</td>
<td>-2.10</td>
<td>0.17</td>
</tr>
<tr>
<td>Body mass index</td>
<td>10,696</td>
<td>22.1 (3.6)</td>
<td>36.6 (7.0)</td>
<td>36.5 (6.0)</td>
<td>-2.76</td>
<td>-0.02</td>
</tr>
<tr>
<td>% female in sample</td>
<td>17,170</td>
<td>99.2</td>
<td>93.9</td>
<td>90.6</td>
<td>0.87</td>
<td>-0.22</td>
</tr>
</tbody>
</table>

Note. BN = individuals with bulimia nervosa; BED = individuals with binge eating disorder; ONB = obese nonbinge eaters.

(SMD = 0.34). In terms of prior history of eating disorders, similar proportions of BN and BED subjects reported having both BN and BED in their lifetimes (11.3% and 12.1%) whereas few ONB subjects reported a prior history of these eating disorders (3.3%). Alternatively, a number of BN subjects reported a history of AN (27.6%), while substantially fewer individuals with BED (2.5%) and none of the ONB subjects reported such a history.

Eating Disordered Behavior

A pattern reflected on four separate measures of binge-eating behavior (binge frequency, BES, BULIT, and the EDI--bulimia subscale) indicated that individuals with BN were moderately to substantially more symptomatic than BED subjects (range of SMDs = 0.54 to 0.89). Likewise, BED subjects were considerably more symptomatic than ONB individuals (range of SMDs = -2.66 to -1.54). Bulimics also reported slightly greater concern over their eating behaviors than BED individuals (SMD = 0.30).

In terms of dietary restraint, BN individuals indicated engaging in much more dieting behavior than those with BED on both measures that examined this variable (SMDs = 1.02 and 1.10). No difference was found between the BED and ONB subjects on measures of restraint.

Contrary to the within-study comparison findings, aggregated mean scores indicated that bulimics
Table 11

Grand Means and Standard Deviations of Subject Variables for Each Diagnostic Group and Standardized Mean Difference Effect Sizes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Samples</th>
<th>Subjects</th>
<th>BN</th>
<th>BED</th>
<th>ONB</th>
<th>BN - BED</th>
<th>ONB - BED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>SDpooled</td>
</tr>
<tr>
<td>Eating and weight history</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onset age of dieting</td>
<td>32</td>
<td>3,206</td>
<td>15.2</td>
<td>3.9</td>
<td>19.0</td>
<td>7.4</td>
<td>6.8</td>
</tr>
<tr>
<td>Onset age of binging</td>
<td>34</td>
<td>2,348</td>
<td>17.9</td>
<td>4.7</td>
<td>19.3</td>
<td>10.0</td>
<td>7.5</td>
</tr>
<tr>
<td>Onset age of ED</td>
<td>57</td>
<td>3,341</td>
<td>18.1</td>
<td>4.6</td>
<td>21.4</td>
<td>9.2</td>
<td>5.8</td>
</tr>
<tr>
<td>Onset age of obesity</td>
<td>35</td>
<td>3,182</td>
<td>---</td>
<td>---</td>
<td>16.2</td>
<td>9.4</td>
<td>---</td>
</tr>
<tr>
<td>% with hx of BN &amp; BED</td>
<td>18</td>
<td>1,433</td>
<td>11.3</td>
<td>2.5</td>
<td>12.1</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>% with hx of anorexia</td>
<td>61</td>
<td>3,742</td>
<td>27.6</td>
<td>0.0</td>
<td>2.5</td>
<td>0.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Eating related pathology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Binge frequency</td>
<td>65</td>
<td>4,386</td>
<td>9.1</td>
<td>7.9</td>
<td>5.1</td>
<td>2.6</td>
<td>7.4</td>
</tr>
<tr>
<td>Binge Eating Scale</td>
<td>39</td>
<td>1,483</td>
<td>36.0</td>
<td>4.8</td>
<td>30.4</td>
<td>6.9</td>
<td>6.7</td>
</tr>
<tr>
<td>Bulimia Test</td>
<td>15</td>
<td>393</td>
<td>119.4</td>
<td>16.2</td>
<td>105.5</td>
<td>13.3</td>
<td>15.6</td>
</tr>
<tr>
<td>EDI - Bulimia</td>
<td>59</td>
<td>3,681</td>
<td>12.0</td>
<td>5.0</td>
<td>7.9</td>
<td>4.0</td>
<td>4.9</td>
</tr>
<tr>
<td>EDE - Eating concern</td>
<td>19</td>
<td>1,435</td>
<td>2.8</td>
<td>1.4</td>
<td>2.4</td>
<td>1.2</td>
<td>1.3</td>
</tr>
<tr>
<td>EDE - Restraint</td>
<td>26</td>
<td>1,843</td>
<td>3.4</td>
<td>1.3</td>
<td>2.1</td>
<td>1.2</td>
<td>1.3</td>
</tr>
<tr>
<td>TFEQ - Restraint</td>
<td>62</td>
<td>3,180</td>
<td>12.7</td>
<td>4.2</td>
<td>8.2</td>
<td>4.0</td>
<td>4.1</td>
</tr>
<tr>
<td>TFEQ - Disinhibition</td>
<td>61</td>
<td>3,109</td>
<td>11.6</td>
<td>3.3</td>
<td>13.0</td>
<td>2.1</td>
<td>2.6</td>
</tr>
<tr>
<td>TFEQ - Hunger</td>
<td>61</td>
<td>3,109</td>
<td>9.1</td>
<td>3.6</td>
<td>9.3</td>
<td>3.3</td>
<td>3.4</td>
</tr>
<tr>
<td>Weight &amp; shape concern</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDE - Weight concern</td>
<td>25</td>
<td>1,809</td>
<td>3.6</td>
<td>1.4</td>
<td>3.5</td>
<td>1.1</td>
<td>1.3</td>
</tr>
<tr>
<td>EDE - Shape concern</td>
<td>25</td>
<td>1,809</td>
<td>4.0</td>
<td>1.2</td>
<td>4.0</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>EDI - Drive for thinness</td>
<td>62</td>
<td>3,844</td>
<td>15.3</td>
<td>5.0</td>
<td>9.1</td>
<td>4.9</td>
<td>5.0</td>
</tr>
<tr>
<td>EDI - Body dissatisfaction</td>
<td>64</td>
<td>3,911</td>
<td>19.2</td>
<td>7.9</td>
<td>21.4</td>
<td>5.2</td>
<td>7.6</td>
</tr>
<tr>
<td>Body Shape Questionnaire</td>
<td>17</td>
<td>1,038</td>
<td>138.2</td>
<td>30.5</td>
<td>140.1</td>
<td>27.4</td>
<td>29.9</td>
</tr>
</tbody>
</table>

(table continues)
<table>
<thead>
<tr>
<th>Variable</th>
<th>Samples</th>
<th>Subjects</th>
<th>BN</th>
<th>BED</th>
<th>ONB</th>
<th>BN - BED</th>
<th>ONB - BED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>SD pooled</td>
</tr>
<tr>
<td>Psychopathology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td>135</td>
<td>6,678</td>
<td>20.5</td>
<td>9.7</td>
<td>15.1</td>
<td>8.5</td>
<td>8.6</td>
</tr>
<tr>
<td>Hamilton Depression Scale</td>
<td>20</td>
<td>1,117</td>
<td>11.8</td>
<td>7.2</td>
<td>9.4</td>
<td>6.8</td>
<td>---</td>
</tr>
<tr>
<td>Hamilton Anxiety Scale</td>
<td>8</td>
<td>396</td>
<td>8.2</td>
<td>5.6</td>
<td>5.2</td>
<td>4.5</td>
<td>---</td>
</tr>
<tr>
<td>SCL- 90</td>
<td>39</td>
<td>2,547</td>
<td>1.5</td>
<td>0.7</td>
<td>0.9</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>% Lifetime axis I d/o</td>
<td>25</td>
<td>1,752</td>
<td>83.9</td>
<td>73.7</td>
<td>73.7</td>
<td>39.3</td>
<td>39.3</td>
</tr>
<tr>
<td>% Lifetime axis II d/o</td>
<td>43</td>
<td>2,522</td>
<td>44.9</td>
<td>32.6</td>
<td>15.7</td>
<td>32.6</td>
<td>15.7</td>
</tr>
<tr>
<td>% Current axis I d/o</td>
<td>9</td>
<td>454</td>
<td>50.6</td>
<td>37.1</td>
<td>---</td>
<td>37.1</td>
<td>37.1</td>
</tr>
<tr>
<td>% Lifetime depressive disorder</td>
<td>29</td>
<td>1,792</td>
<td>68.3</td>
<td>48.2</td>
<td>24.3</td>
<td>24.3</td>
<td>24.3</td>
</tr>
<tr>
<td>% Current depressive disorder</td>
<td>40</td>
<td>2,023</td>
<td>32.8</td>
<td>27.1</td>
<td>---</td>
<td>27.1</td>
<td>27.1</td>
</tr>
<tr>
<td>% Lifetime anxiety d/o</td>
<td>30</td>
<td>1,547</td>
<td>34.3</td>
<td>29.2</td>
<td>15.6</td>
<td>29.2</td>
<td>15.6</td>
</tr>
<tr>
<td>% Lifetime substance abuse</td>
<td>64</td>
<td>5,824</td>
<td>25.2</td>
<td>21.0</td>
<td>8.8</td>
<td>21.0</td>
<td>8.8</td>
</tr>
<tr>
<td>% Hx of sexual abuse</td>
<td>35</td>
<td>3,894</td>
<td>25.8</td>
<td>19.5</td>
<td>14.6</td>
<td>19.5</td>
<td>14.6</td>
</tr>
<tr>
<td>Rosenberg Self-Esteem Scale</td>
<td>22</td>
<td>2,019</td>
<td>24.4</td>
<td>19.5</td>
<td>14.6</td>
<td>19.5</td>
<td>14.6</td>
</tr>
<tr>
<td>EDI - Ineffectiveness</td>
<td>55</td>
<td>3,544</td>
<td>12.1</td>
<td>6.9</td>
<td>6.1</td>
<td>6.9</td>
<td>6.1</td>
</tr>
<tr>
<td>EDI - Maturity fears</td>
<td>51</td>
<td>3,357</td>
<td>5.1</td>
<td>4.7</td>
<td>3.9</td>
<td>4.7</td>
<td>3.9</td>
</tr>
<tr>
<td>EDI - Interpersonal distrust</td>
<td>52</td>
<td>3,435</td>
<td>6.3</td>
<td>4.3</td>
<td>3.5</td>
<td>4.3</td>
<td>3.5</td>
</tr>
<tr>
<td>EDI - Interoceptive awareness</td>
<td>53</td>
<td>3,438</td>
<td>12.6</td>
<td>6.7</td>
<td>5.8</td>
<td>6.7</td>
<td>5.8</td>
</tr>
<tr>
<td>EDI - Perfectionism</td>
<td>52</td>
<td>3,331</td>
<td>8.7</td>
<td>4.8</td>
<td>6.1</td>
<td>4.8</td>
<td>6.1</td>
</tr>
<tr>
<td>Toronto Alexithymia Scale</td>
<td>10</td>
<td>460</td>
<td>73.0</td>
<td>11.4</td>
<td>66.2</td>
<td>10.8</td>
<td>---</td>
</tr>
</tbody>
</table>

Note. BN = individuals with bulimia nervosa; BED = individuals with binge eating disorder; ONB = individuals who are obese nonbingers; ED = eating disorder; Hx = history; EDI = Eating Disorder Inventory; SCL-90 = Symptom Checklist – 90; d/o = disorder.

Higher scores on the RSES reflect higher self-esteem; direction of effect sizes reflect this.
Figure 3. Standardized mean difference for BN - BED on measures of eating pathology and weight/shape concerns.

Figure 4. Standardized mean difference for ONB - BED on measures of eating pathology and weight/shape concerns.
Figure 5. Standardized mean difference for BN - BED on measures of psychopathology.

Figure 6. Standardized mean difference for ONB - BED on measures of psychopathology.
reported moderately less disinhibition when eating (SMD = -0.53) and similar levels of hunger as those with BED. Consistent with the previous analysis, BED subjects noted markedly greater disinhibition and hunger than obese nonbingers (SMDs = -1.44 and -1.02, respectively).

Weight and Shape Concern

Similar to the within-study effect size findings, this analysis revealed that individuals with BN and BED demonstrated similar levels of concern for bodily appearance (as assessed by the EDE; Fairburn & Cooper, 1993). Bulimics, however, reported considerably greater drive for thinness than BED subjects (SMD = 1.24), who, in turn, expressed a moderately greater drive than ONBs (SMD = -0.68). Individuals with BED reported slightly greater dissatisfaction with their bodies than bulimics on the EDI--body dissatisfaction subscale (SMD = -0.29), while no differences were revealed on the Body Shape Questionnaire. Interestingly, these only small differences were found in spite of the BED subjects, as a group, being considerably overweight (whereas bulimic subjects were not). Subjects with BED reported somewhat to substantially greater body dissatisfaction than ONBs on the two measures (SMDs = -0.44 and -1.37).

Other Measures of Psychopathology

On all measures of psychopathology, bulimics reported the greatest levels of distress/psychological dysfunction, followed by those with BED, and obese nonbinge eaters, respectively. The SMDs for each measure are presented in Table 11 and reflect this pattern. Additionally, individuals with BED tended to be either more similar to BN individuals than obese nonbingers or equidistant between the two groups on a continuum of psychopathology severity. A few exceptions to this pattern are worth noting. For example, individuals with BED reported substantially less general psychiatric distress (as measured by the SCL-90) than bulimics
(SMD = 0.89), but only moderately more than the ONB subjects (SMD = -0.59). There were similar findings for self-esteem, interpersonal distrust, and interoceptive awareness.

Effect of Study Variables

The relationship between overall study quality, sample types, and research methodologies and BED subject characteristics was examined in this meta-analysis. Standardized mean difference effect sizes were calculated for key subject variables (refer to Table 12 for list of key variables). In order for a subject variable to be included in a planned comparison, at least two studies needed to measure this variable within each category of the moderator variable being examined. For example, there are five categories of sample type (weight loss clinic, eating disorder clinic, outpatient therapy clinic, inpatient hospital, community); for mean scores on a measure such as the BDI to be compared between any two of these groups, both groups needed to include at least two studies that reported scores on the BDI. Effect size comparisons can be found in Tables 12 and 13. Additional descriptive data (means, standard deviations) can be found in Appendix E.

Diagnostic Criteria

The first moderator variable examined was whether studies used strict DSM-IV (1994) criteria versus slightly modified criteria to diagnose subjects with BED. Small differences between groups were found on 5 of the 10 key variables. In those studies that applied the DSM-IV criteria, subjects had lower BMIs (SMD = -0.38), reported greater dietary restraint (SMD = 0.25), bulimic symptoms (SMD = 0.20), and body dissatisfaction (SMD = 0.34), and experienced less general psychological distress (SMD = -0.31). However, there was little or no
Table 12

Standardized Mean Difference Effect Size Comparisons of Study Variables for Individuals with

Binge Eating Disorder: Diagnostic Method, Diagnostic Criteria, and Study Quality

<table>
<thead>
<tr>
<th>Subject variable</th>
<th>Interview vs. questionnaire</th>
<th>Strict DSM-IV vs. nonstrict</th>
<th>Poor vs. good</th>
<th>Poor vs. moderate</th>
<th>Moderate vs. good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.43&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-0.08</td>
<td>-0.15</td>
<td>-0.20&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.05</td>
</tr>
<tr>
<td>Body mass index</td>
<td>-0.16</td>
<td>-0.38&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.48&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.32&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.14</td>
</tr>
<tr>
<td>TFEQ – Restraint</td>
<td>-0.12</td>
<td>0.25&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.05</td>
<td>0.20&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-0.15</td>
</tr>
<tr>
<td>EDI - Bulimia</td>
<td>0.15</td>
<td>0.20&lt;sup&gt;a&lt;/sup&gt;</td>
<td>--</td>
<td>--</td>
<td>-0.28&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>EDI – Drive for thinness</td>
<td>0.55&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-0.10</td>
<td>--</td>
<td>--</td>
<td>0.12</td>
</tr>
<tr>
<td>EDI – Body dissatisfaction</td>
<td>-0.25&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.34&lt;sup&gt;a&lt;/sup&gt;</td>
<td>--</td>
<td>--</td>
<td>-0.27&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td>-0.40&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.00</td>
<td>-0.44&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-0.39&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-0.05</td>
</tr>
<tr>
<td>SCL-90</td>
<td>--</td>
<td>-0.31&lt;sup&gt;a&lt;/sup&gt;</td>
<td>--</td>
<td>--</td>
<td>0.32&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>% sexually abused</td>
<td>-0.02</td>
<td>-0.02</td>
<td>--</td>
<td>--</td>
<td>0.22&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>% personality disorder</td>
<td>--</td>
<td>0.18</td>
<td>--</td>
<td>--</td>
<td>0.25&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Note. TFEQ = Three Factors Eating Questionnaire; EDI = Eating Disorders Inventory; SCL-90 = Symptom Checklist – 90.

<sup>a</sup> Indicates group differences (ES ≥ 0.20).
Table 13

Standardized Mean Difference Effect Size Comparisons of Study Variables for Individuals with Binge Eating Disorder:

Sample Type

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.21*</td>
<td>0.60*</td>
<td>0.47*</td>
<td>-0.41*</td>
<td>0.36*</td>
<td>0.21*</td>
<td>-0.24*</td>
<td>-0.24*</td>
<td>-1.01*</td>
<td>-0.87*</td>
</tr>
<tr>
<td>Body mass index</td>
<td>0.48*</td>
<td>0.19</td>
<td>0.94*</td>
<td>0.63*</td>
<td>-0.26*</td>
<td>0.45*</td>
<td>0.10</td>
<td>0.70*</td>
<td>0.40*</td>
<td>0.39*</td>
</tr>
<tr>
<td>TFEQ – Restraint</td>
<td>--</td>
<td>0.32a</td>
<td>-0.24a</td>
<td>-0.10</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>EDI – Bulimia</td>
<td>-0.38a</td>
<td>-0.7a</td>
<td>--</td>
<td>-0.26a</td>
<td>-0.28a</td>
<td>--</td>
<td>0.12</td>
<td>--</td>
<td>0.44a</td>
<td>--</td>
</tr>
<tr>
<td>EDI – Drive for thinness</td>
<td>-0.35a</td>
<td>-0.37a</td>
<td>--</td>
<td>0.13</td>
<td>-0.02</td>
<td>--</td>
<td>0.46a</td>
<td>--</td>
<td>0.49a</td>
<td>--</td>
</tr>
<tr>
<td>EDI – Body dissatisfaction</td>
<td>-0.19</td>
<td>0.24a</td>
<td>--</td>
<td>-0.26a</td>
<td>0.38a</td>
<td>--</td>
<td>-0.05</td>
<td>--</td>
<td>-0.46a</td>
<td>--</td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td>-0.75a</td>
<td>-1.19a</td>
<td>-0.02</td>
<td>-0.29a</td>
<td>-0.30a</td>
<td>0.70a</td>
<td>0.52a</td>
<td>1.13a</td>
<td>0.95a</td>
<td>-0.26a</td>
</tr>
<tr>
<td>SCL-90</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>-0.38a</td>
<td>0.70a</td>
<td>0.61a</td>
<td>1.52a</td>
<td>1.17a</td>
<td>-0.36a</td>
</tr>
<tr>
<td>% sexually abused</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.25a</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>% personality disorder</td>
<td>0.51a</td>
<td>--</td>
<td>--</td>
<td>0.09</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. TFEQ = Three Factors Eating Questionnaire; EDI = Eating Disorders Inventory; SCL-90 = Symptom Checklist – 90; WL = weight loss program; ED = eating disorder clinic; Comm = community volunteers; Inpt = inpatient hospital; Outpt = outpatient therapy.

* Indicates group differences (ES ≥ 0.20).
relationship between diagnostic criteria used and subjects’ age, drive for thinness, depressive symptomology, history of sexual abuse, and comorbidity of personality disorder.

**Method of Diagnosis**

There were also small to moderate differences between subjects who were diagnosed using interview as compared to questionnaire on 50% of the variables analyzed. Specifically, subjects diagnosed by an interview were older (SMD = 0.43), reported a greater drive for thinness (SMD = 0.55), lower body dissatisfaction (SMD = -0.25), and less depressive symptoms (SMD = -0.40) than those diagnosed via questionnaire methodology. There were no group differences on history of sexual abuse, BMI, restraint scores, or report of bulimic symptoms.

**Study Quality**

The relationship between study quality (overall internal and external validity) and subject outcomes was also examined. For the analyses, studies were grouped into three categories: (a) poor quality (ratings of 1 - 2), (b) moderate quality (ratings of 3 - 5), and (c) good quality (ratings of 6 - 7). It should be noted that because there were few studies with poor quality ratings, not all variables could be compared between groups.

The findings indicate that subjects in studies of poor quality had moderately higher BMIs (SMD = 0.48), and lower reports of depression (SMD = -0.44), than those subjects in high quality studies, but were not different in age or reported bulimic symptoms. However, subjects in poor quality studies differed from those in moderate quality studies on all four of these variables. That is, subjects in poor quality studies were younger (SMD = -0.20), had greater BMIs (SMD = 0.32), and reported less depression (SMD = -0.39), and more restraint in eating (SMD = 0.20). In comparing subjects from studies of moderate versus high quality, there were small group
differences on 5 of the 10 key variables. Subjects in studies of moderate quality reported less
bulimic symptomology (SMD = -0.28) and body dissatisfaction (SMD = -0.27), as well as greater
amounts of general psychiatric distress (SMD = 0.32), sexual abuse (SMD = 0.22), and comorbid
personality disorders (SMD = 0.25) than those in high quality studies.

Population from Which Sample Was Obtained

As can be seen in Table 13, numerous comparisons were performed between subjects
selected from different populations. From these, it was found that sample type was strongly
related to the differences in subject variables between groups, with 53 of 64 comparisons (83%)
yielding SMDs of 0.20 or greater. Further, 20 of the SMDs were considered to depict moderate
to large group differences (i.e., SMDs ≥ 0.50).

Not surprisingly, those subjects who were studied while receiving inpatient psychiatric
care were the most distinct from other subjects. These subjects were younger, more obese, and
reported less dietary restraint and greater bulimic symptoms, depression, drive for thinness, and
general psychiatric distress than all groups. Interestingly, they also reported less body
dissatisfaction than subjects from any other sample. Subjects from eating disorder clinics tended
to report greater symptoms of depression, psychopathology, and drive for thinness than subjects
from most other sample types.

Community volunteers (i.e., those not receiving any treatment) had the lowest BMIs,
lowest levels of psychopathological symptoms, and highest degree of restraint as compared to
subjects from other types of samples. Those subjects drawn from weight loss programs tended to
be older and heavier than most subjects from other groups, and reported fewer bulimic symptoms,
depression, and drive for thinness than many other subjects. Taken together, it is evident that
studies yielded different outcomes based on the type of sample from which subjects were selected.

Method of Diagnosing Psychiatric Diagnoses

Because there were so few studies that used different means of diagnosing psychiatric illnesses (e.g., structured interview, unstructured interview, questionnaire), there were too few comparisons that could be calculated to produce reliable results. Therefore, this moderator variable was not included in the analyses.

Treatment Study Findings

An objective of the current meta-analysis, as previously noted, was to determine the efficacy of various interventions for BED. Nineteen treatment studies met inclusion criteria for this analysis. Of these, six involved medical/pharmacological interventions (of which three were placebo-controlled), 12 implemented psychosocial treatments (five of which were wait-list-controlled), and three studies examined combined treatments (none of which involved controls). Table 14 provides a summary of mean effect sizes for each type of intervention, while Tables 15 through 20 display effect size data from each individual study.

Pharmacological/Medical Interventions

Of the six treatment studies employing medical interventions, two involved biliopancreatic bypass (BPB) surgery, while four studies utilized pharmacological treatments (with each study prescribing different medication). The pharmacological studies were generally quite brief (6-12 weeks), though those studies intervening with surgery assessed change only after a full year.
Table 14

Overall Mean Effect Sizes at Posttreatment

<table>
<thead>
<tr>
<th>Type of study</th>
<th>N</th>
<th>Effect size</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Weight</td>
<td>Eating bx</td>
<td>Psych</td>
</tr>
<tr>
<td>Controlled psychosocial</td>
<td>5 (8 treatments)</td>
<td>0.10</td>
<td>0.91</td>
<td>0.42</td>
</tr>
<tr>
<td>Intrasubject experimental</td>
<td></td>
<td>(0.00)</td>
<td>(1.15)</td>
<td>(0.44)</td>
</tr>
<tr>
<td>Intrasubject control</td>
<td></td>
<td>(-0.11)</td>
<td>(0.05)</td>
<td>(0.05)</td>
</tr>
<tr>
<td>Pre/post psychosocial</td>
<td>7 (8 treatments)</td>
<td>0.36</td>
<td>1.17</td>
<td>0.61</td>
</tr>
<tr>
<td>Controlled pharmacological</td>
<td>3</td>
<td>0.58</td>
<td>0.86</td>
<td>0.13</td>
</tr>
<tr>
<td>Intrasubject experimental</td>
<td></td>
<td>(1.66)</td>
<td>(1.30)</td>
<td>--</td>
</tr>
<tr>
<td>Intrasubject control</td>
<td></td>
<td>(0.70)</td>
<td>(0.85)</td>
<td>--</td>
</tr>
<tr>
<td>Pre/post pharmacological/medical</td>
<td>3</td>
<td>1.34</td>
<td>1.13</td>
<td>0.85</td>
</tr>
<tr>
<td>Pre/post pharmacological + psychosocial</td>
<td>2</td>
<td>0.34</td>
<td>1.52</td>
<td>0.71</td>
</tr>
</tbody>
</table>

Note. Bx = behavior; Psych = psychopathology.
### Table 15

**Effect Sizes at Posttreatment for Placebo-Controlled Pharmacological Studies**

<table>
<thead>
<tr>
<th>Authors</th>
<th>n</th>
<th>Quality rating</th>
<th>Treatment</th>
<th>Weeks of tx</th>
<th>Effect size</th>
<th>Weight</th>
<th>Eating bx</th>
<th>Psych</th>
</tr>
</thead>
<tbody>
<tr>
<td>McElroy et al. (2000)</td>
<td>34</td>
<td>5</td>
<td>Sertraline</td>
<td>6</td>
<td></td>
<td>0.93</td>
<td>1.55</td>
<td>-0.16</td>
</tr>
<tr>
<td>Stunkard et al. (1996)</td>
<td>28</td>
<td>5</td>
<td>d-fenfluramine</td>
<td>8</td>
<td>--</td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hudson et al. (1998)</td>
<td>85</td>
<td>5</td>
<td>Fluvoxamine</td>
<td>9</td>
<td></td>
<td>0.44</td>
<td>0.60</td>
<td>0.24</td>
</tr>
</tbody>
</table>

*Note.* Tx = Treatment; bx = behavior; psych = psychopathology

*Quality rating based on 1-5 Likert scale (5 = excellent internal validity, 1 = poor internal validity).*

### Table 16

**Effect Sizes at Posttreatment and Follow-Up for Uncontrolled (Pre-Post Only) Pharmacological or Medical Interventions**

<table>
<thead>
<tr>
<th>Authors</th>
<th>n</th>
<th>Quality rating</th>
<th>Treatment</th>
<th>Weeks of tx / fu</th>
<th>Effect size</th>
<th>Weight</th>
<th>Eating bx</th>
<th>Psych</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adami et al. (1998)</td>
<td>25</td>
<td>2</td>
<td>Biliopancreatic diversion surgery</td>
<td>52 / 156</td>
<td>1.51 / 1.68</td>
<td>--</td>
<td></td>
<td>1.61  / 2.00</td>
</tr>
<tr>
<td>Adami et al. (1995)</td>
<td>30</td>
<td>2</td>
<td>Biliopancreatic diversion surgery</td>
<td>52</td>
<td>1.58</td>
<td>1.13</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>Shapira et al. (2000)</td>
<td>13</td>
<td>2</td>
<td>Topiramate</td>
<td>12-130</td>
<td>0.45</td>
<td>--</td>
<td></td>
<td>--</td>
</tr>
</tbody>
</table>

*Note.* Tx = Treatment; bx = behavior; psych = psychopathology; fu = follow up.

*Quality rating based on 1-5 Likert scale (5 = excellent internal validity, 1 = poor internal validity).*
Table 17

Effect Sizes at Posttreatment for Wait-List Controlled Psychosocial Studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>N</th>
<th>Quality rating</th>
<th>Treatment</th>
<th>Weeks of tx</th>
<th>Effect size Weight</th>
<th>Eating bx</th>
<th>Psych</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agras et al. (1995)</td>
<td>42</td>
<td>5</td>
<td>Group CBT</td>
<td>12</td>
<td>0.11</td>
<td>1.06</td>
<td>0.18</td>
</tr>
<tr>
<td>Allen (1996)</td>
<td>20</td>
<td>5</td>
<td>AAT group</td>
<td>8</td>
<td>--</td>
<td>1.34</td>
<td>0.84</td>
</tr>
<tr>
<td>Carter et al. (1998)</td>
<td>72</td>
<td>3</td>
<td>CBT: Self-help</td>
<td>12</td>
<td>0.05</td>
<td>0.44</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CBT: Partial self-help</td>
<td></td>
<td>0.14</td>
<td>0.83</td>
<td>0.25</td>
</tr>
<tr>
<td>Eldredge et al. (1997)</td>
<td>46</td>
<td>5</td>
<td>Group CBT</td>
<td>12</td>
<td>--</td>
<td>1.05</td>
<td>--</td>
</tr>
<tr>
<td>Peterson et al. (1998)</td>
<td>61</td>
<td>4</td>
<td>CBT: Self-help</td>
<td>8</td>
<td>--</td>
<td>0.80</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CBT: Partial self-help</td>
<td></td>
<td></td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CBT: Therapist led</td>
<td></td>
<td></td>
<td>0.80</td>
<td></td>
</tr>
</tbody>
</table>

Note. AAT = Appetite awareness training; CBT = cognitive-behavioral treatment; tx = treatment; fu = follow up; bx = behavior; Psych = psychopathology.

*Quality rating based on 1-5 Likert scale (5 = excellent internal validity, 1 = poor internal validity).
### Table 18

Within-Groups Effect Sizes at Posttreatment and Follow-Up for Uncontrolled Psychosocial Treatment Studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>n</th>
<th>Quality rating$^a$</th>
<th>Treatment</th>
<th>Weeks of tx/fu</th>
<th>Weight</th>
<th>Eating bx</th>
<th>Psych</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agras et al. (1997)</td>
<td>93</td>
<td>2</td>
<td>Group CBT + BWL</td>
<td>36/52</td>
<td>-</td>
<td>1.22/1.21</td>
<td>0.62/0.55</td>
</tr>
<tr>
<td>Agras et al. (1994)</td>
<td>37</td>
<td>3</td>
<td>BWL</td>
<td>36</td>
<td>0.23</td>
<td>0.74</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td></td>
<td>CBT + BWL</td>
<td>36</td>
<td>0.10</td>
<td>1.15</td>
<td>0.59</td>
</tr>
<tr>
<td>Fichter et al. (1993)</td>
<td>68</td>
<td>2</td>
<td>Inpatient CBT</td>
<td>11/156</td>
<td>0.30</td>
<td>1.05/0.95</td>
<td>0.78/0.50</td>
</tr>
<tr>
<td>Gladis et al. (1998)</td>
<td>14</td>
<td>3</td>
<td>Group BWL + CBT</td>
<td>48</td>
<td>1.03</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Kristellar &amp; Hallett</td>
<td>21</td>
<td>2</td>
<td>Meditation group</td>
<td>6</td>
<td>--</td>
<td>2.10</td>
<td>0.57</td>
</tr>
<tr>
<td>(1999)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wells et al. (1997)</td>
<td>7</td>
<td>2</td>
<td>Self-help</td>
<td>12</td>
<td>-0.02</td>
<td>1.28</td>
<td>0.91</td>
</tr>
<tr>
<td>Yanovski et al. (1994)</td>
<td>21</td>
<td>3</td>
<td>Group BWL (VLCD)</td>
<td>26/52</td>
<td>0.89/0.53</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. BWL = Behavioral weight loss treatment; CBT = Cognitive-behavioral treatment; tx = treatment; fu = follow up; bx = behavior; Psych = psychopathology; VLCD = very low calorie diet.

$^a$ Quality rating based on 1-5 Likert scale (5 = excellent internal validity, 1 = poor internal validity).

$^b$ Mean length of hospital stay.
Table 19

Effect Sizes at Posttreatment for Uncontrolled (Pre-Post Only) Psychosocial + Pharmacological Studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>n</th>
<th>Quality rating&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Treatment</th>
<th>Weeks of tx</th>
<th>Weight</th>
<th>Effect size Eating bx</th>
<th>Psych</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agras et al. (1994)</td>
<td>36</td>
<td>3</td>
<td>Group CBT + BWL + desipramine</td>
<td>36</td>
<td>0.34</td>
<td>1.64</td>
<td>0.73</td>
</tr>
<tr>
<td>Devlin et al. (2000)</td>
<td>16</td>
<td>2</td>
<td>CBT + BWL + Fluoxetine + Phentermine</td>
<td>16</td>
<td>0.34</td>
<td>1.26</td>
<td>0.68</td>
</tr>
</tbody>
</table>

Note. BWL = Behavioral weight loss treatment; CBT = cognitive-behavioral treatment; tx = treatment; bx = behavior; Psych = psychopathology.

<sup>a</sup> Quality rating based on 1-5 Likert scale (5 = excellent internal validity, 1 = poor internal validity).
## Table 20

### Within-Groups Effect Sizes for Controlled Studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>n</th>
<th>Treatment</th>
<th>Weeks of tx</th>
<th>Effect size</th>
<th>Weight</th>
<th>Eating bx</th>
<th>Psych</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agras et al. (1996)</td>
<td>12</td>
<td>Group CBT</td>
<td>12</td>
<td>-0.05</td>
<td>0.97</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td></td>
<td>-0.16</td>
<td>0.03</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>Allen (1996)</td>
<td>20</td>
<td>AAT group</td>
<td>8</td>
<td>--</td>
<td>2.14</td>
<td>0.84</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td></td>
<td>--</td>
<td>0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carter et al. (1998)</td>
<td>72</td>
<td>CBT: Self-help</td>
<td>12</td>
<td>-0.02</td>
<td>0.84</td>
<td>0.62</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CBT: Partial self-help</td>
<td></td>
<td>0.08</td>
<td>1.23</td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td></td>
<td>-0.06</td>
<td>0.22</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Eldredge et al. (1997)</td>
<td>46</td>
<td>Group CBT</td>
<td>12</td>
<td>--</td>
<td>1.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td></td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peterson et al. (1998)</td>
<td>61</td>
<td>CBT: Self-help group</td>
<td>8</td>
<td>--</td>
<td>1.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CBT: Partial self-help group</td>
<td></td>
<td>--</td>
<td>0.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CBT: Therapist led group</td>
<td></td>
<td>--</td>
<td>1.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td></td>
<td>--</td>
<td>-0.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>McElroy et al. (2000)</td>
<td>34</td>
<td>Sertraline</td>
<td>6</td>
<td>1.66</td>
<td>1.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Placebo</td>
<td></td>
<td>0.70</td>
<td>1.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stunkard et al. (1996)</td>
<td>28</td>
<td>d-fenfluramine</td>
<td>8</td>
<td>--</td>
<td>1.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Placebo</td>
<td></td>
<td>--</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. AAT = appetite awareness training; CBT = cognitive-behavioral treatment; tx = treatment; bx = behavior; Psych = psychopathology.
Combined findings from the three placebo-controlled pharmacological studies indicate that subjects receiving treatment displayed the greatest improvement in dysfunctional eating behaviors (e.g., binge eating, restraint, disinhibition; \( \text{SMD} = 0.86 \); see Tables 14 and 15). The subjects in these studies also lost moderately more weight \( \text{SMD} = 0.58 \) than controls. Surprisingly, there was no overall improvement in psychiatric symptoms in the two studies in which antidepressant medications were prescribed to treat binge eating. Within-group, pre-post findings revealed what is possibly a rather large placebo effect in one of the two studies that reported pre-post data on control subjects. These controls (blind to their treatment condition) lost a moderate amount of weight following six weeks of placebo \( \text{SMD} = 0.70 \) and reported an even greater reduction \( \text{SMD} = 1.70 \) in dysfunctional eating behaviors than subjects receiving treatment with Sertraline. In contrast, control subjects in the other study reported no change in eating behaviors after 8 weeks of placebo.

Findings from the uncontrolled (pre/post) medical intervention studies indicated that subjects lost substantial amounts of weight following treatment \( \text{SMD} = 1.13 \). This was especially true for the subjects receiving a surgical intervention \( \text{SMD} = 1.54 \). Interestingly, there was also an overall substantial improvement in psychological symptoms following BPB surgery \( \text{SMD} = 0.92 \), though there was a large discrepancy between the findings of the two studies that measured psychological functioning. Eating-related behavior also improved greatly \( \text{SMD} = 1.13 \) among the subjects in the single uncontrolled study that examined this variable. Follow-up data from one study using BPB shows that three years post surgery, subjects continued to lose weight and show psychological improvement (see Table 16).

**Psychosocial Interventions**

There were 16 interventions examined in the 12 studies involving psychosocial treatments.
Of these, 9 samples received CBT interventions alone (6 of which were in group format), 3 received CBT in combination with behavioral weight loss (BWL) treatment, 1 group was given only BWL treatment, and 2 groups received other interventions (meditation, appetite awareness training).

All five wait-list controlled studies examined changes in eating behavior following treatment (see Table 17). Compared to the control subjects those receiving the psychological interventions demonstrated substantial decreases in binge eating and other dysfunctional eating patterns (SMD = 0.91). Of the three samples (from two studies) in which weight changes were measured, no differences between experimental and control subjects were found. However, subjects receiving treatment exhibited somewhat improved psychological functioning following the intervention (SMD = 0.42). Unfortunately, none of these studies reported follow-up data. Within-group changes were also examined in order to determine the degree to which subjects not receiving treatment responded at the end of the “treatment period.” Overall, control subjects did not display changes in weight, dysfunctional eating, or psychiatric symptoms (see Tables 14 and 20).

The results from the seven uncontrolled (pre/post) psychosocial intervention studies also indicated that participants demonstrated the greatest improvement in eating behaviors (SMD = 1.17) following treatment (see Table 18). Specifically, those subjects receiving meditation-based treatment reported the greatest reduction in dysfunctional eating behaviors (SMD = 2.10). Psychologically, subjects in these studies also tended to improve (SMD = 0.61) and demonstrated small weight losses following treatment (SMD = 0.36). Follow-up data were collected on subjects from three of these samples (1 to 3 years posttreatment). At follow-up, subjects had regained some, but not all the weight, remained stable with respect to eating behaviors, and maintained most of their psychological gains.
Combined Psychosocial and Pharmacological Interventions

There were two uncontrolled studies that implemented a combination of treatments, each including a CBT and BWL component along with one or more medications (see Table 19). Similar to findings from studies of psychological or medical interventions alone, the greatest improvement was in the area of eating behavior ($SMD = 1.52$). There were also moderate improvements in psychological well-being ($SMD = 0.71$), with subjects demonstrating small weight losses ($SMD = 0.34$). No follow-up data were reported on these subjects.

Effects of Study Quality on Treatment Outcomes

Finally, the relationship between study quality (internal validity) and treatment study outcome was assessed. Due to the limited number of reports included in this analyses, studies were grouped into one of two categories: (a) those of high quality (internal validity ratings of 4 or 5 out of a possible 5), or (b) those of only fair quality (internal validity ratings of 2 or 3). No studies received a quality rating of 1. Results, presented in Table 21, indicate little difference in outcomes between those studies of high versus fair quality. Amount of weight lost and improvements in eating behavior were highly similar across studies, though studies of poorer quality reported substantially greater improvement in psychological functioning of subjects ($M = 0.60$) than in the higher quality studies ($M = 0.26$). Thus, the study quality appeared to have some impact on findings with respect to psychological changes, but not weight or eating behaviors.
Table 21

Differences in Treatment Outcome Between Studies of High Versus Fair Quality

<table>
<thead>
<tr>
<th>Study quality</th>
<th>N studies</th>
<th>Effect size (SMD)</th>
<th>Weight</th>
<th>Eating bx</th>
<th>Psych</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>7</td>
<td></td>
<td>0.54</td>
<td>1.07</td>
<td>0.26</td>
</tr>
<tr>
<td>Fair</td>
<td>12</td>
<td></td>
<td>0.41</td>
<td>1.10</td>
<td>0.60</td>
</tr>
</tbody>
</table>

Note. Bx = behavior; Psych = psychopathology.
This meta-analytic study addressed four research questions related to the newly proposed BED. These involved (a) identifying the primary characteristics of individuals with BED, (b) identifying ways in which individuals with BED may differ from those with BN and (ONB), (c) examining evidence for BED as a distinct diagnostic disorder versus a milder variant of BN, and (d) assessing and comparing the effectiveness of treatments implemented with BED individuals. This chapter includes an interpretation of the results as well as a discussion of the clinical implications of the meta-analysis findings. In addition, the limits of this study are discussed as are suggestions for future research.

Characteristics of Individuals with Binge Eating Disorder

One of the goals of this study was to describe the key characteristics of individuals with BED. As mentioned earlier, the intent was not to compare these characteristics to population norms, but simply to provide information and data that may be useful in future research. However, examination of this data reveals several interesting findings that merit discussion.

First, it is notable that 94% of BED subjects in the studies evaluated herein were female. This proportion does not correspond to that found in prevalence rate studies, in which BED has been found to be only slightly more common in females than males (Spitzer et al., 1992; Spitzer, Yanovski, et al., 1993). In reviewing the studies included in this meta-analysis, it was found that the majority specifically excluded males. Although this is not surprising, given that eating disorders are generally thought of as a “female disorder,” it does limit the generalizability of findings. The discussion that follows applies primarily to women with BED.
Another interesting finding is that the mean age of BED study participants was approximately 40 years. Given that the average age of onset of the disorder reported by subjects was 21.4 years, it is unclear whether BED tends to be a problem maintained throughout one's life, and/or if individuals simply tend not to seek treatment for 20 years (on average) after beginning to experience eating disturbances. If BED is considered a milder form of BN, it would seem quite likely that individuals with the disorder may not seek treatment for a number of years, as they may feel less distressed about their eating patterns. Certainly, BED appears to be a chronic disorder. The studies included in the present review also suggest that BED is not nearly as maladaptive as BN or AN; based on nearly all measures of psychopathology and epidemiology, degree of obesity among those with BED is clearly the greatest overall health risk for this population.

Based on the average age of onset of certain types of eating behaviors across subjects, it was found that individuals with BED tended to progress from dieting and binging to meeting full criteria for BED in an average period of just over 2 years. Additionally, BED subjects tended to become overweight (by their report) approximately 3 years prior to engaging in dieting. Although the mean onset age of dieting slightly preceded that of binging, only 42% of subjects, on average, reported that dieting occurred before binge behavior (though the range of study means was 25% to 65%). This finding tentatively suggests that for approximately one half of BED individuals, dieting cannot be implicated as a cause of binge eating, as suggested by Herman and Polivy (1980) in their restraint model. On the other hand, such a causal pathway may be relevant to the other half of subjects with BED. That is, it appears some individuals with BED may begin binge eating as a consequence of restricting calories, whereas for other individuals, binge eating occurs without a preceding period of restriction. The fact that these data were all collected retrospectively, however, may account for these findings. Given that the mean age of subjects
was 40 years, participants were required to recall behaviors occurring, on average, more than 20 years earlier. Therefore, these retrospective accounts of behavior so long ago may not accurately reflect true temporal relationships between behaviors. To date, no prospective studies of BED have been conducted that could further clarify this matter.

Another interesting finding from the BED descriptive data was that few subjects reported a prior history of another eating disorder. An average of only 2.5% reported a history of AN and 12.1% reported a history of BN (though the range was 2% to 54% in the 11 studies included in this analysis). It would appear, then, that it is relatively uncommon for an individual with AN or BN to transition to BED (i.e., to solely binge eating patterns/behaviors devoid of any form of purging behavior). Thus, an individual with BN who discontinues purging is unlikely to continue engaging in regular binge eating. One could speculate that individuals with both AN and BN have a uniquely strong drive for thinness that compels them to purge following a binge. Such a strong compulsion or drive to become thin could be a necessary precondition for most purging behavior observed in bulimia and anorexia. Further, once purging behavior has been established, it is unlikely for an individual with bulimia or anorexia to abandon this calorie voiding strategy, and merely revert to a pattern of chronic binge eating and symptoms that define BED; once established, the purging component of the binge-purge cycle is extremely reinforcing (escape from anxiety, loss of weight). In this regard, the binging-purging pattern in BN is likely driven more by the purging behavior than the binge per se. Individuals with BED may be positively reinforced by aspects of binge eating only.

Another notable finding, consistent with the broad literature on BED, was that BED subjects in the studies reviewed tended to be overweight. The mean BMI across studies was 36.6, which is considered to be "obese" (BMI > 27 = obese, BMI > 30 = morbid obesity; Department of Health and Human Services, 1998). This finding is somewhat inconsistent with that of
researchers who have examined prevalence of BED in community populations (Bruce & Agras, 1992; Spitzer et al., 1992; Spitzer, Yanovski, et al., 1993). These studies have reported that a large proportion of BED individuals are not overweight (25-58%). Yet a review of study inclusion criteria in this meta-analysis revealed that the majority of studies on BED required that subjects be obese, and in fact, many subjects were recruited from weight loss programs. Although research indicates obese individuals do not demonstrate greater levels of psychopathology than nonobese individuals (e.g., Friedman & Brownell, 1995), BMI may be a potential confound in this study and may limit generalizability somewhat.

The results of this portion of the meta-analysis are quite consistent with the diagnostic criteria and associated features of the proposed BED outlined in the DSM-IV (1994). In the present study, individuals with BED reported binge eating five times per week, on average, which is well above the minimum criteria of two times per week. The BED subjects also reported loss of control over their eating (as evidenced by particularly high scores on the disinhibition subscale of the TFEQ). Associated features of BED listed in the DSM-IV include higher rates of depression, anxiety, somatic concern, interpersonal sensitivity, self-loathing, and body dissatisfaction, as compared to nonbinging individuals of equal weight. Additionally, individuals with BED were reported to have higher lifetime prevalence rates of major depressive disorder, substance-related disorders, and personality disorders. In addition to confirming these features, the present study found that BED individuals reported greater levels of hunger, drive to be thin, general psychological distress, perfectionism, and lifetime prevalence of anxiety disorders. Also, individuals with BED reported considerable overconcern with body weight and shape (similar in degree to that of bulimics). While one of the diagnostic criteria for BN is that “self-evaluation is unduly influenced by body shape and weight,” (p. 550; DSM-IV) this is not a criterion for BED. Given the similarity between BN and BED individuals on measures assessing this variable, the
APA may need to reconsider including this criterion for BED. In the description of BED, the DSM-IV also states that "in nonpatient community samples, most individuals with this eating pattern [BED] are overweight" (p. 730). In fact, the results of the present literature review suggest this is not the case, and thus, the APA may also need to reconsider that statement.

Diagnostic Group Differences

Conclusions drawn about diagnostic group differences were based on effect sizes calculated from both within-study findings and group grand mean comparisons (calculated across studies). In general, these two methods of examining group differences produced parallel findings, though there were occasional discrepancies. Where equivocal findings arose, consideration should be given to the number of studies included in each analysis and other factors that may have affected the validity of findings. For instance, if a grand within-study effect size was based on only two studies, whereas the effect size of differences between grand means (method 2) was based on 20 studies, more weight should be given to results emanating from the second method. However, because within-study comparisons may have greater validity (as there are typically a number of controls, such as matching for age and use of a standardized interview procedure across groups), within-study findings based on small samples were not disregarded. If there was a moderately large number of studies for between-group, versus a similar number of studies for within-group comparisons involving the same variable, greater weight should be given to the within-group comparison data. The findings of the meta-analysis will be discussed according to type of subject variable, including: (a) personal characteristics, (b) eating and weight history, (c) eating disordered behavior, (d) weight and shape concerns, and (e) psychopathology. Included in this discussion will be the relationship between study ( moderator) variables and study findings.
Personal Characteristics

Demographic information, such as mean age and weight of subjects, was initially collected only as a means to describe samples rather than to offer evidence regarding diagnostic distinctiveness. However, it was found that age and weight were the characteristics that most differentiated subjects with BED from those with BN. Participants with BED were much older than bulimics (by almost 14 years) and substantially heavier (14 points greater BMI). On the other hand, BED and ONB subjects did not differ on these variables. Further, as previously noted, subjects who were asked about age of onset of BED indicated they met criteria at an average age of 21.4 years. Thus, these data suggest that BED is a more chronic disorder. For unknown reasons, subjects with BED are not participating in studies for almost 20 years (on average) after the onset of BED, whereas this is not the case for bulimics. It is likely that relative to persons with BN, individuals with BED do not perceive their eating behaviors as particularly problematic until struggling for many years. Thus, they may maintain their disordered eating patterns for much longer periods before seeking treatment relative to individuals with BN. Although seemingly chronic, BED may lack some of the more significant maladaptive consequences associated with BN, such as severe health problems and disruptive personal relationships, which may prompt a person to seek treatment.

It is also suggested that BED and BN differences may reflect a “cohort” or generational effect. That is, individuals who are now over 40 years old, who perhaps began binge eating prior to 1980, may not have considered purging behavior as it may have been construed as a very low-frequency, unacceptably unhealthy behavior at that time. In fact, research indicates that incidence of BN referrals to certain eating disorder clinics rose dramatically between 1981 and 1986 (four to seven times higher; Garner & Fairburn, 1988; Hall & Hay, 1991). It has also been noted that the more recent one’s birth, the higher the risk for BN and earlier age of onset of BN (Kendler et
al., 1991). While it may be that BN was previously left undiagnosed more often in the past, it may also be that purging has become a more popular or accepted method of weight control, particularly among younger women.

Although mean BMI differed substantially between BN and BED groups (but not BED and ONB groups), weight was not viewed as a characteristic that reliably differentiated the diagnostic groups. Because the majority of BED studies required participants to be overweight or obese for inclusion in the studies, the mean calculated BMI cannot be considered reflective of typical BED individuals within the diagnostic group. Again, while evidence suggests that there is not a relationship between weight and behavior problems/psychopathology, one wonders about the external validity of the research findings given the differences between sample means and BED population means. Although this relationship could not be systematically studied in the present meta-analysis (because too few studies differentiated subjects based on BMI), two studies have found that for nonpurging binge eaters, the prevalence/severity of psychopathology was not related to weight, but instead, to the severity of binge eating (Telch & Agras, 1994; Yanovski et al., 1993).

**Eating and Weight History**

According to within-study effect size calculations (based on two studies, one that included age-matched participants) BED subjects were slightly younger than bulimics when they began dieting and binging, but older when they met criteria for an eating disorder (based on six studies). However, findings from grand means of diagnostic groups (based on 11 studies) indicated that BN subjects developed each of these eating behaviors at a younger age than those with BED. Both group comparison methods revealed that BED subjects were moderately younger if/when they became overweight and began dieting than ONB individuals. This finding might suggest that
the earlier in life disruptive eating behaviors begin, the more likely it is the severe and maladaptive eating disturbance symptoms become over time. That is, relative to younger individuals, those who begin weight loss attempts at age 24 years (average age of dieting onset in obese nonbingers) may have greater internal controls to prevent binge eating in response to caloric deprivation. Such a proposition is supported by a study comparing BED individuals who developed the disorder earlier in life (prior to age 18) versus those who developed BED after age 18 (Marcus, Moulton, & Greeno, 1995). It was found that individuals who developed the disorder earlier had greater concerns about their weight and shape and were more likely to have a history of BN (24.1% vs. 6.5%). Similarly, in another study (Marcus, Wing, Fairburn, Grant, & Haugeland, 1993) BED individuals who binged before ever dieting were found to have an earlier onset of binge eating and weight problems than those who dieted first (13 years vs. 24 years of age) as well as a greater prevalence of depressed mood.

It is also noteworthy that few individuals with BN or BED go on to develop the other disorder. The finding that only 11% of individuals with BN reported a history of BED and 12% of BED subjects reported history of BN, suggests that individuals who binge and purge rarely stop purging without also abandoning binge eating, and that persons with BED rarely go on to engage in regular purging behavior. However, many bulimic subjects reported a history of AN (27.6%) whereas few BED subjects (2.5%) reported such a history.

Perhaps, individuals who only binge eat tend to settle into a pattern of eating behavior they are apt to maintain over several years. It may also be that individuals with BN have such a strong drive for thinness, that they feel more compelled to engage in purging than those with BED. In that respect, it would not be surprising that bulimics have a higher lifetime prevalence of AN, as the major feature of AN is severely low weight. This finding does not support, however, the notion that individuals with BED are simply “burned out bulimics”—those who have tired of the
purging behavior and have given up on weight loss. Instead, this finding supports a position that individuals with BED may chronically maintain less dysfunctional, but still problematic, binge eating behavior. The results also suggest that AN does not appear to be a risk factor for BED, a finding similar to that of Striegel-Moore et al. (2001).

**Eating Disordered Behavior**

There are notable differences between diagnostic groups in terms of binge eating behavior. Given that, by definition, individuals with BED and BN binge eat at least two times per week, whereas obese nonbingers do not regularly binge, such large differences between binging disorders and ONB would be expected. The fact that individuals with BED reported binge eating less often than bulimics (5.1 vs. 9.1 times per week) and have lower scores on all measures of binge eating (BULIT, BES, EDI-bulimia) indicates that their binge behavior is moderately less frequent and less severe than individuals with BN. On the other hand, individuals with BED showed dramatic differences in eating disordered behavior when compared to obese nonbingers, (as effect sizes ranged from -2.66 to -1.54). Based on these findings, it appears that individuals with BED can be most meaningfully differentiated from obese nonbingers with regard to binge-eating patterns.

Bulimics also reported considerably more dietary restriction (i.e., restraint) than those with BED (across all settings), who were similar to ONB subjects on this variable. It would appear that while bulimics binge eat more often than those with BED, they tend to restrict eating more at other times. This finding supports Herman and Polivy’s (1980) theory, which asserts that such frequent dieting can trigger more binge eating. However, it also seems plausible that excessive binge eating could compel bulimics to diet more at other times in order to prevent weight gain. Interestingly, level of restraint did not differ much as a function of the method used to diagnose
subjects or quality of study; however, BED subjects in more intensive treatment programs (e.g., inpatient hospitals) reported less restraint than those in no or less intensive treatment settings (e.g., weight loss treatment centers). This finding is somewhat surprising, given that the most symptomatic BED subjects (according to the EDI-bulimia scale) were in the more intensive treatments. Thus, for BED subjects, severity of binge eating problems does not seem to positively correspond to degree of restraint. This pattern was also found among bulimics—those in inpatient treatment settings reported substantially less restraint than those in the community (SMD = -1.14). Perhaps, individuals who have greater success in dieting (restraining) continue to seek weight loss treatment or no treatment at all, whereas others, particularly more severe binge eaters, may have given up on weight loss attempts and tend to seek treatment for their problems with binge eating (more likely found in inpatient settings).

Within-study findings suggest that BN and BED individuals do not differ on degree of disinhibition when eating, while ONB subjects report considerably less disinhibition. Aggregated mean scores (calculated between-groups), however, indicated that individuals with BED were the most disinhibited group when eating (i.e., had the least control), and, consistently, obese nonbinge eaters had much more control than either eating disorder group. Given that both methods included a number of studies in the comparisons, BED individuals may best be thought of as having approximately the same to slightly less control while eating than bulimics. This finding likely reflects the “out-of-control” nature of binge eating. According to the counter-regulation theory (Hibscher & Herman, 1977) that suggests once a diet is considered “broken,” individuals may rationalize that there is no point to continuing the diet and then they lose inhibition about eating further. Consistent with this theory, both BED and BN individuals showed greater disinhibition than nonbinge eaters. However, BED individuals reported binging less often than bulimics, and according to the counter-regulation theory, they would be expected to have
less disinhibition. It may be that BED subjects are less successful dieters (as supported by lower restraint scores), and consequently give up more easily on dieting. Thus, instead of having alternating periods of restraint versus disinhibition (like those with BN), individuals with BED may more often simply overeat.

Individuals with BED and BN reported similar levels of perceived hunger, which was considerably higher than that reported by ONB subjects. This finding supports the idea that people may engage in binge eating simply because they feel more hungry and have difficulty becoming or feeling satiated. It also supports Bruce and Agras's (1992) finding that a large number of binge eaters cite hunger as a trigger for binging. Perhaps, there are idiosyncratic differences in individuals with regard to hunger sensations that lead some to binge eat (those with BN, BED) in order to feel satiated. On the other hand, it may be that individuals who binge eat develop difficulties accurately perceiving hunger cues.

Weight and Shape Concerns

Individuals with BED and BN reported having similar degree of overconcern about their body weight and shape, but both were much more concerned than ONB subjects. In addition, BED subjects reported more dissatisfaction with their bodies than either bulimics or obese nonbingers. Despite this dissatisfaction and concern about weight and shape, persons with BED do not regularly purge following a binge (as bulimics often report). It was speculated in the literature review that because many individuals with BED are overweight, they do not have the same degree of concern and dissatisfaction about body shape and weight of bulimics and, consequently, do not purge. This speculation does not appear to enjoy support from the present body of literature; thus, it would seem other reasons may account for the absence of purging. One explanation may be that persons with BED, while unhappy with their bodies, do not have the
pronounced drive for thinness shown by bulimics. In fact, individuals with BN reported considerably greater drive to be thin than those with BED (who reported more than ONB subjects). Therefore, it seems that BED individuals may be discontent about their weight, but are not so driven by a need to be thin that they will engage in purging in order to achieve weight loss. This notion was supported by Vanderheyden and Boland (1987), who found that the drive for thinness was one of the primary variables differentiating 158 women in the following categories: normal, mild binge, moderate, severe, or binge-vomit. It may also be that many BED individuals, although unhappy about appearance, find indirect benefit from being overweight (e.g., protection against establishing fear-evoking, romantic relationships). Perhaps there is also a relationship between purging and age of onset—those who develop eating problems later may be less likely to conform to societal norms for beauty and thinness, and therefore less likely to begin purging.

**Psychopathology**

As noted earlier, there was a consistent trend for bulimics to demonstrate a somewhat greater prevalence and/or severity of psychiatric disorders/symptoms, personality disturbance, poor self-esteem/feelings of ineffectiveness, history of sexual abuse, interpersonal problems, and fears of maturity as compared with BED or ONB subjects. This finding is consistent with other studies that have found a positive correlation between frequency of purging, number of purging strategies, and psychopathology (Tobin et al., 1992; Williamson et al., 1987). The results of the present study suggest the possibility that eating-disordered women with the greatest psychopathology tend to binge and purge, those with a moderate amount only binge eat, and those with few psychological disturbances generally refrain from such disordered eating behaviors. The finding that individuals with BN reported the highest levels of negative affect (per BDI scores, rates of depression) and greatest frequency of binging, and those with ONB the least,
is consistent with an escape model of binging (Heatherton & Baumeister, 1991). This model suggests binge eating is a coping mechanism, wherein individuals are able to escape negative affect and painful self-awareness; thus, those with the most frequent binge eating behavior would evidence the greatest levels of negative affectivity. It may also be that engaging in dieting, binging, and/or purging can lead to greater negative affect/psychological disturbance. For example, a person who fails to successfully control eating may begin to feel ineffective and experience lower self-esteem. Further, binging and purging may induce biochemical changes that result in increased psychological symptoms such as depression or anxiety.

Binge Eating Disorder as a Distinct Disorder

**Versus a Variant of Bulimia Nervosa**

Although some researchers and practitioners (e.g., Antony et al., 1994; deZwaan et al., 1994) have argued that because individuals with BED do not engage in regular compensatory (purging) behavior, they are qualitatively different, and, therefore, a distinct group among the eating disorders. Others (e.g., Castonguay et al., 1995; Hay & Fairburn, 1998) have suggested that there are no clinically meaningful differences between individuals with BED and BN, and that the former should be thought of as a variant of the latter. Similarly, researchers and clinicians conceptualizing disturbed eating along a continuum (e.g., Nylander, 1971) have suggested that BED may simply be a “milder form” of BN.

To the extent that individuals with BED do not purge, such a distinction in nosology may be valid (i.e., that a binge syndrome exists distinct from BN). However, it seems reasonable to believe that individuals who meet the criteria for BED should differ from those with BN in clinically meaningful ways, other than simply failing to engage in compensatory behaviors. To date, researchers have not clearly defined the criteria necessary to differentiate BED from BN (or
from ONB individuals). Therefore, in the present study, decision criteria (established \textit{a priori} by the present author) were developed to better contribute to the discussion of the question of how distinct BED is from BN as a disorder (refer to Table 2). These decision rules were necessarily guided by the limits of the research conducted to date comparing these disorders. The findings of the meta-analysis will now be discussed in terms of these decision rules.

**Criteria 1: Onset of Disordered Eating Behaviors**

One clinical feature that is believed to differentiate diagnostic groups is the age of onset for various disordered eating patterns. If the onset age of dieting, binging, or the full eating disorder differs substantially (e.g., by more than seven years) between the BN and BED groups, it may be that these disorders are more likely to show different developmental pathways, and are, therefore, distinct disorders. The results from the meta-analysis indicate that the mean age of dieting onset differed by 4.2 years between BN and BED groups and 5.2 years for BED and ONB groups. Onset age of binging differed between eating disorder groups by only 1.4 years and age of full clinical onset of the eating disorder differed by 3.3 years. Thus, according to the \textit{a priori} decision rules, age of onset variables associated with dieting and binging do not lend much support to the argument of meaningful differences between BN and BED. However, it should be mentioned that BN subjects tended to be younger when each of these behaviors were initiated, which may contribute to the expression and severity of the eating disorder problems. Similarly, the difference between dieting onset for BED and ONB groups was less than seven years. Because ONB individuals do not binge or meet criteria for an eating disorder, they could not be differentiated from the BED subjects on these variables. Overall, the findings for criteria 1 are most consistent with the notion that BED is a variant of BN (or milder form of BN), which falls on a continuum between BN and ONB.
Criteria 2: Eating Patterns/Behaviors, Weight and Shape Concerns, and Psychopathology

A number of variables were analyzed which have commonly been thought to depict and/or differentiate individuals with eating disorders, including: binge eating behavior, dieting and restraint, disinhibition, hunger, weight and shape overconcern, and psychopathology. There were 25 such measures on which individuals with BN and BED were compared (21 for within-study comparisons), and 17 measures on which BED and ONB individuals were compared. In addition, prevalence rates of various psychiatric illnesses were compared. The decision rule for characterizing BED as a disorder distinct from BN was that for four or more of the variables, the following had to be met: (a) measures (of eating behaviors, weight/shape concerns, psychopathology) would differ quite substantially (i.e., by 1.5 SMDs or greater), or (b) prevalence rates of a comorbid disorder would be twice that of the other group (i.e., BN vs. BED; BED vs. ONB).

The findings from the analyses of BN versus BED individuals indicate that there were no SMD differences nearly this large (whether obtained by within- or between-study calculations). The strongest trend was for individuals with BED to report only moderately less psychopathology and eating disturbance than persons with BN; thus, these difference are not consistent with the premise that these are distinct disorders. Rather, across almost all measures, BED individuals reported somewhat less problematic eating patterns and psychopathology, and therefore it seems plausible that BED is a milder form of BN.

However, comparisons made between BED and ONB subjects met the established criteria for distinctness. That is, subjects with BED reported considerably more dysfunction in eating and psychopathology for 5 of the 25 variables assessed (using method 2 to calculate effect sizes). Three of these differences appeared on measures assessing degree of binge eating disturbance,
while two occurred for rates of psychopathology (lifetime substance abuse and personality disorders). As three of the measures assessed the same construct of binging, it would seem the prudent approach would be to consider these as a single variable. In addition, the effect sizes calculated between the BED and ONB groups on rates of psychiatric illness were found to be below the 1.5 SMD cutoff (though differences were still substantial). Consistent with researchers selection criteria, binge eating behavior meaningfully differentiated the BED and ONB groups (much like purging differentiates BED from BN individuals). However, few other substantial differences exist between BED and ONB individuals. Overall, the data from these analyses are most consistent with a model of BED that falls on a continuum between BN and ONB (albeit more closely positioned to BN) rather than it being a distinct disorder.

Criteria 3: Comorbidity of Disorders of Binge Eating

The final, but minor decision rule considers the degree to which individuals with BED or BN have a history of meeting criteria for both disorders. That is, if less than 25% of the subjects from each diagnostic group transitions from one disorder of binge eating to the other, this fact might be most consistent with the argument that disorders are distinct from one another. The findings from this meta-analysis revealed that only 11-12% of the subjects with BED or BN have a history of both disorders. Thus, this finding supports BED being characterized as distinct from BN (rather than falling on a continuum).

Summary of Findings Related to Decision Rules

The present analyses suggest there is a general trend supporting the notion that BED individuals fall between those with BN and ONB on distributions of scores of most measures of disturbed eating and psychopathology; that is, the data are most consistent with the continuum
conceptualization of these binge-eating syndromes. Individuals with BED tended to binge eat less often, have slightly to moderately lower rates of depression, anxiety, substance abuse, personality disorders, and psychiatric distress, as well as less drive for thinness, restraint, and interpersonal problems, and higher levels of self-esteem than BN individuals. The reverse relationship was found when BED individuals were compared to ONB subjects on these same variables. In fact, the BED individuals tended to appear somewhat more like bulimics than obese nonbinge eaters.

The finding that few individuals with either BN or BED transition between the other disorder might be viewed as less consistent with the continuum/variant model. However, the conditioning of escape/avoidance behavior (i.e., purging after eating), along with one's degree of drive-for-thinness, may together help determine whether such transitions occur. In this regard, BED, while highly similar to BN appears to be more stable, chronic, and less maladaptive than BN. Given the lower rates of psychopathology and drive for thinness among individuals with BED than those with BN, it may be that individuals with BED are less likely to turn to more destructive purging methods to lose weight. Rather, they may settle into a long pattern of binge eating, which they may find problematic, but not necessarily as damaging (as may be the case with BN). Given the current DSM-IV (1994) nosology, BED may best be codified under BN with an appropriate specifier (i.e., BN-nonpurging type), or remain under Eating Disorder Not Otherwise Classified (EDNOS), because there appears to be little evidence to support the model of BED as a truly distinct disorder.

Treatment Effectiveness for Binge Eating Disorder

Treating individuals with BED has been found to be particularly challenging, because these individuals often struggle with being overweight in addition to the binge eating. Traditionally, such individuals have been treated in weight loss programs (e.g., Weight Watchers, Jenny Craig,
university-based programs); however, research has indicated that obese binge eaters do even more poorly in these types of programs than nonbinging obese individuals (Gormally et al., 1980; Marcus et al., 1988). Therefore, there has been a move to treat BED individuals with interventions typically used with bulimic individuals (e.g., cognitive-behavioral therapy), to combine psychological treatments with more traditional behavioral weight loss interventions, and to prescribe antidepressant or weight loss medications. The results of published treatment studies were analyzed and compared in the present study.

The results of this meta-analysis suggest that all types of interventions have been successful in treating individuals with BED. In fact, mean SMDs for reductions in disordered eating behaviors were extremely large for all types of treatments, ranging from 0.86 to 1.52. Substantial psychological improvements were found in subjects undergoing almost all treatments, particularly those with a psychosocial component. In terms of weight loss, however, psychosocial interventions were least successful (almost no weight loss, on average, among controlled-psychosocial interventions), while those with a pharmacological or medical intervention appeared most successful (range of SMDs = 0.34 – 1.34). The most dramatic changes occurred among subjects who underwent BPB surgery. These participants lost considerable weight (SMD = 1.54), had improved eating patterns (SMD = 1.13), and reported improved psychological well-being (SMD = 0.85). It is notable, however, that this intervention is especially invasive, expensive, and has a number of health risks that preclude its use as a routine treatment for most individuals with BED.

Of the controlled studies using psychosocial interventions for BED, an appetite awareness training group appeared most successful at changing disturbed eating patterns and improving psychological functioning among participants, though all other specific interventions (CBT in a variety of formats) were also moderately to markedly successful in these areas. The results also
suggest that self-help CBT programs tended to be more successful when subjects were given some guidance by a professional (i.e., "partial self-help"). None of the specific interventions, however, were effective with weight loss.

Uncontrolled studies tentatively suggest that psychosocial interventions may be helpful to BED individuals. These studies must be interpreted more cautiously (though few waiting-list subjects in the controlled psychosocial studies exhibited any significant changes). The research evaluating meditation groups appeared to show particular success in changing eating patterns (SMD = 2.10) and subjects also demonstrated moderate improvements in mental health. In terms of comparing other psychosocial interventions to one another, the data fail to reveal consistent trends indicating the superiority of one treatment over another. However, in one study that compared a behavioral weight loss (BWL) intervention alone to BWL plus CBT, the researchers found greater success in the combined treatment for eating behavior and psychological functioning (Agras et al., 1994). To date, no research has been published implementing interpersonal therapy (a common treatment for BN) with BED individuals.

In terms of pharmacological interventions for BED individuals, four different medications were used (Topiramate, Sertraline, d-fenfluramine, and Fluvoxamine). Sertraline appeared most successful in decreasing disturbed eating patterns and inducing weight loss, though Fluvoxamine was also moderately successful in both of these areas. Assessed only in terms of effect on eating behaviors, d-fenfluramine and was found to have a large positive effect on BED subjects.

Combining pharmacological and psychosocial interventions appeared to be the most consistently successful form of treatment (other than surgery). Although weight loss was small, the BED individuals undergoing such combined treatments displayed dramatic improvements in eating behaviors (SMD = 1.52) and moderate improvements in mental health (SMD = 0.71). The medications involved in these trials (Desipramine, Fluoxetine, and Phentermine) have not been
used alone in any other published studies on BED treatment, so it is difficult to assess the degree
to which changes might be due to the medication versus the psychosocial component.

Overall, the results from the treatment studies reviewed in this meta-analysis indicated that
the interventions ranged from mildly to highly successful with BED subjects. It is possible that
only studies with positive results tend to get published (i.e., the “file-drawer problem”). However,
given the recent demand for studies relating to BED and the fact that some of these treatment
studies did not report many statistically significant findings (even though effect sizes were small
or moderate), it seems unlikely that many studies with null findings are being left unpublished.

The finding that all intervention studies reported positive outcomes in treating individuals
with BED is consistent with the literature on treating other psychological disorders. In their
review of psychotherapy outcome studies comparing treatment modality, Lambert and Bergin
(1994) found that across broad domains of problems, psychotherapy treatments were found to be
effective, and few treatments emerged as significantly superior to others. Similar conclusions
were drawn by researchers conducting a large study on the effectiveness of various treatments for
alcohol dependence (Project MATCH Research Group, 1997)—all psychological treatments were
found to be equally effective.

Summary and Clinical Implications

The overall findings of this meta-analytic study suggest that individuals with BED differ
from BN and ONB individuals. However, these differences tend to be a matter of degree rather
than kind, particularly with respect to BN versus BED individuals. Other than the absence of
regular purging behaviors, individuals with BED share many characteristics with BN individuals,
including frequent binge eating, loss of control over eating, overconcern about one’s own weight
and shape, greater levels of psychological disturbance, and poorer self-esteem and interpersonal
relationships than individuals who do not engage in binge eating. However, the results also suggest that BED may be a more chronic and stable, yet less maladaptive disorder than BN. That is, individuals with BED tend to struggle with binge eating disturbances for decades before seeking professional help. Therefore, there is a need to accurately assess, diagnose, and treat individuals with BED.

The results from this study generally support a continuum/variant model for the conceptualization of BED. Rather than including “binge eating disorder” as a distinct eating disorder in the DSM-IV (1994), it may be more valid for researchers and practitioners to subsume this disorder under the heading of “bulimia nervosa” and add a specifier for “nonpurging” type and either “obese” or “nonobese” type. Another idea is to create an umbrella category of “bulimia disorder,” with BN being one subtype and BED (with/without obesity) the other.

It might also be argued that BED should not be considered a mental disorder at all. Because individuals with BED tend to have less symptomology and psychopathology than individuals with other eating disorders, BED may be thought of as problematic, but not necessarily maladaptive enough to be considered a mental disorder. Also, due to the increasing normality of overeating in our culture, and the concurrent emphasis on thinness and dieting, the symptoms of BED may be thought of by some as a cultural phenomenon, rather than a psychological disorder. According to the sociocultural model of eating disorders, the societal emphasis on weight is so widespread that some degree of body dissatisfaction has become normative among women (Rodin, Silberstein, & Striegel-Moore, 1985). It may be that individuals with BN are at the extreme end of this continuum of eating and weight concerns, while those who meet proposed criteria for BED fall closer to the middle. Additionally, because of the high comorbidity between BED and obesity (which is not considered a mental disorder), BED is frequently viewed as a variant of the health problem referred to as obesity. Where to draw this
line between normalcy and pathology is certainly not a new issue and will likely be debated with respect to BED.

Although accurate diagnoses are helpful in describing groups of individuals, it is also important to remember that there are considerable intra-individual differences. Therefore, a careful assessment of each treatment-seeking individual is an important step in selecting the appropriate interventions. Given the large proportion of weight loss treatment-seeking individuals who meet proposed criteria for BED, it seems especially necessary to assess participants in such programs for presence of binge eating patterns. Rather than placing these patients on diets (as is traditionally the case in most weight loss programs), which tend to increase, rather than decrease binge eating, it is recommended that these individuals receive alternate forms of treatment. While almost all psychosocial and pharmacological studies have been shown to be at least mildly effective, the results from this meta-analysis suggest that a combination of the two interventions may be most effective at decreasing disturbed eating patterns (i.e., binging), increasing psychological health, and aiding in weight loss. If weight loss is not needed or a concern for the patient, psychosocial interventions may be implemented without an adjunct and likely maintain the same level of effectiveness.

Limitations and Future Research

The generalizability of the findings to all BED individuals appears to be a limitation of the present study. That is, almost all of the published studies on BED required subjects to be obese and female, and the findings may not accurately represent many persons with BED (as approximately half of individuals with BED in the community are not obese and slightly less than half are males). Although obesity has not been found to correlate with psychopathology, adjustment, or personality variables, differences between obese and nonobese individuals with
BED may exist. Two studies of nonpurging binge eaters have found no relationship between weight and severity of binge eating, yet there is still uncertainty about the role of weight on differences between BED and BN individuals on a number of variables. Consequently, comparisons made in this meta-analysis between individuals with BED and BN (who are typically not overweight) may not reflect completely accurate group differences found in the population. On the other hand, the subjects in the ONB group are, by definition, overweight, and comparisons made in this study between ONB and BED groups likely reflect population difference more accurately. Given the large number of subjects included in the overall meta-analysis (22,457), it is believed that the results are most reflective of the following groups: individuals with BN, obese women with BED, and ONB women.

Another possible limitation of the findings is that a large number of studies were not included in this analysis because the researchers failed to report basic data, including means, standard deviations, or statistical values for nonsignificant findings. In all, there were at least 30 studies that could not be included because the authors failed to provide such information. Although initial attempts were made to collect these data from the researchers, it quickly proved unsuccessful as it was difficult to locate the researchers, and those who were contacted could not produce the requested information. This was unfortunate, as these data may have added meaningful information about the diagnostic groups being studied.

A further limitation of the results is that all of the studies that gathered data about the developmental history of their subjects (i.e., age of onset of various behaviors) were retrospective and often requested subjects to recall information about their behavior that occurred more than 20 years earlier. It seems likely that such recollections are subject to greater error than if recalling much more recent behaviors. To date, there have been no prospective studies of BED individuals that could help clarify temporal relationships between certain types of eating behaviors.
Finally, a limitation of the methodology of the present study was that a normal weight control group was not included. Although the obese nonbinging subjects served as a control for the overweight BED individuals, no comparisons were made between BED and ONB versus normal weight, noneating disordered individuals. Such comparisons would be useful in determining the degree to which individuals with BED differ from those without weight or eating disturbances.

Based on the noted limitations, several recommendations for future research can be made. First, more research effort and funding directed toward the study of BED in males as well as inclusion of gender as a variable of interest within studies is recommended. It would also be valuable to systematically study differences between obese versus nonobese individuals with BED to determine if BMI is related to other subject characteristics (e.g., body dissatisfaction, restraint, self-esteem). In addition, prospective studies are needed to better understand the developmental pathways to various eating problems. It is also recommended that a normal weight, noneating disordered control group be included in future meta-analyses.

In terms of methodology, researchers and journal editors should ensure that basic information is provided in papers on BED, including clearly defined selection and diagnostic criteria and results data (e.g., means, standard deviations). In addition, researchers should be aware that individuals referred to as “obese binge eaters,” “compulsive eaters,” or those who are identified by using a cutoff score on a measure (such as the BES) are not the equivalent of those who have been assessed to meet the proposed DSM-IV (1994) criteria. Previous reviewers of the BED literature who have included studies with such subjects have likely derived different conclusions about BED than the present study. Therefore, it is recommended that researchers carefully select studies for review or, if they choose to include studies with subjects who do not meet DSM-IV criteria, do not attempt to generalize results to individuals who do meet criteria for
BED. Additionally, researchers and clinicians should be aware that individuals with BED often have significantly different characteristics based on the type of setting from which they were recruited. Although it is of value to assess BED individuals from a variety of settings, it is worth noting that the generalizability of findings to all BED individuals remains limited.

Researchers and clinicians are also encouraged to continue assessing treatment effectiveness with BED individuals. Although a number of CBT interventions have been found to be successful, other forms of therapy (such as interpersonal therapy) should also be examined. Whenever possible, follow-up data should also be collected to better understand the effects of treatment over time. Such data could help determine the need for follow-up treatment and best means of assisting clients maintain improvements made during treatment. Clearly, binge eating, even in the absence of purging behaviors, represents a significant problem for a substantial number of individuals (2% - 4% in the community, up to 30% in weight loss programs). Identifying ways to better assist these individuals in leading healthier lives is needed. To this end, research aimed at improving the understanding and treatment of persons currently labeled "BED" has merely begun and requires greater emphasis in the future.
REFERENCES

Abraham, S. F., & Beumont, P. J. (1982). How patients describe bulimia or binge eating. Psychological Medicine, 12, 625-635.


Appendix A:

Coding Sheet
<table>
<thead>
<tr>
<th>Diagnostic Group</th>
<th>BN</th>
<th>BED</th>
<th>ONB</th>
<th>Other</th>
<th>ES: BN-BED</th>
<th>ES: BED-OB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Study ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STUDY CHARACTERISTICS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Sample type 1=weight loss prog, 2=ED clinic, 3=ipatient, 4=community, 5=oupt txs, 6=combination, 7=other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Method of Diagnosis: 1=questionnaire, 2=interview</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 DSM-IV criteria used? 1=yes, 2=no</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Quality of Study 7=excellent, 1=poor (Interview=2; DSM-IV=2; N&gt;30=1; blind=1; Exclusion criteria &lt; 3 = 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 If psychopathology assessed: Structured Interview = 1; Unstructured Interview = 2; no interview = 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUBJECT CHARACTERISTICS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Body Mass Index (BMI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 % Women</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onset of Eating Related Behavior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Onset age of dieting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Onset age of binging</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Onset age of BED/BN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 Onset age of obesity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 % have had both BED &amp; BN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 % have had AN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Binge Eating Behavior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Binge Eating Scale (BES)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 EDI - Bulimia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 Bulimia Test (BUILT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 Binge frequency (per week)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 EDE - Overeating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic Group</td>
<td>BN</td>
<td>BED</td>
<td>ONB</td>
<td>Other</td>
<td>ES: BN-BED</td>
<td>ES: BED-OB</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>----</td>
<td>-----</td>
<td>-----</td>
<td>-------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>Dieting Behaviors and Restraint</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 EDE-Restraint</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 TFEQ (EI) - Restraint</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 % diet before binge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disinhibition &amp; Hunger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 TFEQ (EI) - Disinhibition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 TFEQ (EI) - Hunger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight &amp; Shape Overconcern</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 EDI-Drive for Thinness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 EDI-Body Dissatisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 EDE-Weight Concerns</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 EDE-Shape Concerns</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 Body Shape Questionnaire</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33 Beck Depression Inventory (BDI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34 Hamilton Depression (Ham-D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 Hamilton Anxiety (Ham-A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 Symptom Checklist-90 (SCL-90)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37 % with lifetime Axis I disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38 % with Axis II disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39 % current Axis I disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 % lifetime affective disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41 % current affective disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42 % lifetime depression</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43 % lifetime anxiety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44 % report sexual victimization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45 % lifetime substance abuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46 Rosenberg Self-Esteem Scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47 EDI - Ineffectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48 Inventory of Interpersonal Problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49 EDI - Maturity Fears</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic Group</td>
<td>BN</td>
<td>BED</td>
<td>ONB</td>
<td>Other</td>
<td>ES: BN-BED</td>
<td>ES: BED-OB</td>
</tr>
<tr>
<td>------------------</td>
<td>----</td>
<td>-----</td>
<td>-----</td>
<td>-------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 51</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 52</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53 53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53 53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53 53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53 53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53 53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53 53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53 53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Treatment Outcome

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre</th>
<th>Post</th>
<th>Follow-up</th>
<th>pre-post difference</th>
<th>ES</th>
<th>Follow-up ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Type of Study: 1=Tx vs. Control, 2=Tx vs. Tx, 3=Tx as adjunct, 4=Pre-post only, 5=Tx vs. Placebo, 6=Tx, Tx, control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Type of Treatment 1=BWL, 2=CBT, 3=IPT, 4=meds (specify), 5=self-help, 6=other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Random Assignment? 1=yes, 2=no</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Internal Validity 1=poor, 5=excellent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent Measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Frequency of binge eating Exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Weight/BMI loss Exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Depression Exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Global pathology Exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Restraint Exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Hunger Exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Disinhibition Exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Self-esteem Exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Body image Exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Interpersonal problems Exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B:

Conventions for Coding
The purpose of this conventions sheet is to provide guidelines for coding the articles to be used in the meta-analysis.

**Coding for Study Variables:**

1. **Study ID**  
   Assigned ID # and name of authors.

2. **Year**  
   Publication year

**Defining diagnostic groups:**

- **BN** = Any group of subjects that was diagnosed as bulimic according to DSM-III-R or DSM-IV criteria will be included under this heading. If the EDI or BUILT was used to diagnose (if subjects met a cutoff score), do not include subjects.

- **BED** = Any group of subjects who are considered to have BED, regardless of whether exact DSM-IV criteria vs. criteria near to DSM-IV were used. If purging behavior was not assessed or there is any indication that one or more subjects may use regular purging (i.e., the sample may include purging or non-purging bulimics) the group should not be included in this category. For example, if the Binge Eating Scale (BES) was used to select subjects, the sample may include bulimic individuals, and thus will be coded under “Other,” rather than BED. If a questionnaire was used to diagnose subjects, and specific items corresponding to DSM-IV or Spitzer’s (1991, 1992, or 1993) criteria were used, include in this diagnostic category.

- **ONB** = Any group of subjects who are obese and do not meet criteria for BED, BN, or AN. If a study breaks down subjects only in terms of those who meet BED criteria vs. those who don’t (i.e., includes subthreshold BED subjects) include in this group. If studies break down subjects into multiple categories (i.e., BED, subthreshold BED, no BED symptoms) use only those subjects in the least symptomatic group.

- **Other** = Those samples that include or may include non-purging bulimics will be categorized as “other.” Many studies refer to their samples as obese binge eaters, but never assess for purging behavior. These samples should be included in this group.

3. **N**  
   Sample size of each diagnostic group

4. **Sample Type:**

   - **1 = Weight loss program**  
     This code will be used for all individuals who were participating in some form of treatment designed specifically to lose weight. This includes those persons in traditional weight loss programs such as Weight Watchers, Jenny Craig, etc., those in university-
based weight loss programs, or any other similar type programs. In addition, this will include persons responding to ads for weight loss treatments, including medication trials.

2 = Eating disorder clinic
If the sample was selected from what was specifically referred to as an eating disorder clinic (private or university-based), it will be coded a "2."

3 = Inpatient unit
This includes any sample of individuals who are seeking treatment for obesity or binge eating in an inpatient, 24-hour care facility.

4 = Community
Community samples refer to those persons not seeking treatment for obesity or binge eating. These samples are usually obtained through ads, asking for “binge eaters” to participate in a research study (excluding treatment), or by randomly selecting individuals from the community and asking those with identifiable BED to participate.

5 = Outpatient therapy
This code is for samples of individuals seeking psychotherapy or medication treatment for their eating disorder (or other psychological disorder) in outpatient settings other than eating disorder clinics. Individuals receiving treatment for both eating problems and weight loss will be included in this group. Samples in which subjects were recruited for treatment for their eating disorder by advertisements are also included in this category.

6 = Combination
This code will be used for any sample including persons from more than one of the above type of groups.

7 = Did not report/unclear
If the study does not report or is unclear about the population from which subjects were selected, this code will be used.

5. Method of Diagnosis

1 = Questionnaire
If a questionnaire was used as the means to diagnose BED, this code will be used. A few different questionnaires have been used with this population, including the EDI, BES, EDE, QEWP, and BUILT. Of these, only the EDE and QEWP have questions directly related to diagnostic criteria. If a study does not report method of diagnosis, include in this category.

2 = Interview
Anytime an interview was used to diagnose BED, this code will be used. The interview may be structured, semi-structured, or unstructured, and may be a well-validated interview, one designed by the authors for the purposes of their study, or any other type of interview.
6. DSM-IV Criteria used?

1 = Yes
If the study specifically states that strict DSM-IV criteria for BED were adhered to, this code will be used. If a study states that Spitzer et al's 1993 criteria were used, this is equivalent to the DSM-IV.

2 = No
If other criteria were used, even though only slightly different, it will receive a "2." If the study states that used Spitzer's criteria from 1991 or 1992, DSM-IV criteria were not used.

7. Quality of Study/ Integrity of Findings

Studies will be coded for degree of quality using the following scale:

1 = very poor
4 = fair
7 = excellent

This rating will be arrived at by adding points for each of the following characteristics:

2 points = Interview was used to diagnose
2 points = Strict DSM-IV criteria were used (of DSM-III-R in the case of BN subjects)
1 point = Sample size was 30 or greater
1 point = Assessor was blind to eating disorder diagnosis if interviewing for additional psychopathology. If no psychopathology was assessed by interview, add this point.
1 point = Fewer than 3 exclusion criteria were used to select sample. Exclusion criteria include health problems, comorbid psychopathology, currently receiving treatment (medication or therapy), restrictions on ages, restrictions on weight/BMI, etc. Excluding subjects who have another eating disorder, subjects whose weight is < 85% of normal or BMI < 18, or who are male will not be counted as exclusion criteria.

8. If Psychopathology Assessed:

If the study assessed for comorbid psychiatric disorders, code how psychiatric disorders were diagnosed. If no comorbid psychiatric disorders were assessed, leave this blank.

1 = Structured Interview A structured or semi-structured interview of any type was used.
2 = Unstructured Interview An unstructured interview was used.
3 = No interview/questionnaire No interview was used (but questionnaire was) or the study does not report how diagnoses were made.
Subject Characteristics

Most of the 55 subject variables to be coded are self-explanatory. Both the mean and standard deviation of each variable will be coded except where percentages are called for. For all measures other than the SCL-90, the mean raw score is used. For the SCL-90, the GSI is to be used.

Coding of Treatment Outcomes

1. Type of Study

   1 = Tx vs control: 2 groups, 1 assigned to a treatment, 1 assigned to no treatment
   2 = Tx vs Tx 2 different treatments being compared
   3 = Tx as adjunct Two groups, one group receives standard treatment, the other group received standard treatment plus some added component
   4 = Pre-post only Only one group, compares pre to post scores
   5 = Tx vs placebo Drug treatment compared to placebo
   6 = Tx, Tx, Control Two different treatments compared to one another and a control group

   Note: there may be multiple groups, but if all data is combined in the analysis, treat this as one group

2. Type of Treatment

   1 = BWL Behavioral weight loss: Goal is to lose weight through diet and exercise
   2 = CBT Cognitive Behavioral Therapy (this includes appetite awareness train.)
   3 = IPT Interpersonal Therapy
   4 = meds Medication treatment
   5 = self-help Treatment is based on a self-help model
   6 = other Includes inpatient tx, surgery, meditation

   Note: Can be more than one of the above. List all.

3. Random Assignment

   1 = yes
   2 = no

4. Internal validity

   5 = excellent
   3 = moderate
   1 = poor
Rate internal validity using the following guidelines:

Threats to internal Validity:

___ Maturity
___ History
___ Testing
___ Instrumentation
___ Regression
___ Selection
___ Mortality

___ Total points

Overall rating based on the Criteria on the right:

0 = not a plausible threat
1 = minor threat
2 = plausible threat
3 = by itself could explain the findings

If threats:

5 = \leq 1
4 = \leq 3 and no scores of 2 or 3
3 = \leq 6 and up to one score of 2
2 = \leq 8 and up to two scores of 2
1 = > 8 and/or more than 2 scores of 2 or one 3
Appendix C:

Studies Included in the Meta-Analysis


Appendix D:

Formulas
List of Formulas used in the Present Study

1. Standardized mean difference effect size derived from group means on a particular measure:

\[ g = \frac{X_1 - X_2}{SD_{pooled}} \]

\[ d = g[1-3/(4N-9)] \]

2. Standardized mean difference effect size derived from percentage of subjects in two groups who surpass some criteria (e.g., % diagnosed with an Anxiety Disorder):

*Example:*
Assume 13/18 BED subjects and 11/24 ONB subject have an Anxiety Disorder

\[ \frac{13 + 1}{18 + 2} = 70\% \text{ for BED group} \]
\[ \frac{11 + 1}{24 + 2} = 46.2\% \text{ for ONB group} \]

Based on the a normal distribution, the corresponding Z score is used:

\[ 70.0\% = .52 \text{ SD} \]
\[ 46.2\% = -.10 \text{ SD} \]

\[ .52 - -.10 = .62 \]

Therefore, the ES = 0.62

3. Standardized mean difference effect size between two groups receiving treatment:

\[ \frac{(X_{\text{post}} - X_{\text{pre}}) - (X_{\text{Cpost}} - X_{\text{Cpre}})}{SD_{\text{pre pooled}}} \]
Appendix E:

Additional Tables
Table 22

Means, Standard Deviations, and Standardized Mean Differences of Key Subject Variables Based on Study Quality for Individuals with Binge Eating Disorder

<table>
<thead>
<tr>
<th>Subject variable</th>
<th>Poor</th>
<th>Moderate</th>
<th>Good</th>
<th>Poor vs. Good</th>
<th>Poor vs. Moderate</th>
<th>Mod vs. Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>38.0</td>
<td>39.9</td>
<td>39.4</td>
<td>-0.15</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Body mass index</td>
<td>39.2</td>
<td>36.9</td>
<td>35.9</td>
<td>0.48</td>
<td>0.22</td>
<td>0.14</td>
</tr>
<tr>
<td>TFEQ - Restraint</td>
<td>8.7</td>
<td>7.9</td>
<td>8.5</td>
<td>0.05</td>
<td>0.12</td>
<td>-0.27</td>
</tr>
<tr>
<td>EDI - Bulimia</td>
<td>--</td>
<td>7.4</td>
<td>8.5</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>EDI - Drive for thinness</td>
<td>--</td>
<td>9.5</td>
<td>8.9</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>EDI - Body dissatisfaction</td>
<td>--</td>
<td>20.6</td>
<td>22.0</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td>11.8</td>
<td>15.1</td>
<td>15.5</td>
<td>-0.44</td>
<td>-0.39</td>
<td>-0.05</td>
</tr>
<tr>
<td>SCL-90</td>
<td>--</td>
<td>1.0</td>
<td>0.8</td>
<td>--</td>
<td>--</td>
<td>0.32</td>
</tr>
<tr>
<td>% sexually abused</td>
<td>--</td>
<td>18.4</td>
<td>24.7</td>
<td>--</td>
<td>0.22</td>
<td>--</td>
</tr>
<tr>
<td>% personality disorder</td>
<td>--</td>
<td>30.3</td>
<td>40.0</td>
<td>--</td>
<td>0.25</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. TFEQ = Three Factors Eating Questionnaire; EDI = Eating Disorders Inventory; SCL-90 = Symptom Checklist – 90.
Table 23

Means, Standard Deviations, and Standardized Mean Differences of Key Subject Variables

Based on Method of Diagnosis of Individuals with Binge Eating Disorder

<table>
<thead>
<tr>
<th>Subject variable</th>
<th>Interview</th>
<th>Questionnaire</th>
<th>ES interview vs. questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Age</td>
<td>40.0</td>
<td>9.2</td>
<td>36.0</td>
</tr>
<tr>
<td>Body mass index</td>
<td>36.5</td>
<td>7.0</td>
<td>37.6</td>
</tr>
<tr>
<td>TFEQ – Restraint</td>
<td>8.2</td>
<td>4.0</td>
<td>8.7</td>
</tr>
<tr>
<td>EDI – Bulimia</td>
<td>8.0</td>
<td>4.0</td>
<td>7.4</td>
</tr>
<tr>
<td>EDI – Drive for thinness</td>
<td>9.0</td>
<td>4.8</td>
<td>11.7</td>
</tr>
<tr>
<td>EDI – Body dissatisfaction</td>
<td>21.3</td>
<td>5.2</td>
<td>22.6</td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td>14.5</td>
<td>8.3</td>
<td>17.9</td>
</tr>
<tr>
<td>SCL-90</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>% sexually abused</td>
<td>19.1</td>
<td>--</td>
<td>19.6</td>
</tr>
<tr>
<td>% personality disorder</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. TFEQ = Three Factors Eating Questionnaire; EDI = Eating Disorders Inventory; SCL-90 = Symptom Checklist – 90; ES = effect size (standardized mean difference).
Table 24

Means. Standard Deviations, and Standardized Mean Differences of Key Subject Variables

Based on Diagnostic Criteria for Individuals with Binge Eating Disorder

<table>
<thead>
<tr>
<th>Subject variable</th>
<th>Strict DSM-IV</th>
<th>Nonstrict DSM-IV</th>
<th>ES strict vs. nonstrict</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Age</td>
<td>39.4</td>
<td>9.1</td>
<td>40.1</td>
</tr>
<tr>
<td>Body mass index</td>
<td>35.7</td>
<td>6.7</td>
<td>38.4</td>
</tr>
<tr>
<td>TFEQ – Restraint</td>
<td>8.6</td>
<td>4.2</td>
<td>7.6</td>
</tr>
<tr>
<td>EDI - Bulimia</td>
<td>8.2</td>
<td>4.1</td>
<td>7.4</td>
</tr>
<tr>
<td>EDI – Drive for thinness</td>
<td>9.0</td>
<td>5.0</td>
<td>9.5</td>
</tr>
<tr>
<td>EDI – Body dissatisfaction</td>
<td>21.9</td>
<td>5.5</td>
<td>20.1</td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td>15.1</td>
<td>8.2</td>
<td>15.1</td>
</tr>
<tr>
<td>SCL-90</td>
<td>0.8</td>
<td>0.6</td>
<td>1.0</td>
</tr>
<tr>
<td>% sexually abused</td>
<td>19.1</td>
<td></td>
<td>19.6</td>
</tr>
<tr>
<td>% personality disorder</td>
<td>33.6</td>
<td></td>
<td>27.0</td>
</tr>
</tbody>
</table>

Note. TFEQ = Three Factors Eating Questionnaire; EDI = Eating Disorders Inventory; SCL-90 = Symptom Checklist – 90; ES = effect size (standardized mean difference).
Table 25

Means and Standard Deviations of Key Subject Variables Based on Sample Type for Individuals with Binge Eating Disorder

<table>
<thead>
<tr>
<th>Subject variable</th>
<th>Weight loss M</th>
<th>Weight loss SD</th>
<th>ED clinic M</th>
<th>ED clinic SD</th>
<th>Inpatient M</th>
<th>Inpatient SD</th>
<th>Community M</th>
<th>Community SD</th>
<th>Outpatient M</th>
<th>Outpatient SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>39.0</td>
<td>9.3</td>
<td>36.9</td>
<td>10.4</td>
<td>33.1</td>
<td>10.6</td>
<td>35.1</td>
<td>7.5</td>
<td>42.8</td>
<td>9.4</td>
</tr>
<tr>
<td>Body mass index</td>
<td>40.4</td>
<td>7.4</td>
<td>36.8</td>
<td>7.5</td>
<td>38.9</td>
<td>8.8</td>
<td>33.4</td>
<td>7.5</td>
<td>36.1</td>
<td>6.6</td>
</tr>
<tr>
<td>TFEQ – Restraint</td>
<td>7.9</td>
<td>4.1</td>
<td>--</td>
<td>--</td>
<td>6.6</td>
<td>3.8</td>
<td>8.9</td>
<td>4.2</td>
<td>8.3</td>
<td>3.9</td>
</tr>
<tr>
<td>EDI – Bulimia</td>
<td>7.0</td>
<td>3.6</td>
<td>8.5</td>
<td>4.7</td>
<td>9.8</td>
<td>4.4</td>
<td>--</td>
<td>--</td>
<td>8.0</td>
<td>4.0</td>
</tr>
<tr>
<td>EDI – Drive for thinness</td>
<td>8.9</td>
<td>4.7</td>
<td>10.6</td>
<td>5.6</td>
<td>10.7</td>
<td>5.3</td>
<td>--</td>
<td>--</td>
<td>8.3</td>
<td>4.7</td>
</tr>
<tr>
<td>EDI – Body dissatisfaction</td>
<td>21.0</td>
<td>4.9</td>
<td>22.0</td>
<td>5.8</td>
<td>19.8</td>
<td>5.5</td>
<td>--</td>
<td>--</td>
<td>22.3</td>
<td>5.3</td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td>12.8</td>
<td>8.0</td>
<td>19.7</td>
<td>11.6</td>
<td>23.0</td>
<td>9.8</td>
<td>13.0</td>
<td>8.4</td>
<td>15.1</td>
<td>8.0</td>
</tr>
<tr>
<td>SCL-90</td>
<td>--</td>
<td>--</td>
<td>1.1</td>
<td>0.7</td>
<td>1.4</td>
<td>0.7</td>
<td>0.6</td>
<td>0.4</td>
<td>0.8</td>
<td>0.5</td>
</tr>
<tr>
<td>% sexually abused</td>
<td>--</td>
<td>--</td>
<td>16.1</td>
<td>--</td>
<td>--</td>
<td>23.0</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>% personality disorder</td>
<td>34.6</td>
<td>18.3</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>38.2</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. TFEQ = Three Factors Eating Questionnaire; EDI = Eating Disorders Inventory; SCL-90 = Symptom Checklist – 90; ED = eating disorder.
CURRICULUM VITAE

Lara Schultz LaCaille

Department of Psychology
2810 Old Main Hill
Logan, UT 84323
(435) 797-1460

1045 South 1200 West #9
Ogden, UT 84404
(801) 393-4346

Education

PhD Utah State University, Logan, Utah; (Expected August 2001)
Combined Clinical/Counseling/School Psychology PhD Program
Full APA Accreditation
Specialization: Child/School Psychology

PhD Internship Salt Lake City Veterans Administration Medical Center
Rotations: Medical Psychology and Mental Health
Full APA Accreditation

MS Utah State University, Logan, Utah; May, 1999
School Psychology
Full NASP Accreditation
Certified School Psychologist, K-12, State of Utah

Traineeship The Devereux Foundation, 1992-1993
Preprofessional training program in clinical psychology
Specialization: Adolescent Psychology, Assessment of Childhood Disorders

BA University of Wisconsin-Madison; May, 1992
Major: Psychology

Clinical Experience & Employment

Child Psychology


1997-1998  **Psychometrician**, Lifespan, Logan, Utah. Conducted educational and psychological assessments with adolescent sex offenders, individuals seeking vocational rehabilitation, and persons receiving services from a private, for-profit outpatient clinic.

1996-1997  **Psychoeducational/Mental Health Specialist**, Community-Family Partnership, Center for Persons with Disabilities, Utah State University. Conducted developmental and psychological assessments for infants and children, and provided adult mental health therapy. Also coordinated volunteer program and interagency agreements.

1995-1997  **Psychometrician**, Early Intervention Research Institute, Utah State University, Logan, Utah. Conducted developmental and psychosocial assessments with developmentally delayed infants and toddlers.

1992-1995  **Residential Counselor**, The Devereux Foundation-Mapleton Treatment Center, Malvern, Pennsylvania. Counseled and supervised severely behaviorally and emotionally disturbed adolescents at a residential treatment center. Also facilitated groups and organized therapeutic activities.

**Adult Psychology/Neuropsychology/Behavioral Medicine**

2000-2001  **Psychology Intern**, Salt Lake City Veterans Administration Medical Center. Six months, full-time Medical Psychology Rotation: neuropsychological assessment, cardiac transplant and presurgical evaluations, pain management, adjustment to illness, competency-evaluations, rehabilitation, interdisciplinary team member, consultation. Inpatient/Outpatient Mental Health Rotation: PTSD evaluation and treatment, drug and alcohol treatment, inpatient diagnosis, assessment, and treatment, geriatric psychology, adult mental health.

1997-2000  **Therapist**, Counseling Center, Utah State University. Provided individual, couples and group therapy. Supervised and trained peer counselors, provided outreach.

1996-2000  **Therapist**, Psychology Community Clinic, Utah State University. Provided individual, couples, and family psychotherapy.

**Teaching Experience**

1999, 2000  **Instructor**, Introductory Psychology, Utah State University, Logan, UT. Responsible for all aspects of instructing a college course.

1997-1999  **Teaching Assistant**, Introductory Psychology, Utah State University, Logan, UT.

1998-2000  **Guest Lecturer**, Experimental Psychology, Psychology of Gender, Abnormal Psychology, and Play Therapy, Utah State University, Logan, UT.

1998  **Instructor**, Social Psychology, Utah State University, Logan, UT. Responsible for all aspects of instructing a college course.
1993-1995  **Trainer,** The Devereux Foundation - Mapleton Treatment Center, Malvern, Pennsylvania. Provided crisis prevention and intervention training to employees of a residential treatment program for seriously emotionally disturbed adolescents.

**Research Experience**

2002  **Dissertation Research,** Utah State University. Meta-analysis examining characteristics of individuals with binge eating disorder versus those who are obese nonbinge eaters and those with bulimia nervosa. Supervisor: David M. Stein, PhD.

2000  **Research Assistant,** Utah State University. Meta-analysis examining the effects of parental involvement on outcomes of children in early intervention programs. Supervision: Karl White, PhD.

2000  **Research Assistant,** Utah State University. Participated in experimental research on cognitive aspects of running.

1999  **Thesis Research,** Utah State University. Single subject research examining the psychological and physiological effects of consuming chocolate or sugar versus a placebo in individuals who believe they are "addicted" to these substances. Supervisor: David M. Stein, PhD.

1996-1998  **Child Health Psychology,** Utah State University. Part of a research team examining variables related to child health psychology such as asthma, exercise, nutrition and eating disorders. Supervisors: Kevin Masters, PhD. and Gretchen Gimpel, PhD.

1992-1995  **Research Assistant,** The Devereux Foundation, Mapleton Center, Malvern, Pennsylvania. Conducted an outcome study of adolescents in residential treatment; an outcome study involving changes in Rorschach variables; and a study examining adolescents' perception of process and specialty group therapy. Also participated in applied research on development of child behavior rating scales. Supervisors: Pamela Abraham, PhD., Stephen Pfeiffer, PhD.


1990  **Independent Research,** University of Wisconsin-Madison. Conducted experiment on gender roles and nonverbal communication. Supervisor: Susan Rogers, PhD.

**Publications**


**Presentations**


**Honors and Awards**

1999  
Recipient of the Walter R. Borg Scholarship, Utah State University.

1995  
Recipient of the President's Fellowship, Utah State University.

1992  
Phi Beta Kappa, National Honor Society.

1991  
Psi Chi, National Honor Society.

1991  
Phi Kappa Phi, National Honor Society.

**Professional Affiliations and other Positions**

1999 - present  
Student Affiliate, Rocky Mountain Psychological Association.

1998 - present  
Student Affiliate, National Association of School Psychologists.

1996 - present  
Student Affiliate, American Psychological Association.

1996 - 2000  
APA Student Representative at Utah State University

**References**

David Stein, Ph.D., Associate Professor and Department Head, Utah State University, 2810 Old Main Hill, Department of Psychology, Logan, UT 84322 (435) 797-3274

Scott Hill, Ph.D., Olympic Planner, Staff Psychologist, Salt Lake City VA Medical Center, 500 Foothill Blvd., Salt Lake City, UT 84148 (801) 584-5656

Steven Allen, Ph.D. Staff Psychologist, Salt Lake City VA Medical Center, Intern Supervisor, 500 Foothill Blvd., Salt Lake City, UT 84148 (801) 582-1565 x 2190

Gretchen Gimpel, Ph.D., Director of School Psychology Program, Utah State University, 2810 Old Main Hill, Department of Psychology, Logan, Utah 84322 (435) 797-0721