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EXAMINING THE STRUCTURE OF EATING PATHOLOGY THROUGH SCALE CONSTRUCTION

by

Kelsie Terese Forbush

An Abstract

Of a thesis submitted in partial fulfillment
of the requirements for the Doctor of
Philosophy degree in Psychology (Clinical Psychology)
in the Graduate College of
The University of Iowa

December 2011

Thesis Supervisor: Professor Emeritus David Watson

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ABSTRACT

Eating disorders are alarmingly prevalent and potentially lethal. The proper assessment of eating disorder symptoms is therefore crucial for the early identification and treatment of those suffering from these serious illnesses. Current measures of eating disorder symptoms are either very narrow in scope (e.g., assess only one aspect of disordered eating, such as bingeing) and/or have one or more serious limitations, such as inconsistent factor structures and/or poor discriminant validity. Because several of the existing measures of eating disorders were created over 20 years ago, many of these limitations are the direct result of out-dated scale development methods and testing.

The goal of this study was to determine the structure underlying the symptoms of eating disorders and develop a multidimensional measure of eating pathology based on this structure. To accomplish this goal, an initial item pool was developed to assess 20 dimensions of eating pathology. The initial item pool of 160 items was administered to a student sample (*N*=433) and community sample (*N*=407) to determine the preliminary structure of the measure using exploratory and confirmatory factor analyses. The revised measure was then administered to independent samples of psychiatric patients (*N*=190) and students (*N*=227). Exploratory and confirmatory factor analyses revealed a 7-factor structure that showed excellent convergent and discriminant validity. The final measure was also internally consistent (median coefficient alphas ranged from .84-.89) and reliable over a two- to four-week period (*r*'s ranged from .70-.84).

The current study represents one of, perhaps, *the* most comprehensive scale development project ever conducted in the field of eating disorders and is expected to improve future basic and treatment research focused on eating disorders.

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Abstract Approved: _____

Thesis Supervisor

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Title and Department

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Graduate College
The University of Iowa
Iowa City, Iowa

CERTIFICATE OF APPROVAL

PH.D. THESIS

This is to certify that the Ph.D. thesis of

Kelsie Terese Forbush

has been approved by the Examining Committee for the thesis requirement for the Doctor of Philosophy degree in Psychology (Clinical Psychology) at the December 2011 graduation.

Thesis Committee:

David Watson, Thesis Supervisor

Wayne Bowers

Lee Anna Clark

Kristian Markon

Michael O'Hara

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To My Family

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We think of bulimia and anorexia as either a bizarre psychosis or as a quirky little habit, a phase or as a thing that women just do. We forget that it is a violent act, that it bespeaks a profound level of anger toward and fear of self.

Marya Hornbacher
Wasted

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CHAPTER I

INTRODUCTION

Eating disorders are associated with the highest mortality rate of any class of psychiatric disorder (Harris & Barraclough, 1998). The suffering experienced by those with an eating disorder is great, as eating disorders are associated with significant impairments in social adjustment and quality of life, including problems with interpersonal and family relationships and work productivity (Keel & Herzog, 2004; Mitchell, Hatsukami, Eckert, & Pyle, 1985). In fact, eating disorders ranked 4th among the leading causes of burden of disease in terms of years of life lost through death or disability among women aged 15-24 (Mathers, Vos, & Stevenson, 1999). The economic burden of eating disorders often exceeds that observed in other severe mental illnesses. The annual cost of eating disorder treatment is between $3,000-6,000 per individual (Striegel-Moore, Leslie, Petrill, Garvin, & Rosenheck, 2000), which is greater than the cost of treatment for obsessive-compulsive disorder and on par with the annual cost of treatment for schizophrenia (Striegel-Moore, et al., 2000). Thus, efforts to better understand, prevent, and treat these serious disorders represent a major public health priority.

The *Diagnostic and Statistical Manual of Mental Disorders* (APA, 2000), which is the diagnostic and classification system of the American Psychiatric Association, currently recognizes three types of eating disorders: anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified (APA, 2000). Anorexia nervosa is a self-starvation syndrome marked by a refusal to maintain a minimally acceptable body weight. Individuals with anorexia nervosa are intensely afraid of gaining weight, experience a significant disturbance in the way they perceive their body weight/shape, and experience menstrual disturbance (i.e., amenorrhea). There are two subtypes of anorexia nervosa: restricting type and binge-eating/purging type. Bulimia nervosa is characterized by body image disturbance and recurrent episodes of binge eating and

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inappropriate compensatory behavior(s) (e.g., fasting, self-induced vomiting, excessive exercise, diuretics use, and laxative use), which occur in the absence of low weight. There are two subtypes of bulimia: purging type (characterized by the presence of self-induced vomiting, laxative use, diuretic use, and/or enema use) and non-purging type (characterized by the presence of inappropriate compensatory behaviors such as excessive exercise and/or fasting). Finally, eating disorders not otherwise specified (EDNOS), which represents the most common eating disorder diagnosis, consists of sub-threshold and atypical eating disorder symptoms that meet criteria for clinical significance. For example, individuals who engage in recurrent episodes of binge eating, in the absence of the regular use of inappropriate compensatory behaviors, are diagnosed with binge eating disorder, which is currently recognized in the *DSM* as a specific example of an EDNOS.

Issues in the Assessment and Diagnosis of Eating Disorders

The current *DSM* eating disorder classification scheme has numerous advantages (Gordon, Denoma, & Joiner, 2005) but also significant limitations. As noted by Bulik and et al. (2007), "the current tripartite classification system represents a series of cumulative historical accidents which, rather than optimizing and incorporating extant empirical observations, perpetuates clinical opinion and the biases inherent therein. In part, this reflects the uncomfortable truth that sufficient data of the appropriate type do not exist to inform the diagnostic criteria for eating disorders fully, yet certain troubling facts underscore the importance of critically evaluating and revising our diagnostic approach to eating disorders" (p. S52). For example, the current diagnostic and classification system for eating disorders is limited by (a) frequent diagnostic cross-over among eating disorder classes and subtypes (Eddy, et al., 2002; Herzog, Keller, & Lavori, 1988; Tozzi, et al., 2005), (b) considerable heterogeneity within eating disorder subtypes and symptom clusters (Steiger & Bruce, 2004; Westen & Harnden-Fischer, 2001), (c) significant

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symptom overlap between the eating disorders (APA, 2000; Wonderlich, Joiner, Keel, Williamson, & Crosby, 2007), and (d) exceptionally high rates of EDNOS in patient and community samples (Fairburn & Bohn, 2005; Machado, Machado, Gonçalves, & Hoek, 2007; Thomas, Vartanian, & Brownell, 2009). Moreover, efforts to refine the current eating disorder classification system are hampered by a lack of psychometrically sound assessment instruments that were created explicitly to elucidate the underlying structure of eating disorders.

For example, to determine the construct validity and clinical utility of a potential new eating disorder diagnosis, which is now provisionally recognized as binge eating disorder, the *DSM-IV* Work Group on Eating Disorders developed the Questionnaire on Eating and Weight Patterns, a self-report measure of eating disorder symptoms associated with bulimia nervosa and binge eating disorder (Spitzer, et al., 1992). Based on the information reported in their study, it appeared that the authors did not carry out factor analyses or other structural analyses of their measure prior to its administration (the authors noted only that the questionnaire was "pilot tested and revised several times before being administered in the study," p. 194). To evaluate the construct validity of binge eating disorder, the authors examined the prevalence and odds ratios for patterns of episodic overeating (including binge eating), frequent weight fluctuations, and obesity, and found that these variables were significantly associated with each other. They also examined the internal consistency of the total set of binge eating disorder symptoms and the correlation of each individual binge eating disorder symptom with the total score of all binge eating disorder symptoms. The results of these analyses indicated that binge eating disorder symptoms were internally consistent and that each binge eating disorder symptom was significantly correlated with the total symptom score. Based on these results, the authors recommended binge eating disorder for inclusion in the *DSM-IV* as an official category or as a disorder warranting further study.

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Although Spitzer et al. (1992) provided excellent evidence indicating that the diagnosis of binge eating disorder is internally consistent and is significantly associated with obesity and frequent weight fluctuations, studies such as this limit our understanding of the structure of eating disorders by failing to examine convergent and discriminant validity. *Convergent validity* is the extent to which a measure correlates with other measures of the same construct, whereas *discriminant validity* is established when a measure does not correlate with measures of other constructs that are theoretically (or empirically) distinct (Simms & Watson, 2007). Although the authors used item-total correlations to assess whether symptoms of binge eating disorder were significantly correlated with each other, these analyses were not able to provide information regarding the convergence of their criteria for binge eating disorder with other measures of binge eating, such as the binge eating items on the Eating Disorder Examination (EDE) (Fairburn & Beglin, 2008) or the Binge Eating Scale (BES) (Gormally, Black, Daston, & Rardin, 1982). Their study did not examine the correlation of symptoms across eating disorder diagnoses and subtypes. In other words, the authors did not conduct structural analyses to evaluate whether the symptoms of binge eating disorder, bulimia nervosa, and anorexia nervosa loaded on similar or distinct factors using factor analysis or another multivariate technique. Finally, Spitzer et al. (1992) did not examine the correlations of binge eating disorder with other psychological disorders from which it is posited to be distinct. By failing to examine these crucial aspects of construct validity, the authors impeded the establishment of discriminant validity and the differential diagnosis and assessment of binge eating disorder (particularly for discriminating the non-purging subtype of bulimia nervosa from binge eating disorder).

Advantages of Developing a Replicable Empirical Structure of Eating Pathology

Developing a replicable empirical structure of eating pathology could improve the classification and assessment of eating disorders in several ways. First, structural

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analyses of eating disorder symptoms would allow for the identification of general dimensions of disordered eating that are shared by all eating disorders, which could result in an improved understanding of the core psychopathology of eating disorders. For example, over-concern with body shape and weight is a symptom both of anorexia nervosa and bulimia nervosa, but *not* binge eating disorder. The main reason that over-concern with shape was not included as a symptom of binge eating disorder was to "distinguish bulimia nervosa from binge eating disorder, which may occur independently of weight concerns" (Garfinkel, 1992, p. 377). This rationale makes strong theoretical sense; however, it is unclear whether this symptom *empirically* distinguishes those with bulimia nervosa from those with binge eating disorder. It is therefore possible that structural analyses of eating disorder symptoms would reveal over-concern with weight and shape as a general dimension that unites all eating disorders. If this is true, then over-concern with shape and weight should display strong convergent validity (i.e., strong positive correlations) with all eating disorder symptoms and symptom dimensions.

Second, structural analyses would allow for the identification of unique symptom dimensions that distinguish between eating disorder diagnoses. Identifying unique components of eating disorders is critically important for improving differential diagnosis and assessment. In the current eating disorders diagnostic system, the only unique symptoms that differentiate between anorexia nervosa and bulimia nervosa are: (a) the presence of low weight, (b) a morbid fear of becoming fat or gaining weight, and (c) amenorrhea. However, it is important to note that although 'morbid fear of fatness' is unique to anorexia nervosa (according to the *DSM*), substantial numbers of individuals with bulimia nervosa endorse a fear of gaining weight or becoming "fat" (Garfinkel, 1992; Martin, Williamson, & Thaw, 2000); furthermore, fear of fatness is strongly correlated with over-concern with shape and weight (P. J. Cooper, Taylor, Cooper, & Fairburn, 1987). Martin, Williamson, and Thaw (2000) also found that fear of fatness was actually *highest* in individuals with bulimia nervosa compared to those with anorexia

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nervosa or binge eating disorder. These results call into question (a) the validity and clinical utility of including 'morbid fear of fatness' in addition to 'over-concern with weight and shape' in the diagnostic criteria for anorexia nervosa and (b) the ability of 'morbid fear of fatness' to distinguish anorexia nervosa from other forms of eating pathology. Structural analyses would allow for an empirical examination of whether a particular symptom dimension shows discriminant validity from other symptom dimensions as well as specificity in relation to its target disorder. If a particular symptom dimension is specific to anorexia nervosa, for example, then it should display stronger associations with other indicators of anorexia nervosa than with indicators of bulimia nervosa or binge eating disorder.

Third, structural analyses can enhance differential diagnosis and assessment by allowing researchers to focus on specific eating disorder symptom clusters, while deemphasizing nonspecific manifestations of psychopathology (Watson, 2009). For example, negative affect (i.e., the propensity to experience negative emotions and mood states) is elevated across a wide range of psychiatric illnesses (Mineka, Watson, & Clark, 1998; Ormel, Rosmalen, & Farmer, 2004). The current study aims to deemphasize negative affect in the items of the proposed measure in two ways: First, whenever possible, I will avoid writing items with stems such as "I worry about …" or "I am afraid of …" in order to avoid building a substantial amount of negative affect into the new questionnaire. Second, I will administer measures of negative affect, anxiety, and depression to ensure that nonspecific manifestations of psychopathology are deemphasized in the final measure.

Fourth, structural analyses are ideal for building a hierarchical, multi-level model of eating disorders. For example, factor analysis will allow me to examine how eating disorder symptoms statistically cluster to form syndromes. Surprisingly, no prior research has used this methodology in order to refine eating disorder diagnoses, despite the fact that this method has proven quite successful for examining the structure of other

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psychological constructs, such as depression and anxiety (Watson, et al., 2008; Watson, et al., 2007) and normal and abnormal personality traits (Markon, Krueger, & Watson, 2005). Moreover, examining the structure of eating disorder symptoms through scale construction is advantageous from a practical standpoint. For example, examining eating disorder symptoms (rather than dichotomous diagnoses): (a) bypasses the problem of diagnostic heterogeneity that is associated with disorder-based analyses, (b) is relevant to EDNOS (which currently represents the most common eating disorder diagnosis), and (c) renders low-base rate disorders, such as anorexia nervosa, less problematic to analyze.

Finally, structural analyses are more likely to inform the nosology of eating disorders when they use item pools that are created to assess the domain of eating disorders as comprehensively as possible, rather than when they use pre-existing item pools that were not developed to examine the underlying structure of eating pathology. Thus, the current project aims to refine the internal structure of eating pathology through the development of a comprehensive assessment of the symptoms and dimensions that constitute eating disorders. To ensure that the measure assesses the full range of eating disorder dimensions' severity, items will be written across a range of difficulty (i.e., from relatively common eating behaviors to extreme eating behaviors, such as self-induced vomiting).

The Structure of Eating Disorder Symptoms

Very few studies have examined the underlying factor analytic structure of eating disorder symptoms. In fact, a significant limitation of extant assessments of eating pathology is that most were either (a) developed rationally and were not submitted to factor analytic procedures or (b) examined using structural analyses that were based on extremely small samples that increase the standard errors for variables, creating inconsistent/unreplicable factor structures.

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The Eating Attitudes Test

The Eating Attitudes Test (EAT) (Garner & Garfinkel, 1979) has been called "the most widely used of all the self-report eating disorder instruments" (Mintz & O'Halloran, 2000, p. 490). The EAT was developed in the late 1970's as a 40-item self-report instrument to be used in the general population to screen for the presence of pathological eating attitudes and behaviors related to anorexia nervosa. In order to determine the measure's factor structure, the EAT-40 was administered to a sample of 33 female patients with anorexia nervosa and 59 normal controls. The authors found evidence for seven factors, labeled: Food Preoccupation, Body Dissatisfaction, Vomiting and Laxative Use, Dieting, Slow Eating, Clandestine Eating, and Perceived Social Pressure to Gain Weight. However, very few details were provided regarding the method of factor analysis (although the authors reported using varimax rotation) and factor loadings were not reported in the paper. Thus, it is unclear which items loaded on which factors. Moreover, it is important to note that Garner and Garfinkle's (1979) sample size was too small to yield trustworthy results (MacCallum, Widaman, Zhang, & Hong, 1999).

Soon after its development, researchers sought to refine the EAT-40 in response to concerns raised about the measure's psychometric properties (including factor structure). Thus, Garner, Olmsted, Bohr, & Garfinkel (1982) carried out an exploratory factor analysis of EAT-40 items in 160 female patients with anorexia nervosa and 140 female university students. The authors found evidence for three oblique factors, which accounted for approximately 40% of the total variance, labeled: Dieting, Bulimia and Food Preoccupation, and Oral Control (items relating to self-control over eating and perceived social pressure from others to gain weight). Fourteen items did not load on any factor, which resulted in a revised 26-item version of the EAT.

Currently, the EAT-26 is an extremely popular instrument that is used both to screen for eating disorders and for use in research as a continuous measure of eating pathology. In addition to the EAT-26, several shorter versions of the EAT also exist

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(Engelsen & Hagtvet, 1999; Lavik, Clausen, & Pedersen, 1991). The majority of these short-versions were developed due to issues related to the unreliability of the factor structure of the original EAT-40 and EAT-26. In fact, one lingering issue with respect to the EAT is that there is no consistent factor structure. For example, previous exploratory factor analyses have supported: one- (Engelsen & Hagtvet, 1999) three- (Lavik, et al., 1991; Lee & Lee, 2000), four- (Elal, Altug, Slade, & Tekan, 2000; Koslowsky, Scheinberg, Bleich, Mark, & et al., 1992; Mumford, Whitehouse, & Choudry, 1992; Wells, Coope, Gabb, & Pears, 1985), five- (Eisler & Szmukler, 1985), six- (Doninger, Enders, & Burnett, 2005; C. S. Johnson & Bedford, 2004; Smead & Richert, 1990), and ten-factor solutions (Lundholm & Wolins, 1987).

Although there is no clear, replicable structure of the EAT, this is not necessarily problematic because the EAT is typically used as a unitary measure of eating pathology. In other words, in many cases, researchers use the EAT total score and not its factors/subscales. This approach makes sense given that the EAT was not developed for use as a multi-dimensional measure of eating pathology. On the other hand, despite the fact that the EAT can be used appropriately as a unitary measure, it is relatively narrow in its coverage of eating disorder behaviors. For example, the EAT is geared mainly towards restrictive eating behaviors that are frequently observed in individuals with anorexia nervosa and, as a result, it does not represent the full range of eating pathology. Thus, the EAT cannot be used to examine the structure of bulimic behaviors and cognitions.

The Eating Disorders Inventory

The Eating Disorders Inventory (Garner, Olmstead, & Polivy, 1983) is another widely used measure of eating pathology that was originally designed to measure cognitive and behavioral symptoms *both* of anorexia nervosa and bulimia nervosa. Thus, the EDI is a much more comprehensive eating disorder measure compared to the EAT. The EDI and EDI-2 include eight subscales: Drive for Thinness, Bulimia, Body

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Dissatisfaction, Ineffectiveness, Perfectionism, Interpersonal Distrust, Interoceptive Awareness, and Maturity Fears.

Several studies have examined the factor structure of this measure; however, most of these studies have not supported the original eight-factor model. In fact, there is a very wide range of factor structures across studies, with prior research supporting two (Williamson, Barker, Bertman, & Gleaves, 1995), three (Welch, Hall, & Walkey, 1988), five, (Eklund, Paavonen, & Almqvist, 2005; Schoemaker, Verbraak, Breteler, & van der Staak, 1997), six (Klemchuk, Hutchinson, & Frank, 1990), seven (Bennett & Stevens, 1997), eight (Eberenz & Gleaves, 1994; Lee, Lee, Leung, & Yu, 1997; Welch, et al., 1988; Wicks, Siegert, & Walkey, 2004), and fourteen (Limbert, 2004) factors. Finally, some factor analytic studies excluded items from three of the EDI subscales due to their lowered reliabilities or low correlations with eating-disorder behaviors and generally found support for a five- or six- factor model (Joiner & Heatherton, 1998; Limbert, 2004; McCarthy, Simmons, Smith, Tomlinson, & Hill, 2002). However, McCarthy et al. (2002) recently examined the stability of the five-factor structure across a three-year period in adolescent females recruited from public schools using confirmatory factor analysis and found that the overall model fit was only moderate in the first two years and poor in the final year. The authors examined the Lagrange multiplier test (which provides a measure of model misspecification), which indicated that the moderate-to-poor model fit was attributable to a number of items that had high loadings on more than one factor, indicating that the EDI possesses sub-optimal discriminant validity.

A reason that the factor structure of the EDI has not replicated well within and across samples may be due to the way in which the measure was created (see McCarthy, 2002 for a discussion of this issue). For example, the developers of the EDI retained items in a subscale if the items were able to differentiate significantly between individuals with anorexia nervosa and female university students and if the items on a particular subscale were more highly correlated with the total subscale score to which

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they were purported to belong compared to other subscales. Although the logic behind this approach makes intuitive sense, their method of item elimination may have contributed inadvertently to poor factor structure replicability due to the fact that they retained items on a subscale with very low item-total correlations if they deemed the item "conceptually important" (Garner, et al., 1983, p.20). For example, on the Interoceptive Awareness subscale the authors retained the item "I feel bloated after eating a small meal," which had an item-total correlation of 0.22 in women with anorexia nervosa and an item-total correlation of only 0.06 in college women. However, these findings also illustrate why factor analysis should not be used in isolation from other statistical methods. Extreme, low base rate items often do not do well in factor analysis due to their low frequency, yet they may still be good measures of the extreme end of the dimension.

Moreover, item-total correlations are not able to provide information regarding the correlation of items across subscales. Thus, this method of scale construction often results in items on one subscale being more strongly correlated with items on another subscale due to the lack of attention paid to item-factor specificity. If this measure had been subjected to factor analysis in the initial validation stages, the authors could have eliminated items that loaded weakly on a factor (below |0.30| in principal factor analysis or below |0.40| in principal components analysis) and/or items that loaded moderately to strongly on more than one factor (above |0.40|), as this would help ensure that the measure had strong convergent and discriminant validity. Of course, factor analysis is only one of many statistical tools that should be used in the scale construction process; however, using factor analysis in conjunction with other appropriate statistical methods likely would have led to a measure with a consistent factor structure.

Finally, the EDI was recently revised and updated. The EDI-3 (Garner, 2004) contains twelve subscales that were designed to measure the phenomenology, severity, and clinical course of eating disorders in women. Surprisingly, the authors continued to use item-total scale correlations of *approximately* 0.40 or greater in eating disorder

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samples as the basis for retaining items, despite the now widespread use and availability of exploratory factor analysis. Although there are currently no research articles validating the factor structure of the EDI-3, exploratory factor analyses in the EDI-3 manual revealed a three-factor structure. However, subsequent confirmatory factor analyses did not support this structure, as indicated by unacceptable levels of goodness-of-fit. On the basis of these data, the authors concluded, "the primary consideration in constructing the EDI-3 scales was clinical relevance" (Garner, 2004, p. 137).

Clinical relevance is extremely important. However, clinical relevance in the absence of validity is problematic because it sacrifices clinical utility and slows scientific progress. The current project aims to create a measure that is both clinically and scientifically useful by carefully considering clinical relevance beginning with the creation of the initial item pool. For example, the goal of this project will be to create an initial item pool that is overly inclusive and representative of the major theories and extant models of eating disorders. This will ensure that important clinical concepts are not omitted inadvertently from the final scale. However, another major goal of this project is to ensure that the new measure is valid and structurally sound – otherwise it will have little scientific usefulness. In order to accomplish this goal, items that are poor markers of a subscale or that load strongly on more than one subscale will be omitted. Items that represent the extreme end of a subscale will be retained, even if they do not perform well in factor analysis, because it will be important to cover the full range of each construct dimension.

The Bulimia Test and Bulimia Test-Revised

The Bulimia Test (BULIT) is a 32-item questionnaire that was developed to screen for bulimia nervosa in the general population (M. C. Smith & Thelen, 1984). The initial item pool included 75 items, which were administered to 18 women with bulimia nervosa and 119 female control participants. Items were eliminated from the final measure if they failed to distinguish between groups. However, four items that did not

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distinguish between groups were retained (resulting in a 36-item version) in order to provide information about laxative and diuretic use and dysmenorrhea. These four items were not included in the scale's total score because they have poor predictive ability, which the authors attribute to the low base rates of these behaviors in the general population. Finally, five items that showed correlations of 0.80 or above with "better discriminating items" (M. C. Smith & Thelen, 1984, p. 865) were eliminated from the final measure in order to shorten the scale.

The authors carried out an exploratory factor analysis (with oblique rotation) of the final 36-item version of the measure (which included the four items that inquired about laxative and diuretic use and dysmenorrhea) in two independent samples. The first sample included 22 women with bulimia nervosa, 14 women with anorexia nervosa, and 99 female control participants. The second sample included 22 women with bulimia nervosa, 13 women with sub-threshold bulimia nervosa, and 34 female control participants. Participants within each sample were combined for the purposes of statistical analysis. Results of both principal factor analyses suggested there were seven factors when using eigenvalues greater than 1.0 as the basis for deciding how many factors to extract. The authors, however, decided that a five-factor model was the optimal factor solution on the basis of an additional factor analysis of the first sample using the 32-item version of the BULIT. However, it is important to note that Factors 4 and 5 contained only two items each, indicating that these factors are likely under-defined (for a discussion of identification in factor analysis, see Brown, 2006b). It is possible that a four-factor solution might have been a better model to select, but it appears that the authors did not examine the interpretability of a four-factor solution compared to a five-factor solution.

The BULIT was revised in 1993 in order to reflect the updated criteria for bulimia nervosa in the *DSM-III-R* (Thelen, Farmer, Wonderlich, & Smith, 1991). The revised BULIT-R correlates 0.99 with the original scale, indicating that the two measures are

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virtually identical in their content (Thelen, et al., 1991). Exploratory factor analyses of the BULIT or BULIT-R have revealed four-factors in university women (Wertheim, 1989) and five-factors in individuals with eating concerns and in middle-to-late adolescent women (Stein & Brinza, 1989; Wertheim, 1989). Boerner, Spillane, Anderson, & Smith (2004) also used confirmatory factor analysis to examine the structure of the BULIT-R and found that a four-factor model fit the data very well in both men and women. However, using confirmatory factor analyses, McCarthy et al. (2002) found a one-factor model fit the data very well in a sample of adolescent females and that this one-factor model remained stable over a three-year period.

Although no prior study has used confirmatory factor analysis to compare various models to one another in order to determine the optimal factor-solution for the BULIT-R, this does not represent a serious concern in most contexts. In other words, researchers generally examine the measure's total score, rather than its subscales, which is consistent with its recommended use as a screening measure for bulimia nervosa. On the other hand, because the BULIT-R is focused on the assessment of bulimia nervosa and because it has only a few items that assess inappropriate compensatory behaviors, it cannot be used to examine the structure of eating disorders characterized mainly by dietary restriction and/or inappropriate compensatory behaviors.

The Dutch Eating Behavior Questionnaire

The Dutch Eating Behavior Questionnaire (DEBQ) (van Strien, Frijters, Bergers, & Defares, 1986) is a 33-item English-language self-report questionnaire that assesses restrained, emotional, and external eating. This questionnaire was developed in order to examine restrained and unrestrained eating behaviors. The initial pool of 100 items was selected from existing measures of eating pathology, including: the Eating Patterns Questionnaire (Wollersheim, 1970), the Eating Behavior Inventory (O'Neil, et al., 1979), and the Fragenbogen fur Latente Adipositas (Pudel, Metzdorff, & Oetting, 1975), which was translated from Dutch to English. The scale was administered to several samples

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(including male and female, normal weight, and obese participants) in its initial validation. The measure was also factor analyzed (beginning with the pilot study) in order to determine which items to eliminate or retain. As a result of the scale development process, the DEBQ has equivalent psychometric properties and factor structure in men and women and across the full range of weight categories. In addition, subsequent exploratory and confirmatory factor analyses generally have supported the original three-factor structure (Wardle, 1987).

Although the DEBQ is not a comprehensive measure of eating pathology (for example, it does not assess body image disturbance, inappropriate compensatory behaviors, or drive for thinness), analyses of the DEBQ suggest that: (a) there are at least three sub-factors of eating pathology and (b) it is quite possible to develop a replicable structural model of eating pathology when up-to-date psychometric methods and testing are used. Finally, it is possible that the factor structure in men and women is empirically different and that constraining it to be the same may have created an invalid structure and measure. In the current project, the structure will be tested in both sexes separately to determine if the eating disorder dimensions are equivalent in men and women or if different questionnaires should be developed for each sex.

The Eating Disorder Examination and
Eating Disorder Examination Questionnaire

The Eating Disorder Examination (EDE) (Z. Cooper, Cooper, & Fairburn, 1989; Fairburn, Cooper, & O'Connor, 2008) is a structured interview that is considered by many in the eating disorders field to represent the "gold-standard" of eating disorders assessment. The EDE is designed to assess eating disorder behaviors and attitudes and contains four rationally derived subscales: Restraint, Eating Concerns, Shape Concerns, and Weight Concerns. The EDE is also able to provide diagnostic information for anorexia nervosa, bulimia nervosa, binge eating disorder, and other forms of EDNOS. The EDE has also been adapted for use as a 32-item questionnaire (EDE-Q) (Fairburn &

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Beglin, 2008). Although the EDE has recently been revised to include additional subscales, such as "Night Eating," there currently are no factor analytic studies of the new version of the instrument.

Mannucci et al. (1997) conducted an exploratory factor analysis of the EDE in a sample of obese men and women who did not meet criteria for binge eating disorder and found support for a two-factor model. The first factor replicated the original EDE Restraint Subscale and the remaining three EDE subscales comprised the second factor. Hrabosky et al. (2008) examined the factor structure of the EDE-Q in a sample of obese men and women who were preparing to undergo gastric bypass surgery and found evidence for four factors, labeled Eating Disturbance, Appearance Concern, Dietary Restraint, and Shape/Weight Overvaluation. However, the authors' Shape/Weight Overvaluation factor was represented by only two indicators, which is most likely a "trivial" factor/methodological artifact that arose from the inclusion of two very similarly worded items (viz., "Has your weight influenced how you think about (judge) yourself as a person?" and "Has your shape influenced how you think about (judge) yourself as a person?"). Peterson et al. (2007) examined the factor structure of the EDE-Q in women with bulimic symptoms and found evidence supporting a four-factor model that was similar to Hrabosky et al.'s (including the existence of the trivial 2-item Shape/Weight Overvaluation factor). On the basis of these three studies, it would appear that the EDE-Q contains two meaningful factors in women with bulimic symptoms and two or three meaningful factors in obese individuals.

Byrne, Allen, Lampard, Dove, & Fursland (in press) used confirmatory factor analyses in order to compare the fit of a one-factor, two-factor, three-factor, four-factor, and brief one-factor model (that contained eight items) in 158 women referred to an outpatient eating disorder service, 329 women from the community, and 170 overweight and obese women enrolled in a cognitive-behavioral obesity treatment program.

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However, Bryne et al. (in press) found that only the brief one-factor model exhibited a good fit to the data.

The different factor structures found for the EDE and EDE-Q are likely attributable to the method of scale construction. Specifically, the original EDE subscales were created by rational grouping of items together on the basis of the similarity of their content (Z. Cooper, et al., 1989). This method of scale construction resulted in items on the Weight Concern subscale exhibiting higher average correlations with the Shape Concerns subscale total than with the Weight Concern subscale total and the items on the Shape Concern subscale exhibiting higher average correlations with the Weight Concerns subscale total than with the Shape Concerns subscale total. In addition, the "sensitivity to weight gain" item exhibited a low correlation with the subscale to which it was purported to belong and a moderately high correlation with the Restraint and Shape Concerns subscales.

The authors retained the "sensitivity to weight gain" item because they noted that it is "an important one from a descriptive point of view and one which clearly differentiates patients from controls" (Z. Cooper, et al., 1989, p. 809). They went on to say that "It would therefore seem inappropriate to drop it from the instrument altogether and since the subscales were derived on rational rather than empirical grounds, it would also be inappropriate to move it to another subscale. It therefore seems sensible to retain the item within the full EDE, but drop it from the 'weight concerns' subscale. To do so raises the subscale alpha coefficient to 0.68 and the mean item total correlation to 0.44" (p. 809). The authors carried out an identical procedure for the 'pursuit of thinness' item, which also had a low correlation with its own subscale and high correlations with the Restraint, Eating Concerns, and Weight Concerns subscale totals.

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The Three Factor Eating Questionnaire and

Eating Inventory

The Three Factor Eating Questionnaire (TFEQ) currently also called the Eating Inventory (Stunkard & Messick, 1985), was designed to improve upon the Restraint scale (Herman & Polivy, 1975), which was created to measure chronic dieting behaviors. The Restraint Scale was developed rationally and the construct validity of the instrument has been criticized – particularly in obesity research (Ruderman, 1983; Stunkard & Messick, 1985). The TFEQ was created by selecting items from existing measures of eating disorders in order to tap several facets of eating pathology. The measures that were used to create the TFEQ included the Restraint Scale (Herman & Polivy, 1975) and Pudel's Latent Obesity Questionnaire (Pudel, et al., 1975). In addition, the authors wrote 17 new items based on their clinical experience. The measure currently consists of three subscales: Behavioral Restraint, Lability in Behavior and Weight, and Hunger.

The authors of the TFEQ conducted an exploratory factor analysis of the preliminary item pool in 97 men and 123 women recruited to represent normal, restrained, and unrestrained eaters. The initial factor analysis revealed three factors, reflecting: (a) behavioral restraint involving the cognitive control of eating, (b) lability in behavior and weight, and (c) hunger. To determine whether or not their factor structure replicated across weight categories, the authors conducted another factor analysis separately in the community recruited sample (n=80), dieters (n=72), and unrestrained (n=62) eaters. Factor analyses indicated that the community recruited sample and dieters produced three factors (although the factor structures were not identical between groups). The sample of unrestrained eaters yielded four factors, three of which matched the combined (i.e., full) sample. The additional factor consisted of items such as: often skipping meals, frequently leaving something behind on one's plate in a restaurant, stopping eating when full, and not eating without being really hungry. The authors labeled this additional factor "Indifference to Eating." Based on the results of their initial

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factor analysis, the authors wrote new items in order to heighten the distinctiveness of each factor in relation to the other two. The authors carried out an additional exploratory factor analysis in an independent sample of 98 individuals (representing both dieters and unrestrained eaters). Similar to the results of the preliminary item pool, the authors found evidence for three factors in the dieting sample and four factors in the unrestrained eaters sample.

Subsequent studies have provided mixed support for the original TFEQ factor structure. Hylund et al (1989) found three factors in a combined sample of 133 undergraduate students, 67 students enrolled in a catering course, and 27 individuals enrolled in Weight Watchers. The first factor was nearly identical to that of Stunkard and Messick's (1985) first factor. However, their second factor was comprised of a combination of items from Factor 2 (Lability in Behavior and Weight) and Factor 3 (Hunger) and contained items that related to: (a) taste (e.g., "Sometimes things just taste so good that I keep on eating even when I am no longer hungry"), (b) social eating (e.g., "I usually eat too much at social occasions, like parties and picnics"), and (c) hunger (e.g., "I am usually so hungry that I eat more than three times a day"). Hylund et al.'s third factor consisted of three items that measured eating in response to dysphoric mood states and was labeled Emotional Eating. Other studies that have focused on replicating the Restraint factor have found that it can be split into two factors (Allison, Kalinsky, & Gorman, 1992; Westenhoefer, 1991). However, Gorman, Allison, and Primavera noted (1993) that the two restraint factors were highly correlated and appeared to be associated with differential base rates. To determine the effect that item prevalence had on the structure of the Restraint subscale, Gorman et al. (1993) examined the data using multidimensional scaling and item response theory. Their analyses revealed a bipolar one-factor model with behavioral restraint items loading on one end of the dimension and cognitive restraint items at the other.

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Multifactorial Assessment of Eating Disorder Symptoms

Anderson, Williamson, Duchmann, Gleaves, & Barbin (1999) created the Multifactorial Assessment of Eating Disorder Symptoms (MAEDS) in order to provide a brief self-report inventory that could evaluate treatment outcome for anorexia nervosa and bulimia nervosa. The authors reviewed the relevant research literature (including the *DSM-IV*, treatment outcome studies, and factor analytic studies of eating disorder symptoms), which suggested six important symptom domains, including: binge eating, purging behavior, restrictive eating, fear of fatness, negative affect, and denial and resistance to treatment. The authors wrote fifteen questions for each of the six symptom domains for a total of 90 questions. The questions were then administered to 295 female undergraduate students and 94 female inpatients or outpatients diagnosed with an eating disorder. The authors conducted a factor analysis of the combined sample of students and patients using principal components analysis (with orthogonal varimax rotation) and found evidence for six factors. The authors also refined the questionnaire by eliminating items that did not load above |0.40| on a factor or that loaded |0.40| or greater on more than one factor. The resulting factors were labeled: Depression, Binge Eating, Purgative Behavior, Fear of Fatness, Restrictive Eating, and Avoidance of Forbidden Foods.

The final 56-item version of the MAEDS was administered to new sample of 68 female undergraduates who did not have a diagnosis of an eating disorder, 178 female undergraduates who were not screened for eating disorders, and 50 women diagnosed with either bulimia nervosa (n=3) or EDNOS (n=47). Exploratory factor analysis indicated that the factor structure of the final version of the MAEDS was identical to the six-factor solution described above.

Although the MAEDS has revealed a 6-factor structure in two samples (see Anderson, et al., 1999), no subsequent studies have tested the stability of the factor structure in men or in individuals of different weight categories.

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DSM-based Questionnaires

Existing *DSM*-based self-report measures of anorexia nervosa and bulimia nervosa usually only inquire about each symptom once (Kutlesic, Williamson, Gleaves, Barbin, & Murphy-Eberenz, 1998; Mintz, O'Halloran, Mulholland, & Schneider, 1997; Stice, Telch, & Rizvi, 2000). This makes it impossible to conduct meaningful structural analyses of *DSM* eating disorder symptoms because one cannot model a factor or latent variable with a *single* observed variable. In fact, most experts agree that a latent variable cannot be identified with less than three observed indicators (Brown, 2006b). One potential way to circumvent this issue would be to administer multiple eating disorder questionnaires that were designed to assess *DSM*-defined eating disorders. However, current *DSM*-based eating disorder questionnaires measure *DSM*-defined symptoms so closely that items corresponding to each symptom are redundant across questionnaires, which is problematic when carrying out statistical analyses. Obviously it is very important to use the language contained in the *DSM* to ensure the resulting measure is actually measuring the construct of interest. However, the current project is designed to balance these seemingly competing goals by writing *multiple* items for each *DSM* eating disorder symptom, while also taking care not to write redundant items. This approach to scale construction will allow me to carry out structural analyses of *DSM*-defined eating disorder symptoms (as well as a full-range of disordered eating behaviors and attitudes that are not included in the current diagnostic nomenclature). These analyses could prove invaluable to the eating disorder field, as we must first define and understand a construct before studying its etiology.

Summary

Based on the aforementioned literature, what are the replicable dimensions of eating disorders, if any? Previous factor analyses appear to indicate that: (a) body image dissatisfaction, a morbid fear of fatness, and/or drive for thinness (EDI), (b) binge eating, (c) purging, and (d) dietary restraint (EDE and MAEDS) have emerged across all three

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multidimensional eating disorder measures (i.e., the EDE, EDI, and MAEDS), indicating that these behaviors may represent the most important dimensions of eating disorders. This hypothesis is supported by a factor analysis of the Interview for the Diagnosis of Eating Disorders – IV, which found a three-factor model of *DSM-IV* eating disorders, which included Binge Eating, Fear of Fatness/Compensatory Behaviors, and Drive for Thinness (Williamson, et al., 2002).

However, other measures of eating pathology that have focused more specifically on binge eating have found a greater differentiation of binge eating behaviors, suggesting a possible hierarchical structure of eating pathology symptomatology. For example, factor analyses of the DEBQ or TFEQ have found factors that include binge eating in response to: (a) external stimuli and (b) internal perceptions of hunger (i.e., satiety). These results indicate that future structural analyses of eating pathology should include a full range of binge eating items in order to examine the possibility of various sub-types of binge eating. Finally, food avoidance (including avoidance of eating in certain social situations or avoiding eating in front of others due to embarrassment) has emerged in factor analyses of the EAT, EDE, and MAEDS, and appears to be a replicable construct that should be included within a structural model of eating pathology.

Importance of Theory in the Structure of Eating Pathology

Given the number of existing eating disorder measures, it appears that an ideal approach to examining the internal structure of eating pathology would be to administer multiple measures of eating disorder symptoms. However, there are two problems with such an approach: First, because some aspects of eating pathology are likely over- or under- represented, depending on which eating disorder measure is used, a factor analysis of multiple extant measures may inadvertently omit some important factors or include extra factors that are defined by trivially redundant variables.

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Second, because existing measures of eating pathology were not specifically created to examine the underlying structure of eating pathology, it is highly doubtful that the items included in an extant measure (or combination of measures) will provide a representative sampling of the entire domain of eating pathology. For example, the Yale-Brown-Cornell Eating Disorder Scale (YBCEDS) was designed to measure *eating disorder-related obsessions, preoccupations, and rituals* (Mazure, Halmi, Sunday, Romano, & Einhorn, 1994), but is not commonly used in the literature, most likely because it assesses a very specific aspect of eating pathology. Moreover, eating disorder obsessions and rituals are not represented with sufficient items for a factor to emerge in more commonly used measures of eating disorders, such as the EAT. A possible reason that other measures have not included eating disorder preoccupations and rituals is because these concepts are not central to the target domain of interest (which is focused on the psychological and behavioral symptoms of eating disorders).

Although food and eating rituals may be less centrally related to my target construct, I believe they are nevertheless important to include in the initial item pool. This is because it is essential to err on the side of over-inclusiveness, to ensure the initial item pool is as comprehensive as possible so that important psychological and behavioral symptoms of eating disorders are not omitted from the final scale. As recommended by Clark and Watson (1995), one's item pool should be broader and more comprehensive than one's target construct. In addition, an experimental study in men has shown that food hoarding and other food rituals emerge when previously healthy individuals starve themselves to the point of becoming significantly underweight (Keys, 1950); thus, food rituals and food hoarding may be important markers of physical health in individuals with anorexia nervosa and, therefore, should be included in my initial item pool.

There are also some important theoretical constructs that are not represented in any current measure of eating pathology. For example, Dialectical Behavior Therapy (DBT) has recently been adapted for treating individuals with binge eating disorder and

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bulimia nervosa (Safer, Telch, & Chen, 2009). One of the main targets of DBT for bulimic syndromes is increasing an individual's *"mindful" eating behavior*, which is defined as eating with awareness in the present moment, with a sense of control (Safer, et al., 2009). This aspect of eating pathology is not included in extant eating pathology measures, but may be useful to include within a new eating pathology measure, given its relevance to the treatment of binge eating. Thus, in addition to writing items to assess commonly identified factors in prior factor analyses of widely used eating disorder measures, I will also write items designed to measure other theoretically important aspects of eating disorders that are included in less common measures of eating pathology, as well as eating disorder behaviors that are currently unrepresented in extant eating disorder measures.

Finally, I will examine web sites devoted to maintaining anorexic and bulimic attitudes and behaviors (i.e., "pro-ana" and "pro-mia" websites) in order to determine whether other important facets of eating disorder behavior exist that are not represented in the literature. An initial examination of several pro-ana websites has indicated that individuals with eating disorders may over-value thinness, rather than (or perhaps in addition to) displaying a fear of becoming fat or overweight. Thus, I will write items that are focused on an *obsession with extreme thinness* (e.g., "I enjoy looking at pictures of very thin fashion models.") in addition to a morbid fear of fatness.

Measurement of Eating Disorder Symptoms in Special Populations

Men

Large community- and population-based epidemiologic studies of mental illness indicate that full-threshold eating disorders are approximately three times more likely to occur in women than men (Hudson, Hiripi, Pope, & Kessler, 2007; Woodside, Garfinkel, Lin, Goering, & Kaplan, 2001). However, recent data from the National Comorbidity – Replication (NCS-R) indicate that sub-threshold diagnoses of eating disorders

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demonstrate a much lower gender disparity, with certain sub-threshold forms (marked by binge eating) exhibiting significantly *higher* lifetime prevalence rates in *men* compared to women (Hudson, et al., 2007).

Recently, Striegel-Moore et al. (2009) examined the prevalence of disordered eating behaviors in 3,714 women and 1,808 men. They found that overeating was significantly more prevalent in men compared to women, but that women were more likely to report a loss of control over eating. Moreover, despite significant sex differences indicating that women are more likely to endorse binge eating, fasting, self-induced vomiting, and body checking and avoidance behaviors, the effect sizes are small to moderate (Striegel-Moore, et al., 2009). These findings contradict the stereotype that all eating disorders occur more frequently among women and underscore the value of developing measures that can be validly used in male populations.

Despite increased recognition of eating disorders as a serious concern among men, the most commonly used self-report and interview-based measures of eating pathology were developed and validated using all female samples (Anderson, et al., 1999; Z. Cooper, et al., 1989; Fairburn & Beglin, 1994; Garner & Garfinkel, 1979; Garner, et al., 1983; M. C. Smith & Thelen, 1984; Stice, Fisher, & Martinez, 2004; Stice, et al., 2000) and few subsequent studies have examined the psychometric properties of eating disorder questionnaires in men. This is a concern because assessments of disordered eating behaviors and attitudes may affect the results of studies designed to examine eating disorders in men. As Carlat and Camargo (1991) point out, "Almost all studies of bulimia in males have relied to some extent on self-report questionnaires, yet rarely have investigators evaluated the performance of these instruments in male subjects. It cannot be assumed that the validity, reliability, and predictive value of these questionnaires are the same for both sexes" (p. 831).

Yet, nearly two decades after Carlat and Camargo's (1991) review, few have conducted research aimed at examining sex-based differences in the psychometric

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properties of commonly used eating pathology questionnaires. For example, I found no studies reporting the coefficient alpha of the EDE subscales in men; this is particularly surprising considering that the EDE is considered by some to be "the most widely used assessment for disordered eating behaviors" (Craighead & Smith, 2008, p. 453). The lack of psychometric data in men appears to be due to the fact that: (a) many studies in the field of eating disorders simply do not report coefficient alpha and (b) most studies that include men have not reported coefficient alpha separately in each sex.

Even so, extant eating disorder symptom measures generally have lower internal consistency reliability in men compared to women (see Table A1). This is a major concern because low reliability can create problems for estimating effect sizes, testing hypotheses, and estimating parameters in structural models, problems that cannot be overcome by correcting for attenuation due to unreliability (John & Soto, 2007). For example, research shows that men tend to have lower correlations between eating disorder behaviors and other psychological variables, such as perfectionism, than do women (Boerner, et al., 2004; Forbush, Heatherton, & Keel, 2007; Spillane, Boerner, Anderson, & Smith, 2004). Of course, these lower correlations in men may be due to decreased reliability, rather than the result of substantive sex differences.

Another concern is that current measures of eating pathology, such as the Eating Attitudes Test, which focus on dieting and restricting behaviors as they are observed in women, do not tap the same latent construct in men. To evaluate this possibility, Boerner et al. (2004) and Spillane et al. (2004) used multiple group confirmatory factor analysis in a sample of 214 men and 215 women. In multiple group confirmatory factor analysis, variables are constrained in order to assess the extent to which two or more groups respond to them in the same way. Boerner et al.'s (2004) analysis included a modified version of the Structured Clinical Interview for *DSM-IV* Disorders (SCID) (First, Spitzer, Gibbon, & Williams, 1997), BULIT-R, Eating Expectancies Inventory (Hohlstein, Smith,

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& Atlas, 1998), TFEQ, Restraint Scale, and EAT-40. Spillane et al.'s (2004) analysis included the EDE.

The authors found that constraining the SCID, EDI Drive for Thinness Scale, and EDI Body Dissatisfaction Scale to have equal factor loadings resulted in a significant decrement in model fit, indicating that these variables do not assess the same latent construct (i.e., have different meanings) in men and women. The BULIT-R, Eating Expectancies Inventory, TFEQ, Restraint Scale, EDI Bulimia Scale, and EAT-40 had equivalent factor loadings between sexes. However, constraining the factor variances to be equivalent between men and women resulted in significant chi-square values for each of these measures, which appeared to be attributable to the fact that women had greater variance in their responses to eating pathology measures. These results may be due to the fact that men are more likely to report a desire to be lean *and* muscular, which typically involves increasing their muscle mass to fat ratio, yet these male-specific expressions of overvalued weight and shape are not represented in common multi-dimensional eating disorder measures.

An important aspect of the proposed project is that I will write items that are specifically targeted to men. For example, I will write items that are designed to assess a desire for high muscularity (e.g., "I often spend time thinking about ways to increase my muscle mass") and a desire for different body proportions (e.g., "I would be happier if I had broader shoulders"). I will also write items designed to measure over-concern with weight and shape that are not gender biased (e.g., "I am self-conscious about the way my body looks when I am in public").

Overweight and Obese

Currently, self-report measures that assess issues relevant to obesity (such as obesity-related quality of life and obesity-related stigma) exist separately from measures of eating pathology. However, the field of eating disorders has recently come to recognize that eating and weight disorders frequently co-occur (Neumark-Sztainer,

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2009). For example, binge eating disorder demonstrates positive significant correlations with overweight and obesity. Moreover, there is also a portion of individuals who suffer from binge eating disorder and are *not* overweight or obese, as well as a portion of individuals who are overweight or obese, but do not engage in binge eating. Given this complex interplay between certain eating disorder behaviors (such as binge eating) and weight, it has become increasingly important to assess these issues together, rather than separately. This is particularly important because overweight and obesity are associated with numerous public health concerns such as high LDL cholesterol and low HDL cholesterol, elevated blood pressure, and cardiovascular disease. Thus, it is important to assess various eating behaviors, such as binge eating and dietary restraint, which may be concomitant and/or predictive of obesity, as well as success in weight loss programs and treatment.

One way researchers have tried to bridge the gap between eating and weight disorders is simply to administer questionnaires developed for use in individuals with eating disorders to obese populations. However, because these measures were not originally intended for use in obese populations, it should not be surprising that the psychometric properties of these tests are not consistent across weight categories.

A strong test for or against differential validity of disordered eating measures in obese versus non-obese populations would be provided by submitting the data to multiple group confirmatory factor analysis (see section on Men for a basic description of this analysis). Another method for answering this question would be to assess the items of the self-report measure using item response theory (IRT) to see if any items function differently in obese versus non-obese persons. However, I can find no such analyses in the literature. In the absence of such analyses, I will discuss relevant available psychometric data from obese and non-obese samples (i.e., coefficient alpha, test-retest reliability, and exploratory and confirmatory factor structures), as a proxy for more direct

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analyses of differential validity. For ease of understanding, I discuss broad measures of disordered eating separately from specific measures of binge eating and dietary restraint.

Broad Eating Pathology Measures

The Eating Disorder Examination. The EDE-Q is frequently used to assess bariatric surgery patients pre- and post- operatively (see Mitchell & de Zwaan, 2005), despite limited data to support its use in this population. For example, only two studies have examined the factor structure of the EDE interview (Bryne et al., 2009; Mannucci et al., 1997) and only two studies examined the factor structure of the EDE-Q (Peterson et al., 2007; Hrabosky et al., 2008). On the basis of these four studies, it would appear that the EDE/EDE-Q contains one meaningful factor in a heterogeneous group of individuals with eating disorder symptoms (Bryne et al., 2008) and two or three meaningful factors in obese individuals and in individuals with bulimic symptoms (Mannucci et al., 1997; Hrabosky et al., 2008; Peterson et al., 2007).

As mentioned previously, Byrne et al. (2009) conducted the most comprehensive factorial study of the EDE, to date. They compared a one-factor, two-factor, three-factor, four-factor, and a brief one-factor model that contained eight items separately in 158 women referred to an outpatient eating disorder service, 329 women from the community, and 170 overweight and obese women enrolled in a cognitive-behavioral obesity treatment program. Although the authors did not submit the data to a multiple group analysis or IRT analyses, these data provide information on the structure of the EDE interview across a range of weights (mean body mass index, which was measured as kilograms/meters^2, ranged from 16.26 for individuals with anorexia nervosa to 35.76 for the obese sample). The results of their study indicated that except for the brief one-factor model in the eating disorder sample, none of the tested models met criteria for an acceptable fit to the data in any of the samples, which provides indirect evidence that the EDE is differentially valid in non-eating disorder samples and across weight categories. Further evidence is provided by the wide range of standardized factor loadings on the

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one-factor model across samples – for instance EDE items loaded much lower on the factor in the brief one-factor model (0.32-0.76) in obese participants versus community (0.46-0.88), and eating disorder (0.53-0.81) participants, which means that EDE items are more strongly (i.e., differentially) associated with the latent disordered eating factor in patients with eating disorders.

The authors also examined internal consistency estimates for the original EDE subscales separately in each sample. In general, a scale is considered to meet acceptable internal consistency criteria if its coefficient alpha estimate is above 0.70 (Nunnally, 1978), although more typically 0.80 is used as the cutoff for good reliability, with 0.70-0.79 minimally acceptable. Based on this criterion, the Restraint and Eating Concerns subscales were unacceptable in each sample. The Weight Concern subscale also had an unacceptably low coefficient alpha in both the community (alpha=0.69) and obese samples (alpha=0.67). These data are consistent with internal consistency estimates from the EDE-Q subscales. In other words, the range of coefficient alpha estimates is lower in obese samples (0.61-0.78) (Hrabosky, et al., 2008) compared to samples of undergraduate women and women with bulimic symptoms (alpha 0.70-0.90) (Luce & Crowther, 1999; Peterson, et al., 2007). Finally, because only three studies have examined test-retest reliability/stability of the EDE or EDE-Q in normal weight samples (Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beumont, 2004; Ravaldi, et al., 2004), it is unclear whether the EDE-Q is differentially stable over time in obese versus non-obese individuals.

The results of these studies suggest the factor structure of the EDE is not replicable in obese versus non-obese persons and that the internal consistency of this measure is lower in obese populations compared to non-obese populations, indicating the EDE may be differentially valid across weight categories.

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Eating Disorders Inventory. Tasca, Illing, Lybanon-Daigle, Bissada, & Balfour (2003) examined the internal consistency, factor structure, and test-retest reliability of the EDI in a sample of 144 female obese outpatients with binge eating disorder (mean body mass index = 40.61) and 152 female normal weight outpatients with bulimia nervosa (mean body mass index = 26.52). The authors used a method developed by Fan and Thompson (2001) in order to compare coefficient alphas between groups. Although the Bulimia and Body Dissatisfaction subscales were less reliable in obese patients compared to normal weight patients with bulimia nervosa, these differences were not statistically significant.

Test-retest correlations in a randomly selected subsample of obese individuals with binge eating disorder were adequate and ranged from .67 to .82. The authors did not examine the test-retest reliability of the EDI in normal weight participants with bulimia nervosa in their sample. However, other studies of the EDI's test-retest reliability have found correlations of .65 to .97 for in an undergraduate sample and .77 to .96 in a subset of undergraduates who were identified as being at-risk for the development of eating disorders based on their EDI scores (presumably there were not substantial numbers of obese persons in these samples) (Wear & Pratz, 1987). Another study found the test-retest reliability of the EDI was .81 to .89 in a combined group of female inpatients with anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified and .75 to .94 in a group of general psychiatric patients without a diagnosis of an eating disorder (Thiel & Paul, 2006). Thus, it appears that the EDI might be less stable over time in obese individuals compared to non-obese individuals, although future studies are needed to examine the test-retest reliability of the EDI in obese individuals without binge eating disorder.

Finally, Tasca et al. (2003) carried out a second-order confirmatory factor analysis of the EDI separately in obese participants with binge eating disorder and non-obese participants with bulimia nervosa. In their model, Drive for Thinness, Bulimia, and

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Body Dissatisfaction were regressed on the latent Eating Pathology factor and Ineffectiveness, Perfectionism, Interpersonal Distrust, Interoceptive Awareness, and Maturity Fears were regressed on the latent Personality Traits factor. In confirmatory factor analysis, CFI values of .95 or greater and RMSEA values of .08 or lower indicate excellent fit, whereas CFI values below .90 and RMSEA values above .10 indicate a poor fit to the observed data. Thus, in obese women with binge eating disorder, the model fit very well (CFI=.96 and RMSEA=.07). However, the model did not demonstrate a good fit to the data in normal weight women with bulimia nervosa (CFI=.82 and RMSEA=.14) and post-hoc model modifications were unable to improve fit. This latter result is surprising given that the EDI was designed for use in individuals with bulimia nervosa. These results indicate that the EDI is internally consistent, adequately stable over time in obese individuals (although less stable than in normal weight populations), and demonstrates a good fit to the data in obese participants who have binge eating disorder. Nevertheless, the results of confirmatory factor analyses also indicate that the EDI may not be a valid measure for use in normal weight women with bulimia nervosa.

Measures of Dietary Restraint and Binge Eating

The TFEQ is specifically recommended for use in assessing individuals who plan to undergo bariatric surgery (Kalarchian & Marcus, 2005). As previously mentioned, the TFEQ consists of three factors that are designed to measure Cognitive Control of Eating, Disinhibition, and Susceptibility to Hunger. Stunkard and Messick (1985) found that the Cognitive Control of Eating factor was less reliable in a sample of dieters participating in a weight loss program (50% of whom were obese) (coefficient alpha = .79) compared to a sample of "free" eaters (i.e., participants who were nominated by each dieter as the most unrestrained non-obese person he or she knew) (coefficient alpha = .92). However, Allison et al. (1992) found that the TFEQ Cognitive Control of Eating factor was only slightly less reliable in obese college students (coefficient alpha = .88) compared to normal weight college students (coefficient alpha = .91).

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Previous exploratory factor analyses of unrestrained eaters who are normal weight have revealed a four-factor structure, in which the Disinhibition factor splits into a Weight Fluctuation factor and an Overeating factor, whereas exploratory factor analyses of obese and non-obese individuals reveals a three-factor structure. Moreover, Allison et al. (1992) noted that factor congruence coefficients, which index how well a given factor solution replicates in another sample, were only modest when comparing obese to non-obese individuals. Taken together, these results indicate that the: (a) Cognitive Control of Eating factor may be less reliable in samples that include obese individuals and (b) Disinhibition factor may not be measuring the same construct across weight categories.

The Restraint Scale is another common measure of dietary restraint that was designed to identify individuals who are chronically concerned about their weight and attempt to gain control of their weight through dieting. In theory, the concept of dietary restraint is an important component of both anorexia nervosa and bulimia nervosa, as well as an important predictor of obesity and weight loss success. However, the restraint scale has been shown across a number of different studies to be less reliable in obese populations with coefficient alphas typically in the range of .50-.70 (for a review, see Gorman & Allison, 1995) compared to normal weight populations in which coefficient alphas range from .78-.86 (for a review, see Gorman & Allison, 1995). W. G. Johnson, Corrigan, Crusco, & Schlundt (1986) also found that the Restraint Scale is less reliable in women with bulimia nervosa. Thus, the Restraint scale demonstrates acceptable internal consistency only in normal weight samples. This scale also has differential factor structures when substantial portions of obese or bulimic participants are included (W. G. Johnson, et al., 1986; W. G. Johnson, Lake, & Mahan, 1983; Ruderman, 1986). Specifically, the greater the number of obese or bulimic participants in the study, the more factors emerge (W. G. Johnson, et al., 1986; W. G. Johnson, et al., 1983; Ruderman, 1986), which indicates that this measure may be differentially valid in normal weight versus obese samples.

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Finally, the DEBQ demonstrates very high coefficient alphas in both obese (alphas range from .91-.94) and nonobese participants (alphas range from .89-95). The authors did not carry out separate factor analyses on obese and non-obese samples; however, all of the DEBQ Restrained Eating items appeared to have similar item-total scale correlations within obese and non-obese participants. Thus, out of the various restraint measures, it appears that the DEBQ Restrained Eating factor is valid across weight categories. The likely reason that the DEBQ Restrained Eating factor performs well in obese samples is because it was developed and validated in large samples of normal weight, overweight, *and* obese participants. This is very encouraging because it shows that it is possible to measure dietary restraint validly across weight categories if sufficient numbers of obese individuals are included in the initial scale development sample.

Strengths and Limitations of Existing Measures

Validity of Eating Disorder Measures

Research indicates that self-report measures of eating pathology demonstrate good test-retest reliability, yet are also sensitive to change following treatment (for reviews, see Grilo, Mitchell, & Peterson, 2005; Peterson, Mitchell, Mitchell, & Peterson, 2005). In addition, current measures of eating pathology generally show acceptable levels of internal consistency (for a review, see Peterson, et al., 2005).

Existing measures of eating pathology also tend to demonstrate good to excellent *convergent validity*. For example, eating disorder measures tend to be highly correlated with one another (Anderson, et al., 1999; Berland, Thompson, & Linton, 1986; Garner, et al., 1983; Hill, Reid, Morgan, & Lacey, 2010; Kutlesic, et al., 1998; Raciti & Norcross, 1987; Stice, Fisher, & Martinez, 2004; Thelen, et al., 1991; Williams, et al., 1994) and self-report measures of eating disorders tend to converge well with clinician ratings of eating disorders (Fairburn & Beglin, 1994; Garner, et al., 1983). In terms of criterion validity, measures of eating disorder symptoms are typically successful in discriminating

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individuals with an eating disorder from individuals without an eating disorder (Z. Cooper, et al., 1989; Garner, et al., 1983; Gross, Rosen, Leitenberg, & Willmuth, 1986; Stice, et al., 2000). However, few measures of eating disorders demonstrate good *discriminant validity* in terms of *not* correlating with measures of other constructs that are theoretically and/or empirically distinct.

A good example of this problem is demonstrated by correlations between measures of eating disorder symptoms and depression. Anderson et al. (1999) found that the correlation between the EDI Bulimia scale and the MAEDS Purging scale was .28, whereas the correlation between the EDI Bulimia scale and MAEDS Depression was .51. Moreover, the correlation between the EDI Body Dissatisfaction scale and the MAEDS Purging scale was .20, whereas the correlations between the EDI Body Dissatisfaction scale and MAEDS Restrictive Eating and Avoidance of Forbidden Foods were .31 and .32, respectively. However, the correlation between the EDI Body Dissatisfaction scale and MAEDS Depression was .55. The Goldfarb Fear of Fatness scale correlated .48 with MAEDS Restrictive Eating, .42 with MAEDS Purging, .45 with MAEDS Avoidance of Forbidden Food, yet was correlated .58 with MAEDS Depression. Furthermore, Stice, Fisher, & Martinez (2004) found that the EDE symptom composite score correlated .50 with diagnoses of *DSM-IV* depression, but only .40 with the Ideal-Body Stereotype Scale – Revised (Stice, 2001) and .46 with the Satisfaction and Dissatisfaction with Body Parts Scale (Berscheid, Walster, & Bohrnstedt, 1973). This result is remarkable given that, in general, correlations between different methods (e.g., interview versus self-report) tend to be *lower* than correlations between similar methods (Campbell & Fiske, 1959). In fact, the Dutch Eating Behavior Restraint Scale was the only scale that was more highly correlated with the EDE symptom composite score compared to a diagnosis of depression. Finally, Mazure et al. (1994) found that the Beck Depression Inventory was more highly correlated with the Yale-Brown-Cornell Eating Disorder Scale (r=.63) and EDI Bulimia scale (r=.60) than with the DEBQ Total Score (r=.42) or the EDI Drive for

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Thinness (r=.47) and Body Dissatisfaction (r=.47), scales. These results indicate that certain eating disorder symptoms are more highly correlated with depression than with other eating disorder symptoms, which seriously calls into question the discriminant validity of extant eating disorder measures.

One likely reason for these issues with discriminant validity is that the items in current measures of eating pathology often include terms that *inadvertently* build a substantial amount of neuroticism/negative affectivity into the items. In the current study, stems such as "I *worry* about…," "I am *troubled* by …," "I would be *upset* if…," and "I am *terrified* by…" will be avoided. Further, I will administer measures of depression, anxiety, and neuroticism along with other measures of eating disorder symptoms in the initial validation stages, in order to ensure that the structural model of eating disorders has both convergent and discriminant validity.

Another concern with the validity of some current eating disorder measures (viz., measures of dietary restraint) is their *criterion-related validity*, which involves: (a) *concurrent validity*, which is a measure's association with criterion evidence collected at the same time as the measure itself and (b) *predictive validity* which involves associations with criteria assessed in the future (Simms & Watson, 2007). One major debate within the field concerns the ability of self-report dietary restraint scales to predict actual caloric intake (Stice, Cooper, Schoeller, Tappe, & Lowe, 2007; Stice, Fisher, & Lowe, 2004; Stice, Presnell, Lowe, & Burton, 2006; van Strien, Engels, van Staveren, & Herman, 2006). This debate started with observations that although dietary restraint has been consistently shown to predict bulimic psychopathology, experimental and quasi-experimental findings that randomly assign obese participants to low-calorie diets indicate that actual dietary restriction leads to *decreased* binge eating in both controlled and uncontrolled trials (for a review, see Stice, Fisher, & Lowe, 2004). These findings are contrary to the dietary restraint model, which suggests that a reliance on cognitive control over eating, rather than relying on internal hunger cues, leads to uncontrolled eating (i.e.,

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binge eating) if the individual's cognitive control is temporarily disinhibited (Polivy & Herman, 1985). Moreover, episodes of disinhibited eating are thought to lead to efforts to increase strict cognitive control over eating, which results in various eating disorder behaviors, such as inappropriate compensatory behaviors and fasting, which ultimately lead to the recurrence of binge eating (Fairburn & Wilson, 1993).

Stice, Fisher, & Lowe (2004) carried out a series of four research studies that examined the correlations between short-term caloric intake and five commonly used self-report measures of dietary restraint. They found that none of the dietary restraint measures were significantly correlated with actual caloric intake during laboratory meals, but that the DEBQ Dietary Restraint scale showed significant correlations with fat-gram intake, but not actual caloric intake, and only the Dietary Intent Scale (DIS) (Stice & Agras, 1998) showed significant correlations with both fat and calorie intake collected unobtrusively at a fast food restaurant. These results suggest that the Dietary Intent Scale is a more valid measure of short-term dietary restraint compared to similar self-report measures.

Despite the encouraging correlations between the DIS and caloric intake, the average correlation between dietary restraint scales and short-term actual caloric intake was only -.07, suggesting that most self-report dietary restraint measures are not good measures of caloric intake. Stice et al. (2007) followed this up with a long-term study of dietary restriction. In this study they estimated caloric intake by: (a) using a biomarker of caloric intake called "doubly labeled water," which uses isotopic tracers to assess carbon dioxide production, in a sample of obese women who had recently lost weight and in a sample of healthy women, (b) employee meal purchase data from hospital cafeterias, and (c) self-reported caloric intake. They found that doubly labeled water and the TFEQ – Restraint Scale both correlated significantly with participants' self-reported caloric intake, but that the TFEQ – Restraint Scale did *not* correlate significantly with doubly labeled water intake or actual caloric intake during lunch consumed at a hospital

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cafeteria. It is interesting that the authors chose not to include the DIS, given that it outperformed the TFEQ-Restraint Scale in short-term studies of caloric intake.

The results of these studies indicate several important findings: (a) in general, self-report measures of dietary restraint show poor concurrent and predictive validity with actual dietary intake, (b) self-reported information on caloric intake tends to show good predictive validity with biomarkers of dietary intake (as measured by doubly labeled water), and (c) self-reported information on caloric intake is correlated with self-reported measures of dietary restraint. What is noteworthy about these findings is that both the DIS and self-reported caloric intake require the participant to record concrete behaviors about foods they may or may not have eaten (e.g., "I take small helpings in an effort to control my weight), whereas other dietary restraint measures use more global descriptions (e.g., "How often are you dieting?" and "How conscious are you of what you're eating?"). This may explain why dietary restraint measures show strong predictive validity for future diagnoses of bulimia nervosa (in which an individual is often *thinking* about dieting, but experiences frequent lapses in cognitive control over eating in which they actually consume a large number of calories), but demonstrates poor concurrent and predictive validity with actual caloric intake. To evaluate this hypothesis, as well as improve the criterion-related validity of this construct, I will include items that assess both *cognitive control over eating*, which will be designed to measure global perceived efforts to diet and limit food intake (e.g., "I am almost always on a diet") and *dietary restriction*, which will be designed to measure concrete food intake behaviors (e.g., "I rarely snack before bedtime" and "I almost never eat at fast food restaurants").

Lack of Comprehensiveness

Some self-report eating pathology instruments possess excellent psychometric properties and were created using up-to-date scale development methods and testing. For example, the DEBQ has a stable factor structure and is reliable in men and women and across weight categories. However, the DEBQ assesses only a limited number of

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disordered eating behaviors. Thus, if an investigator is interested in assessing other areas of eating pathology that may predict eating disorders or obesity-related health outcomes (i.e., body image disturbance and binge eating) or *DSM*-defined eating disorder symptoms, then they must administer additional measures of disordered eating specific to their interests (many of which suffer from a variety of serious limitations, as previously discussed). The current project aims to overcome this problem by creating a comprehensive measure of eating disorder symptoms that can be validly used in a variety of populations.

Sample Size and Statistical Power

Out of 26 measures of eating pathology, only 42% had adequately powered sample sizes in their initial validation studies to detect small-medium effects for bivariate correlations with an alpha of .05 in women (see Table A2). In men, only the DEBQ had adequate power to detect small-medium effects for bivariate correlations with an alpha of .05 (see Table A2). However, it is recommended that, in addition to examining bivariate correlations in order to examine convergent and discriminant validity, researchers should also carry out multivariate analyses such as exploratory and confirmatory factor analyses to examine the structure and differential validity of the measure. Although the power of these tests depends on the number of parameters in the model and the expected factor loadings of these parameters, sample sizes of 250 or greater generally are recommended (MacCallum, Browne, & Sugawara, 1996; MacCallum, Widaman, Zhang, & Hong, 1999; Marsh, Hau, Balla, & Grayson, 1998). Based on this recommendation, it appears that approximately 70% of current eating disorder symptom measures were under-powered for multivariate statistical modeling in their initial validation.

Significance

Many of the limitations of existing disordered eating measures are the direct result of poor or out-dated scale development methods. For example, of 26 measures of eating pathology reviewed, only 42% were developed using adequately powered sample sizes.

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Moreover, scale development experts recommend that researchers carry out several analyses of the item pool in order to refine the measure prior to finalization (Clark & Watson, 1995; Loevinger, 1957; Simms & Watson, 2007). Yet, few of these measures were developed according to this method, which can lead to problems with discriminant validity. Finally, as discussed previously, only 11.5% of existing eating disorder measures I examined were administered to boys or men during the initial validation process, and only one of these studies was adequately powered in men. Because of this, current measures of disordered eating may significantly underestimate the degree of eating pathology in males. The proposed new measure has the potential to improve the assessment of the psychological and behavioral symptoms of eating disorders and may contribute to a better understanding of the internal structure, etiology, long-term course, and outcome of full-threshold eating disorders through the refined assessment of their constituent parts. Taken together, this project has the potential to advance fundamental conceptualizations of the internal structure of eating pathology through the development of a comprehensive assessment of the symptoms and dimensions that constitute eating disorders. In addition, a psychometrically sound structural model of eating disorder symptoms could be helpful in behavioral genetic contexts, in which having meaningful phenotypes is critically important for clarifying genotype(s). Thus, a deeper understanding of the construct of eating pathology through scale construction may allow for more precise theories about the etiology of eating disorders and their symptoms.

Study Goals

Goal of Phase One: Item Writing and Questionnaire Development

The overall goal of the first phase of the current study was to create a preliminary version of the eating disorder symptom measure. This was accomplished by (a) creating a comprehensive pool of items, (b) administering items to undergraduate students and community participants, (c) examining participants' responses using exploratory and

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confirmatory factor analyses, and (d) using the results of these structural analyses to refine the measure. To ensure the initial item pool is as comprehensive as possible, I erred on the side of over-inclusiveness. As recommended by Clark and Watson (1995), the item pool should be broader and more comprehensive than the target construct because it is not possible to fix deficiencies in the initial item pool through statistical analyses. Thus, I included items that appeared peripheral to my target construct by creating homogeneous item composites (HICs), which represented theoretical dimensions of eating pathology that potentially could emerge in analyses.

Based on a review of the literature and pro-eating disorder websites[1], I developed 20 HICS (see Appendix B), corresponding to replicable dimensions of eating disorders that have emerged in prior exploratory and confirmatory factor analyses of multidimensional eating pathology measures, including: (1) body image dissatisfaction, (2) a morbid fear of fatness/drive for thinness, (3) binge eating, (4) compensatory behaviors, and (5) dietary restraint. Some content domains (e.g., binge eating, body image dissatisfaction, and fear of fatness) had more than one HIC: First, factor analytic studies of measures of binge eating suggest that this construct can be differentiated into eating in response to (a) external stimuli and (b) internal hunger cues/satiety. Thus, I developed HICs for these facets of binge eating.

Second, although the correlation between concerns with body weight and shape in the EDE are so high that they do not appear to be separate constructs, this may be due to the wording of the questions rather than an accurate representation of the true association between these constructs. For example, the EDE weight and shape items are *identical* except that the term *'weight'* is used for the weight scale and the term *'shape'* is used for

[1] Pro-eating disorder websites refer to websites in which individuals who suffer from these disorders support the stance that anorexia nervosa and bulimia nervosa are lifestyle choices, not disorders. These sites provide support for starving oneself, tips on how to engage in eating disorder behaviors, such as self-induced vomiting, and pictures of thin or underweight individuals as inspiration to continue self-starvation.

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the shape scale. Thus, I developed a HIC for weight dissatisfaction and a separate HIC for body dissatisfaction, being careful not to write overly similar/redundant items.

Third, because many extant measures of eating pathology appear to be differentially valid in men, I developed a body image dissatisfaction HIC to tap a desire for high muscularity, which appears to be related to eating pathology in men, but not women (Berg & Andersen, 2007). Finally, because pro-anorexia and pro-bulimia websites indicate that individuals with eating disorders exhibit an obsession with slimness, in addition to a morbid fear of fatness, three HICs representing this construct were developed: (1) disgust of overweight people, (2) fear of gaining weight and (3) an obsession with slimness/refusal to maintain a minimally healthy body weight.

I also included HICs to represent all of the *DSM-IV* symptoms of anorexia nervosa, bulimia nervosa, and binge eating disorder, which include: (1) refusal to maintain body weight at or above a minimally normal weight for age and height, (2) intense fear of gaining weight, (3) undue influence of body weight or shape on self-evaluation, (4) eating a large amount of food in a discrete period of time, (5) sense of lack of control over binge eating episodes, (6) inappropriate compensatory behavior, (7) eating much more rapidly than normal, (8) eating until uncomfortably full, (9) eating large amounts of food when not physically hungry, (10) eating alone because of being embarrassed by how much one is eating, and (11) feeling disgusted with oneself, depressed, or very guilty after overeating. Some of these symptoms clearly overlap with dimensions of eating pathology that have emerged in factor-analytic studies. However, in cases in which the *DSM* definition includes more differentiation of the behavior than prior factor-analytic studies (e.g., for binge eating), additional HICs were developed to represent the current diagnostic system fully.

Finally, HICs that are theoretically important, despite not emerging in prior factor-analytic studies, were developed: (1) cognitive control over eating (i.e., global efforts to limit food intake) to examine its association with dietary restriction, (2)

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food/weight rituals, given their relevance to biological starvation, and (3) mindless eating, due to its importance in the treatment of bulimia nervosa and binge eating disorder. I wrote 6-8 items per HIC to sample each content domain comprehensively; thus, the initial item pool consisted of 160 items (see Appendices B and C).

Goal of Phase Two: Establish Construct Validity of the Measure

The main goal of phase two was to establish the convergent and discriminant validity of the multi-level model of eating disorder symptoms developed through scale construction in phase one. This aim was accomplished by replicating the phase one scale-level structural analyses in a sample of psychiatric patients, which allowed me to verify that the structure obtained in phase one was replicable across a different—and different types of—samples. As mentioned previously, eating-disorder researchers often use the ability of the measure to discriminate between criterion groups as the sole basis for determining discriminant validity (even though these methods are more accurately described as examining criterion validity). John and Soto (2007, p. 479) note that "a critical issue with the use of such external criteria is the 'gold standard problem'" (p. 479). Specifically, "the convergent and discriminant validity of the criterion itself is typically not well established. For example, patients with a diagnosis of major depression may be comorbid with other disorders (e.g., anxiety) or may have been hospitalized for construct-irrelevant reasons (e.g., depressed individuals lacking social or financial support are more likely to be hospitalized)" (John & Soto, 2007, p. 479). The present study examined correlations between scales to examine convergent and discriminant validity more fully.

Goal of Phase Three: Examine Reliability of the Structural Model

The goal of phase three was to assess the measure's test-retest reliability over a 2-week time period to strengthen evidence for the robustness of the structural model.

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Convergent and discriminant validity of the test-retest correlations also was examined, using a multi-trait multi-occasion matrix following procedures developed by Conley (1985). To accomplish this aim, the measure will be administered to a large sample of male and female undergraduate students.

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CHAPTER II

PHASE ONE

Method

Participants and Recruitment

The University of Iowa's Institutional Review Board approved all study procedures. Exclusion criteria were kept to a minimum to obtain data from a broad range of community residents and students. Exclusion criteria included (1) not speaking fluent English, (2) not having access to a personal or public computer, and (3) being age 18 or below (because most questionnaires used in the current study have not been validated in young samples). All study assessments were completed online using WebSurveyor.

Community Sample

Participants were men (*N*=214) and women (*N*=193) recruited from the community to take part in a study designed to develop and validate a new self-report measure of health and eating behaviors. Participants were recruited from posters, newspaper advertisements, and from a mass e-mail sent to university faculty and staff. Community residents who expressed interest in the study were sent a web URL for online participation, and received $30.00 for their time and participation. Validity checks were imbedded within the WebSurveyor program to determine whether participants were responding randomly to survey items. As a result of invalid responding, *N*=8 community participants were removed from the dataset prior to conducting statistical analyses (these individuals are not included in the sample sizes reported above).

The mean (SD) age of community participants was 38.24 (13.51). Men reported a mean (SD) body mass index (BMI) of 26.77 (5.39) and women reported a mean (SD) body mass index of 25.95 (6.70). Based on classifications used by the National Heart Lung and Blood Institute, participants' mean BMIs were within the normal to overweight range (NIH, 1998). Participants were allowed to self-report multiple racial and ethnic identities; 89.2% of the participants reported they were Caucasian, 2.2% African-

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American, 2.2% Hispanic or Latino(a), 6.4% Asian-American, 1.2% Native American/Alaskan Native, 0.5% Native Hawaiian/Pacific Islander, and 2.2% another race or ethnicity.

Student Sample

Participants were men (*N*=108) and women (*N*=271) who were currently enrolled in Elementary Psychology (31:001) or Introduction to Social Psychology (31:015). Students were recruited via the University of Iowa Psychology Department research pool and via course announcements made in Introduction to Social Psychology. Participants received 1 credit towards the completion of their research exposure requirement (for Elementary Psychology students) or extra credit per their course policy (for students enrolled in Introduction to Social Psychology).

To increase the number of male participants in the study, a mass e-mail was sent to all undergraduate men enrolled at the University of Iowa. Those who responded (*N*=47) completed a reduced set of study questionnaires and were compensated with a $15.00 gift certificate for their time and participation. Finally, male student athletes (*N*=7) who were recruited to take part in a different study examining eating disorder symptoms in varsity athletes also were included in the current study. These male student athletes were recruited from a mass e-mail sent to University of Iowa undergraduates and through posters placed in university locker rooms and the Gerdin Athletic Learning Center, a study center used exclusively by University of Iowa varsity athletes. Male student athletes were entered into a raffle to win a $25.00 gift certificate to a local area business.

Thus, the final student sample included *N*=162 men and *N*=271 women. All students who expressed interest in the study were sent a web URL for online participation. Validity checks again were imbedded within the WebSurveyor program to determine whether participants were responding randomly to survey items. As a result of

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invalid responding, *N*=27 students were removed from the dataset prior to conducting statistical analyses (these individuals are not included in the sample sizes above).

The mean (SD) age of student participants was 19.7 (2.10). Men reported a mean (SD) body mass index (BMI) of 24.6 (3.65) and women reported a mean (SD) body mass index of 22.7 (3.67). These BMIs were within the normal range (NIH, 1998). Participants were allowed to self-report multiple racial and ethnic identities. 91.2% of the participants reported being Caucasian, 2.8% African-American, 3.7% Hispanic or Latino(a), 4.4% Asian-American, 0.5% Native American/Alaskan Native, 0.5% Native Hawaiian/Pacific Islander, and 0.9% another race or ethnicity.

Normal Weight and Overweight/Obese Subsamples

Data from community members and students were combined to create normal weight and overweight/obese subsamples. Consistent with recommendations from the National Heart Lung and Blood Institute (NIH, 1998), participants were considered to be normal weight if their self-reported body mass index was between 18.5 and 24.9. Participants were considered to be overweight if they had a self-reported body mass index of 25 or greater. Individuals were considered obese if their self-reported body mass index was 30 or greater. Based on these criteria, *n*=510 participants were normal weight, *n*=203 participants were overweight, and *n*=101 participants were obese. Participants who reported a body mass index below 18.5 (*n*=26) were considered to be underweight and were excluded from weight-based subsample analyses. To ensure adequate power, overweight and obese individuals were combined into a single class (*n*=304).

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Measures

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Eating Pathology Measures

Iowa Eating Behaviors Questionnaire (IEBQ) item pool. The initial 160-item pool was administered to all study participants, who indicated the frequency with which they experienced each symptom "during the past four weeks, including today," using a 5-point scale ranging from *never* to *very often.*

The Body Shape Questionnaire (BSQ) (P. J. Cooper, et al., 1987) is questionnaire designed to measure dissatisfaction with body weight and shape. Written permission from the first-author was obtained to use the 14-item short-form of the BSQ developed by Dowson and Henderson (2001). The BSQ demonstrates good convergent validity with the EDI-3 Body Dissatisfaction scale (r=.66) (P. J. Cooper, et al., 1987) and Eating Attitudes Test (r=.93) (Dowson & Henderson, 2001) and discriminant validity from the Beck Depression Inventory (r=.47) (Dowson & Henderson, 2001). The BSQ short-form demonstrates excellent internal consistency (*Cronbach's alpha* = .93) (Dowson & Henderson, 2001).

The Dutch Eating Behavior Questionnaire (DEBQ) (van Strien, et al., 1986)[2] is a 33-item self-report questionnaire designed to assess dietary restriction and binge eating. It contains three factor-analytically derived scales: Restrained Eating, Emotional Eating, and External Eating. This questionnaire was developed to examine restrained and unrestrained eating behaviors. It possesses excellent internal consistency in both men and

[2] The Dutch Eating Behavior Questionnaire (DEBQ) was adapted and reproduced by special permission of the Publisher, Boom test publishers, Amsterdam, The Netherlands, for the DEBQ, copyright 2005 by Dr. T. van Strien p/a Boom test publishers, Amsterdam. This material is copyright protected and further reproduction is prohibited without permission in writing from the publisher.

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women (*Cronbach's alpha* = .80 to .93 in men and .81-.95 in women) (van Strien, et al., 1986).

Eating Disorders Examination Questionnaire (EDE-Q) (Fairburn & Beglin, 1994) is a 28-item self-report questionnaire based on the EDE Interview. It is designed to assess eating-disorder behaviors and attitudes and contains four rationally derived subscales: Restraint, Eating Concerns, Shape Concerns, and Weight Concerns. The EDE-Q includes six non-scored count variables that assess the frequency of binge eating behaviors, self-induced vomiting, laxative use, and excessive exercise over the past 28 days. Only the subscale and total scores were used for Phase I analyses. Structural analyses were carried out to determine whether the discriminant validity of the EDE-Q can be improved.

The Eating Disorders Inventory-3 (EDI-3) (Garner, 2004) contains 12 subscales designed to measure the phenomenology, severity, and clinical course of eating disorders in women. Only the three subscales (i.e., 25-items) related to eating disorder psychopathology (i.e., the Drive for Thinness, Bulimia, and Body Dissatisfaction Scales) were administered. The eating disorder scales demonstrate adequate internal consistency in men (*Cronbach's alpha* = .63 to .86) and women (*Cronbach's alpha* = .74 to .90) (Garner, 2004).

Lifetime history eating-disorder behaviors. To examine the presence of lifetime history of eating-disorder behaviors, participants were asked if they had ever engaged in self-induced vomiting, fasting (for 8 or more waking hours), diuretic use, and/or diet pill use "for the purposes of weight loss or to counteract the effects of eating." Due to concerns about the validity of self-report assessment of binge eating (Fairburn & Beglin, 1994), participants were asked if they had "ever experienced an episode of binge eating (eating a large amount of food in a short period of time and feeling that your eating is out of control or unavoidable)." Participant responses were rated as absent (0) or present (1).

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The Male Body Attitudes Scale (MBAS) (Tylka, Bergeron, & Schwartz, 2005) is a 29-item measure designed to assess a desire for increased muscularity, preference for low body fat, and satisfaction with height. Accordingly, this measure has three scales: Muscularity, Low Body Fat, and Height. The internal consistency is excellent (Cronbach's alpha = .80 or above for each factor) and the structure of the measure was supported by excellent goodness-of-fit indices in confirmatory factor analyses (Tylka, et al., 2005).

The Restraint Scale (Herman & Polivy, 1975) is a 10-item common measure of dietary restraint designed to identify individuals who are chronically concerned about their weight and attempt to gain control of their weight through dieting. In theory, the concept of dietary restraint is an important predictor of obesity and weight loss success. Internal consistency is good to excellent in normal weight participants (*Cronbach's alpha* = .78-.86) and low to adequate for obese participants (*Cronbach's alpha* = .50-.70) (Gormally, et al., 1982). It has excellent convergent (*rs* with TFEQ Restraint = .74 and DEBQ Restrained Eating = .75) (Gorman & Allison, 1995) and limited discriminant validity (*r* with The Binge Scale = .66) (Hawkins & Clement, 1980).

The Three Factor Eating Disorder Questionnaire (TFEQ) (Stunkard & Messick, 1985) is a 51-item measure specifically recommended for use in assessing individuals who plan to undergo bariatric surgery (Kalarchian & Marcus, 2005). The TFEQ consists of three factors that are designed to measure Cognitive Control of Eating (also referred to as Restraint), Disinhibition, and Susceptibility to Hunger. Internal consistency is good in college students and "free" eaters (i.e., participants who were nominated by each dieter as the most unrestrained non-obese person he or she knew) (*Cronbach's alpha* = .91-.92) and in obese individuals (*Cronbach's alpha* = .79-.88) (Stunkard & Messick, 1985). This measure has moderate discriminant validity (*rs* between TFEQ scales range from -.37 to .64) (Gorman & Allison, 1995).

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General Psychopathology and Personality Measures

The Albany Panic and Phobia Questionnaire (APPQ) (Rapee, Craske, & Barlow, 1994) is a 27-item inventory that assesses fear of activities that produce physical sensations and phobic avoidance. This measure includes three subscales: Social Phobia, Agoraphobia, and Interoceptive. The APPQ distinguishes individuals with panic and agoraphobia from individuals with social phobia and has excellent internal consistency (coefficient alphas range from 0.87 to 0.90) (Rapee, et al., 1994). The APPQ scales have good convergent validity (*rs* between APPQ scales and similar Fear Questionnaire scales range from .66 to .67) and discriminant validity from the Penn State Worry Questionnaire (*rs* = .38) (Longley, Watson, Noyes, & Yoder, 2006).

The Alcohol Use Disorders Identification Test (Saunders, Aasland, Babor, Fuente, & Grant, 1993) is a 10-item questionnaire that was developed by the World Health Organization. This test is internally consistent (*Cronbach's alpha* = 0.83) (Saunders, et al., 1993), correlates well with other standardized alcohol screening tests, such as the Short MAST (*r*=0.66) and CAGE (*r*=0.62) (Bohn, Babor, & Kranzler, 1995; Hays, Merz, & Nicholas, 1995), and has good discriminant validity from the Beck Depression Inventory (*r*=.33) (Dum, Pickren, Sobell, & Sobell, 2008).

The Big Five Inventory (John & Srivastava, 1999) is a 44-item measure of the five general traits comprising the prominent five-factor model of personality (Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness). The BFI is a widely used and psychometrically sound measure with good internal consistency (*Cronbach's alpha* = 0.83), strong convergent validity with the NEO-FFI scales (*rs* ranged from =.66 to .79), and excellent discriminant validity (mean discriminant correlation between BFI scales = .20) (John & Srivastava, 1999).

The Drug Abuse Screening Test (DAST) (Skinner, 1982) is a 28-item screening questionnaire that assesses drug use over the past 12 months. The DAST has excellent internal consistency (*Cronbach's alpha* = 0.92) (Skinner, 1982) and is correlated with

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other standardized alcohol screening tests, such as the MAST (*r*=0.52) (Cocco & Carey, 1998; Staley & El-Guebaly, 1990). This measure possesses good discriminant validity from the Beck Depression Inventory (*r*=.26) (Dum, et al., 2008).

The Fear Questionnaire (Marks & Mathews, 1979) is a widely used self-report measure of phobia. It consists of 15 items that assess the extent to which individuals avoid certain situations. The FQ includes three dimensions: agoraphobia, social phobia, and blood-injection injury-phobia. Coefficient alphas range from 0.57 to 0.70 (Marks & Mathews, 1979). Scale intercorrelations were low to moderate (*rs* ranged from -.10 to .44) (Marks & Mathews, 1979), suggesting that the scales measure different aspects of phobia. The FQ has good discriminant validity from the Penn State Worry Questionnaire (*rs* range from .22 to .31) (Longley, et al., 2006).

The Frost Multidimensional Perfectionism Scale (FMPS) (Frost, Lahart, & Rosenblate, 1991) is a 35-item questionnaire that consists of six dimensions: Concern over mistakes, Personal standards, Parental expectations, Parental criticism, Doubt, and Organization. This measure is internally consistent (*Cronbach's alpha* = 0.88 for the total score, with subtests ranging from 0.57 to 0.95) (Frost, et al., 1991; Parker & Adkins, 1995) and demonstrates evidence of good convergent and discriminant validity from Hewitt and Flett's Multidimensional Perfectionism Scale (MPS): MPS self-oriented perfectionism was significantly correlated with all FMPS subscales, *rs* ranged from .18 to .61; MPS other-oriented perfectionism was significantly correlated with four of the six FMPS dimensions, *rs* ranged from .07-.42; and MPS social-prescribed perfectionism was correlated with all FMPS subscales, except FMPS organization, *rs* ranged from .01-.59) (Flett, Sawatzky, & Hewitt, 1995).

The Inventory of Depression and Anxiety Symptoms (IDAS) (Watson, et al., 2007) is a 64-item self-report measure of depression and anxiety. This measure is internally consistent (coefficient alphas for each scale above 0.76) and stable over time (mean one-week test-retest value of 0.78). Finally, the IDAS scales demonstrate good convergent

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and discriminant validity with the BDI-II and BAI (e.g., General Depression was strongly related to the Beck Depression Inventory-II, r = .83, and somewhat less strongly correlated with the Beck Anxiety Inventory, r=.69, whereas Panic was correlated strongly with the Beck Anxiety Inventory, r=.79, and somewhat less strongly correlated with the Beck Depression Inventory-II, r=.59) (Watson, et al., 2007).

The Schedule of Compulsions, Obsessions and Pathological Impulses (SCOPI) (Watson & Wu, 2005) is a 47-item measure with five scales that assess symptoms of—or associated with—obsessions and compulsions: Obsessive Checking, Obsessive Cleanliness, Compulsive Rituals, Hoarding, and Pathological Impulses. The SCOPI has excellent internal consistency (coefficient alphas for each scale above 0.80), is correlated with other measures of obsessions and compulsions, such as the OCI-R (*rs* between scales range from 0.11 to 0.84) (Watson & Wu, 2005), and has excellent discriminant validity from negative affectivity (*r*s ranged from -.02 to .03) (Koffel & Watson, 2009).

Statistical Analyses

Missing data were imputed using SAS version 9.2. Maximum-likelihood multiple imputation if 10% or less of the total responses for the initial item pool were missing (i.e., 16 or fewer items), averaged over 11 imputations. For other study questionnaires, imputation was carried out if 15% or less of the total responses for a questionnaire were missing, averaged over 11 imputations per questionnaire.

Exploratory factor analysis

Exploratory factor analyses were carried out to derive a set of factors that can be used to form provisional scales. Consistent with recommendations in the literature, common factor analysis rather than principal components analysis was used as the initial factor extraction method (Brown, 2006b; Fabrigar, Wegener, MacCallum, & Strahan, 1999; Floyd & Widaman, 1995). Both oblique and orthogonal rotations were examined.

The optimal number of factors to extract was determined through a variety of methods: (a) inspection of the number and size of item loadings across factors, (b)

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examination of item redundancy, and (c) parallel analysis of eigenvalues using the SAS statistical program. Specifically, items that loaded |.40| or greater on a factor and below |.30| on all other factors were considered for inclusion in a candidate scale. If a factor had fewer than three marker items (i.e., fewer than three items loading |.40| or greater), then either: (a) the factor was not retained, given that there needs to be at least three marker items are needed to define a factor defined (Brown, 2006b), or (b) additional items were written to assess the factor if it was a clinically important dimension that potentially could be retained in a subsequent phase of the study. Item redundancy was examined through the average inter-item correlation (see Convergent and Discriminant Validity, below). Finally, parallel analysis was carried out. The basic logic underlying parallel analysis is that non-trivial factors from actual data underlying a meaningful factor structure should have larger eigenvalues than parallel factors derived from a random dataset that has the same number of participants and variables. As noted by Hayton et al. (2004), "parallel analysis is one of the most accurate factor retention methods while also being one of the most underutilized" (p. 191).

Convergent and discriminant validity

Correlations between the item pool and existing measures of depression, anxiety, neuroticism, and substance misuse were used to examine discriminant validity. Items with very high correlations with depression, anxiety, and/or neuroticism (i.e., above |0.70|) were candidates for removal from the scale to ensure that the final measures of eating disorder symptoms were distinct from negative affect.

Internal consistency and homogeneity

Coefficient alpha was computed to examine the average interrelation among the set of items retained in factor analyses. Coefficient alpha was computed for each subscale/factor, given that the overall measure was expected to be multi-dimensional. Because high coefficient alphas can be obtained by including redundant items, I examined the average interitem correlation of each subscale. Ideally, average interitem

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correlations should fall within .15 to .50 (Clark & Watson, 1995; Simms & Watson, 2007). Scales were revised, as needed, to decrease redundancy if average interitem correlations were higher than .50.

Scales with low correlations with other eating disorder scales, but moderate to strong correlations with the general factor, and scales with low correlations with the general factor, but moderate correlations with other scales were retained to capture all important aspects of eating pathology fully.

Confirmatory factor analysis

Confirmatory factor analysis was conducted at the scale level to test the hypothesized structure of eating disorder symptoms obtained in exploratory factor analysis separately in men and women and in normal weight and obese individuals. Model superiority was established by inspecting the: overall model chi-square, root-mean-square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis Fit Index (TLI). These indices were selected based on their favorable performance in Monte Carlo research (Hu & Bentler, 1998, 1999; Marsh, Balla, & McDonald, 1988) and because they provide a range of information about model fit (i.e., absolute fit, fit adjusting for model parsimony, and comparative/incremental fit) (Brown, 2006b; Jackson, Gillaspy Jr, & Purc-Stephenson, 2009). Evidence for an acceptable fit were considered to be met if: (a) CFI and TLI were .90 or greater and (b) RMSEA was .08 or less (Hu & Bentler, 1999).

The Bayesian Information Criterion (BIC) also was used to compare the fit of nested and non-nested models using the formula provided by Raftery (1995) $\chi^2 - df * ln(N)$, where χ^2 is the chi-square fit statistic for the model, df is the corresponding degrees of freedom, and N is the sample size. The objective of Bayesian approaches to model selection is to choose the model that has the highest posterior probability (i.e., the highest Bayes factor or odds). Thus, given the observed data, the difference in BIC values provides an odds ratio of the probability that the second model is correct divided by the

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probability that the first model is correct. In comparing two models, a difference between BICs of 2-6 represents positive evidence (3:1 to 20:1 odds), differences of 6-10 represent strong evidence (20:1 to 150:1 odds), and differences larger than 10 represent very strong evidence (greater than 150:1 odds) in favor of the model with the smaller (i.e., more negative) BIC value, respectively (Kass & Raftery, 1995; see also Nagin, 1999). An important feature of the BIC is that it balances two important aspects of model fit: the discrepancy between obtained and model-implied moments and the number of parameters estimated in the fitted model. Thus, the BIC favors parsimonious models that also accurately reproduce the obtained data (for further discussion of the BIC, see Krueger, Caspi, Moffitt, & Silva, 1998). BIC improves as the number of observed variables increases; therefore, BIC was only used to compare models with the same number of observed variables.

Multiple-group confirmatory factor analysis was carried out to examine whether the data are invariant between men and women and between normal weight and obese individuals. Based on recommendations provided by Cheung and Rensvold (2002), I examined the overall model *chi-square,* as well as changes in *RMSEA, CFI, Gamma hat*, and *McDonald's non-centrality index (NCI)*. In comparing a more restricted to a less restricted model, changes of greater than -0.01 (*CFI*), -0.001 (*Gamma hat*), and -0.02 (*NCI*) suggest rejecting the null hypothesis of invariance. Any evidence for factor variance was used to refine the scale to ensure the measure is valid across multiple groups. However, if factor variance was judged to represent empirical reality, rather than psychometric invalidity, then separate scales were developed for each sex.

Results and Discussion

Interitem Correlations

Prior to conducting factor analyses, Pearson's correlations were computed between variables included in the initial item pool. Items 7 and 8 had a correlation above

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0.70 in the community sample and items 7, 8, and 9 had correlations close to or above 0.70 in the student sample. Thus, items 7 and 8 were not included in subsequent analyses.

The item pool also was examined to determine whether there were high correlations with neuroticism (i.e., above |0.70|), as these items would be candidates for removal from the scale. The highest correlation was between Item 70 ("I was self-conscious about the way my body looked") and neuroticism (r=0.38 in the community sample and r=0.45 in the student sample). Therefore, given the moderate magnitude of these associations, no items were removed from the item pool on the basis of their correlations with neuroticism.

Preliminary Analyses

As previously mentioned, the EDE-Q is a rationally created measure and preliminary structural analyses were, therefore, carried out to see if the discriminant validity of the EDE-Q could be improved. Exploratory factor analysis with promax rotation was carried out to improve this measure's discriminant validity. Four factors were extracted initially, because the EDE-Q has four rationally derived scales. In community members, the 4-factor solution was interpretable, but only two items loaded above |.40| on the fourth factor, indicating that the 4-factor solution was under-defined. Three factors then were extracted, which resulted in an interpretable solution. Items with substantial cross-loadings or low primary loadings were removed (i.e., Items 2, 5, 6, 10, 12, 20, and 21) and the 3-factor analysis was re-run on the remaining questionnaire items. In student participants, the 4- and 3-factor solutions were interpretable and both solutions had at least three marker items per factor. The 3-factor solution was retained due to its similarity to the community sample analysis. Items with substantial cross-loadings or low primary loadings were removed (6, 10, 12, 20, and 21). Item 5 was removed because it loaded on different factors in each sample and Item 2 was removed so that the questionnaire content would be consistent between samples. After removing these questionnaire items (see Table A3 for a list of omitted questionnaire items), the 3-factor

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analysis was re-run on the remaining questionnaire items. The final 3-factor solution is presented in Tables A4 and A5.

The initial estimates of common variance indicated that the revised EDE-Q (hereafter referred to as the EDE-QR) accounted for 66.5% of the total variance in community members and 66.1% of the total variance in students. Body Dissatisfaction captured more total variance than the other two factors (Community Eigenvalue = 7.27 and Student Eigenvalue = 7.57). Body Dissatisfaction was marked by items such as "How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower?" and "How dissatisfied have you been with your weight?"

The other two factors were more specific and included content related to cognitive restraint and food/ weight concerns. Restraint was similar to the original EDE-Q Restraint scale, except that item 5 ("Have you had a definite desire to have an empty stomach, with the aim of influencing your weight or shape?") was omitted from the revised questionnaire. Restraint was marked by such items as "Have you deliberately been trying to limit the amount of food you eat to influence your weight or shape (whether or not you have succeeded)?" and "Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?" Eating/Body Concerns included one item from the EDE-Q Shape Concerns scale (i.e., "Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?") and items from the EDE-Q Eating Concerns scale (e.g., "Have you had a definite fear of losing control over eating?").

The correlations among the original scales ranged from .90 and .93 (for Weight Concerns and Shape Concerns) to .50 and .61 (for Restraint and Eating Concerns) in community members and in students, respectively. The correlations among the revised scales ranged from .43 (for Body Dissatisfaction and Restraint) to .48 (Body

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Dissatisfaction and Eating/Body Concerns) in community participants, and from .54 (Body Dissatisfaction and Eating/Body Concerns) to .55 (Restraint and Eating/Body Concerns) in student participants. These results indicate that the EDE-QR has substantially improved discriminant validity compared to the original questionnaire.

Exploratory Factor Analysis

Prior to conducting exploratory factor analyses of the Iowa Eating Behaviors Questionnaire, parallel analysis was conducted to aid in determining the optimal number of factors to extract. This analysis suggested that a maximum of 9 and 14 factors should be extracted in the community and student samples, respectively. Thus, the 1-9 factor solutions for community members and the 1-14 factor solutions for students were examined using principal factor analysis with both oblique and orthogonal rotations.

In students, the 11-factor solution initially appeared to be the most interpretable. Items were removed from the initial item pool if they had substantial cross-loadings on other factors (>.30) or low loadings on the primary factor (<.30) using principal factor analysis with varimax rotation. This resulted in the removal of the following 57 items, 35.6% of the initial item pool: 13, 18, 20, 22, 25-32, 53, 56, 58, 64, 71-72, 75-78, 81-83, 85, 90-91, 96, 104-105, 108-109, 111-113, 126, 130-133, 138, 143, 145-149, 151-158, and 160. The analysis was re-run using the revised item pool consisting of 101 items. This resulted in no items with primary loadings on factor 11. Thus, the factor analysis was re-run and 10 factors were extracted, which resulted in only 1 item loading on factors 9 and 10. The 8-factor solution had at least three marker items on each factor and was readily interpretable.

In community members, the 9-factor solution appeared interpretable, but had several items with substantial cross-loadings on other factors (>.30) or low loadings on the primary factor (<.30). This resulted in the following 71 items being removed from the initial item pool: 3, 9, 13, 18-32, 35, 39-40, 43, 45-47, 49, 52-55, 57, 64-65, 73-75, 78, 80, 83, 88-90, 92, 94, 100, 102-109, 111-113, 124, 126, 132, 136, 139-141, 145-156, and

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158. The 9-factor solution was re-run on the reduced pool of 87 items. This resulted in only two items (Item 75, "I did not participate in certain activities because people would notice my weight" and Item 56, "I wanted more defined abdominal muscles") loading above |0.40| on Factor 9, which indicated that the 9-factor solution was under-defined. The 8-factor solution resulted in an interpretable solution. Thirteen items with substantial cross-loadings or low primary loadings were removed (i.e., Items 33, 41-42, 48, 60, 67, 72, 81, 85, 130, 131, 134, 157) and the 8-factor analysis was re-run on the reduced pool of 74 items. The revised 8-factor solution had at least three marker items per factor and was interpretable. Tables A6 and A7 present the promax factor loadings for the 8-factor solution in the student and community samples.

Among the eight factors, the initial estimate of common variance constituted 62.0% and 64.3% of the total variance in the community-member and student samples, respectively. Body Dissatisfaction, was a large factor characterized by general dissatisfaction with one's shape and weight (Community Eigenvalue = 14.3 and Student Eigenvalue = 20.1). Body Dissatisfaction was marked by such items as "I was self conscious about the way my body looked" and "I thought my arms were too fat." The other seven factors were more specific and defined various aspects of eating pathology. These factors were tentatively labeled Binge Eating (e.g., "I stuffed myself with food to the point of feeling sick"), Weight Control Behaviors (e.g., "I tried to avoid foods with high fat content" and "I felt guilty when I missed a workout or exercise class"), Body Building Supplements (e.g., "I took weight gainers" and "I used muscle building supplements"), Negative Attitudes toward Obesity (e.g., "I was disgusted by the sight of obese people"), Purging (e.g., "I made myself vomit in order to lose weight"), Restricting (e.g., "People told me I do not eat very much"), and Muscularity (e.g., "I wanted more defined abdominal muscles").

Only one item (Item 110, "I was told that I am too thin") demonstrated a cross-loading above |0.30| in the community sample. Two items demonstrated a cross-loading

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above |0.30| in the student sample. These items were Item 110 (see above) and Item 115 ("I thought laxatives are a good way to lose weight"). These items were retained given their potential relevance to diagnosable eating disorders.

Across samples, all eight factors corresponded to the original HICs, including: Body Dissatisfaction, Binge Eating, Weight Control Behaviors (which represents a blend of the Cognitive Food Restraint and Excessive Exercise HICs), Purging, Body Building Supplement Use, Desire for High Muscularity, Restricting (which represents a combination of the Fasting/Dietary Restraint, Obsession with Slimness/Refusal to Maintain "Normal" Body Weight, and Satiety HICs), and Negative Attitudes toward Obesity. Contrary to the hypothesized structure, sub-factors of binge eating did not emerge. In addition, food/weight rituals items did not load on any factor and fear of fatness items cross-loaded on Body Dissatisfaction. These HICs were subsequently dropped from future analyses.

The content for each factor was similar across samples, with one exception. In the community sample Weight Control Behaviors was defined both by attempts to: (a) reduce dietary intake *and* (b) increase caloric expenditure through exercise, whereas this factor was defined exclusively by exercise in the student sample. To examine the similarity of the factor structures in the student and community samples more formally, comparability coefficients were examined in each sample. Comparability coefficients were computed by calculating regression-based factor scoring weights for each factor solution, multiplying the factor scoring weights against the standardized item responses, and summing them to obtain estimated factor scores. The two sets of factor scores, based on the community and student solutions, were correlated to obtain comparability coefficients for each sample (see Tables A8 and A9).

Comparability coefficients ranged from .46 to .99. The comparability coefficients for Body Dissatisfaction, Binge Eating, Negative Attitudes toward Obesity, Body Building Supplements, and Restricting demonstrated excellent similarity between

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samples, exceeding the recommended benchmark of .90 in both samples *(r*s ranged from .94 to .99 across the two samples*)*, indicating strong structural replication (Everett, 1983).

In contrast, Weight Control Behaviors, Purging, and Muscularity had comparability coefficients that were below recommended guidelines, with Weight Control Behaviors demonstrating particularly poor structural replication between samples. As noted above, the Weight Control Behaviors factor assessed narrower content in student versus community samples. The content of the Purging scale was characterized by laxative use, diuretic use, and diet pill use in community participants, but was characterized by self-induced vomiting and laxative use in students. Although the self-induced vomiting item (i.e., Item 114) was retained in the community sample, the loading of this item on the Purging factor was .32 in community participants, whereas this item loaded .60 on the Purging factor in student participants. These results indicate that self-induced vomiting may be more relevant to younger participants, whereas diet pill and diuretic use may be more important to the construct of Purging in older samples.

Muscularity was comprised of a desire to increase muscle mass, muscle tone, and definition of abdominal and chest muscles in both samples, whereas in the student sample it also was characterized by a desire to increase muscle mass in the arms and by the belief that one's arms were too thin. These results may be due to age effects. For example, younger participants tend to have higher metabolic rates, greater muscle mass, and less abdominal adipose tissue than older participants (Fukagawa, Bandini, & Young, 1990; Howel, in press; Lazzer, et al., 2010). This may explain why items assessing a desire to have more defined abdominal and chest muscles were more central to Muscularity in community adults.

Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was used to determine how well the 8-factor model fit the data in each sample separately. A mean- and standard errors- adjusted chi-square statistic was calculated using Robust Weighted Least Squares (WLSMV) in

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Mplus. WLSMV was chosen over maximum likelihood estimation, because WLSMV is an appropriate estimator for ordinal data. For the initial models, all latent factors were allowed to be correlated.

Student Sample

Model 1 was based on the best-fitting EFA reported in Table A7. The initial 8-factor CFA model (Model 1) demonstrated a good fit to the data in the student sample (see Table A10). All items loaded significantly on their latent factors (p's<.03). Most latent factors were significantly correlated with each other. However, the latent Body Building Supplements factor was uncorrelated with the Binge Eating, Purging, and Restricting factors. Muscularity was uncorrelated with the Purging and Weight Control Behaviors factors and Restricting was uncorrelated with Binge Eating.

Modification indices indicated that there were several areas of localized model strain. To address these issues, additional items were removed from the initial item pool to improve model fit. This resulted in the removal of the following seven additional items: 3, 14, 61, 65, 121, 139, and 141. (Item 110 also had a significant modification index; however, this item was retained in Model 2, given its potential relevance to anorexia nervosa.) Correlations for latent factors that were not significant in Model 1 were set to zero. After making these changes, model fit improved based on an examination of CFI, TLI, and RMSEA (see Model 2 in Table A10). In Model 2, all items loaded significantly on their latent factors (p's <.05); however, Item 110 had a very small loading on the latent Restricting factor (λ=0.14). Thus, Item 110 was dropped from the Restricting factor and the analyses were re-run (Model 2b). In this model all items loaded significantly on their latent factors (p's <.001). However, the Muscularity factor was no longer significantly correlated with the Restricting factor (r=0.102, p=.06). Thus, the correlation between Restricting and Muscularity was set to zero and the model was run again, which resulted in Model 2c.

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To determine whether Body Dissatisfaction represented a general higher order factor, Binge Eating, Weight Control Behaviors, Body Building Supplements, Negative Attitudes toward Obesity, Purging, Muscularity, and Restricting were regressed on the latent Body Dissatisfaction factor (see Model 3 in Table A10). In Model 3, the seven latent endogenous factors were allowed to correlate with each other. In Model 3b, correlations for latent endogenous factors that were not significantly correlated with each other in Model 3 were fixed to zero. Specifically, correlations between: (1) Purging versus Binge Eating, Purging versus Weight Control Behaviors, and Purging versus Negative Attitudes toward Obesity, (2) Restricting versus Binge Eating and Restricting versus Body Building Supplements, and (3) Muscularity versus Binge Eating, Muscularity versus Weight Control Behaviors, Muscularity versus Purging, and Muscularity versus Restricting were set to zero.

Finally, the concept of a higher order structure was examined by allowing all 8-factors (including Body Dissatisfaction) to be regressed on a latent exogenous Eating Pathology factor (Model 4). This allowed for the possibility of a higher order structure that was not explained by the influence of body dissatisfaction on eating disorder symptoms. Although BIC indicated that Model 3b fit slightly worse than Model 3 (Δ BIC = .84), CFI and RMSEA were better for Model 3b. Thus, Model 3 or Model 3b appeared to represent the best-fitting model in student participants, as there are few differences in fit indices between these models.

Community Sample

The same process of model testing was conducted for community participants. Model 1 was based on the best-fitting EFA reported in Table A6. The initial model fit was poor, with fit indices generally below recommended guidelines. To improve model fit, modification indices were used to remove items to reduce areas of localized model strain. This resulted in the removal of the following 15 items: 5, 76, 79, 86, 93, 96, 110, 117, 121, 122, 127, 135, 138, 159, and 160. After removing these items, model fit

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improved substantially (see CFI, TLI, and RMSEA for Model 2 in Table A11). All items loaded significantly on their latent factors (*p*'s <.001), yet several latent factors were uncorrelated with one another. Thus, correlations between: (1) Body Building Supplements versus Binge Eating and Body Building Supplements versus Purging, (2) Restricting versus Body Dissatisfaction, Restricting versus Binge Eating, and Restricting versus Muscularity were set to zero and the model was re-run (see Model 2b in Table A11).

To determine whether Body Dissatisfaction represented a general higher order factor, Binge Eating, Weight Control Behaviors, Body Building Supplements, Negative Attitudes toward Obesity, Purging, Muscularity, and Restricting were regressed on the latent Body Dissatisfaction factor (see Model 3 in Table A11). All latent factors were allowed to correlate with each other. This model resulted in a good fit to the data, yet Restricting was not significantly correlated with Body Dissatisfaction. There were also several latent factors that were uncorrelated with each other (e.g., Weight Control Behaviors was not correlated with the Binge Eating, Body Building Supplements, or Negative Attitudes toward Obesity factors and Muscularity was not correlated with Purging or Restricting). Thus, the model was re-run setting non-significant correlations to zero (see Model 3b in Table A11).

Finally, the concept of a higher order structure was examined by allowing all 8-factors (including Body Dissatisfaction) to be regressed on a latent exogenous Eating Pathology factor (see Model 4 in Table A11). The results of Model 4 indicated that the latent endogenous Body Building Supplements and Restricting factors were uncorrelated with the latent eating pathology factor. Model 4 was therefore run again and the factor loadings of Body Building Supplements and Restricting on the general exogenous eating pathology factor were fixed to zero (see Model 4b in Table A11). Based on a comparison of fit indices and BIC values, the best-fitting model in community participants was Model 3, which demonstrated a better fit to the data relative to Model 3b, which was the next

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best-fitting model. Although Model 2b had better CFI, TLI, and RMSEA values relative to Model 3, the BIC clearly demonstrated a better fit for Model 3.

An examination of BIC values across samples provided further evidence favoring Model 3 as the optimal model. Finally, CFI, TLI, and RMSEA were all within recommended guidelines for this model. Thus, across both samples, the best-fitting CFA models were ones in which Body Dissatisfaction represented a general factor that was super-ordinate to other latent eating pathology factors (Model 3). In the community sample, the Restricting and Body Building Supplements factors demonstrated weak links to this general factor, but had stronger links to other sub-ordinate eating pathology factors. Moreover, there was evidence that regressing eating pathology factors on Body Dissatisfaction did not improve (or worsen) model fit compared to a model without a super-ordinate factor in the community sample.

Factorial Invariance

Prior to conducting multiple-group analyses between sexes and weight categories, principal factor analysis with promax rotation was carried out in men and women and across weight categories to determine the initial structure in these subgroups prior to examining replicability. Items from the final exploratory factor analyses for the community and student samples were used to examine the exploratory factor structure in each subsample (i.e., all items included in Tables A6 and A7). To ensure adequate power, data were combined across the community and student samples.

Exploratory Structure in Men and Women

Items that loaded below |.40| on their primary factor or demonstrated cross-loadings above |.30| on other factors were dropped from the item pool and the analysis was re-run. This resulted in the removal of the following items in men: 1, 3, 6, 5, 37, 56, 58, 69, 46, 50, 51, 70, 91, 110, 117, 118, 119, 121, 122, 123, 125, 127, 143, 48, and 106. The following items were removed from the item pool in women: 6, 54, 133, 21, 48, 52, 55, 81, 103, and 86.

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As shown in Tables A12 and A13, an 8-factor structure was interpretable in each sample, although there were sex differences in the form of these factor structures. In men, the Body Building Supplement items initially loaded together with excessive exercise items or cross-loaded on the Muscularity or Purging factors. After these items were removed from the item pool, there no longer was a Body Building Supplements factor in men. In women, items from the Muscularity scale generally loaded on the Body Dissatisfaction factor (although one item, "I would have felt more confident if I had greater muscle mass," cross-loaded on the Restricting factor and subsequently was removed from the item pool). The Weight Control Behaviors factor split into a Cognitive Restraint factor (e.g., "I tried to avoid foods with high calorie content") and an Excessive Exercise factor (e.g., "I exercised even when I was sick") for both sexes.

Exploratory Structure across Weight Categories

In the normal weight sample, the overall initial structure replicated well. The only items with substantial cross-loadings were items 52, 54, 55, and 125. These items were dropped and the analysis was re-run, resulting in 8 factors. There were a few differences in the form of the factor structure for normal weight participants compared to the community and student samples. First, Muscularity items failed to form a distinct factor. Second, the Weight Control Behaviors factor split into a Cognitive Restraint factor and an Excessive Exercise factor. Finally, items 56 ("I wanted more defined abdominal muscles") and 58 ("I wished my body was more toned") loaded on the Body Dissatisfaction factor, whereas item 57 ("I wanted a more muscular chest") loaded on the Body Building Supplements factor (see Table A14).

In the obese and overweight sample, several of the Binge Eating items had substantial negative cross-loadings on the Restraint factor (i.e., items 1, 4, 5, 6, and 12). Other items had low loadings on their primary factors or high cross-loadings and were removed from the item pool, resulting in the removal of additional items (i.e., items 21, 41, 44, 58, 86, 102, 103, 110, 117, 125, 134, 135, 136, 137, 138, 139, 140, 141, and 160).

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After removing these items, there were 8 factors, which were highly similar to the factors derived in earlier samples (see Table A15). One difference in the obese and overweight group was that items 86 and 110 no longer loaded on the Restraint scale. In addition, Excessive Exercise items did not load on any factor (i.e., these items did not load on a Weight Control Behaviors factor, as they had in the combined community and student samples, nor did these items define their own factor).

In general, the 8-factor structure identified in the community and student samples was replicated across weight categories. The most notable differences were the lack of a Muscularity factor for normal weight participants and the absence of Excessive Exercise items for overweight and obese participants. Various Binge Eating items did not perform well in the obese sample; however, these items were removed from the item pool in an attempt to reduce bias in the final questionnaire.

Multiple Group Analysis in Men and Women

A series of nested hierarchical models was examined to test increasingly restrictive invariance models using robust weighted least squares (WLSMV) and the delta parameterization. Because the data were ordinal, thresholds were modeled instead of intercepts or means. The number of thresholds for each item was equal to the number of categories minus one. Thresholds for items 2, 36, 114, 115, 128, and 129 differed between men and women. To account for differences in these thresholds, categories were collapsed so that the thresholds were equivalent between sexes.

There are numerous ways to test measurement invariance. Often researchers test equivalent form, factor loadings, thresholds, and residual variances in a step-wise fashion (Dimitrov, 2010; South, Krueger, & Iacono, 2009). For ordinal data, however, thresholds and factor loadings must be constrained at the same time because the item probability curve is influenced by both parameters (Millsap & Yun-Tein, 2004; Muthén & Muthén, 1998-2007, p. 399-400). Thus, invariance testing for ordinal data consists of two steps (Muthén & Muthén, 1998-2007). The first step, invariance of form, tests whether the

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same items are indicators for the same factor(s) across groups. Scale factors are fixed to one in both groups and factor means are fixed to zero in both groups. In the second step, factor loadings and thresholds are constrained to be equal across groups.

To compare the fit of increasingly restrictive models, differences in chi-square values are examined to determine if imposing a constraint reduces model fit. A non-significant chi-square difference value is suggestive of factor invariance, whereas significant values suggest a lack of factor invariance. For ordinal data, differences in chi-square values are not distributed as a chi-square. Thus, non-parametric bootstrapped chi-square values (using 500 draws) were calculated using maximum-likelihood estimation to compare chi-square differences for nested and non-nested models.

Configural Invariance. Prior to multiple group analysis each model was tested separately to ensure the model fit was acceptable in both groups. Items for these CFAs were chosen if they were represented across multiple groups in prior exploratory and confirmatory factor analyses. For example, item 1 was not retained in men or in the obese/overweight sample; therefore, this item was not included in these analyses. The two exceptions were: (1) the Muscularity and Body Building Supplement factors were included, even though these factors did not emerge in all groups, to allow for the possibility of sex-specific questionnaires and (2) a Cognitive Restraint factor (rather than a Weight Control Behaviors factor or an Excessive Exercise factor) was used, because this factor was the most robust across samples in previous analyses. Overall, 49 items (30.6% of the original pool) were retained for these analyses.

Models were specified according to the best-fitting models identified from previous CFAs. Binge Eating, Cognitive Restraint, Body Building Supplements, Negative Attitudes toward Obesity, Purging, Muscularity, and Restricting were regressed on the latent Body Dissatisfaction factor. Initial models allowed latent factors to be correlated with one another.

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In women, the initial model demonstrated a marginal fit to the data (χ^2=623.34(99), p<.001, *CFI*=.879, *TLI*=.913, *RMSEA*=.107). Item 118 ("I took weight gainers") and item 119 ("I thought about taking weight gainers") had correlations of -.997 or above with items 114, 128, and 129 from the Purging factor, which resulted in a not positive definite residual covariance matrix, due to a linear dependency for these items. Removing these items would have resulted in too few items to define a Body Building Supplement factor; therefore, this factor was dropped from all subsequent analyses.

Consistent with prior CFAs, non-significant correlations for latent variables were set to zero. This resulted in the following correlations being set to zero: (1) Restricting versus Body Dissatisfaction, (2) Cognitive Restraint versus Binge Eating, (3) Negative Attitudes toward Obesity versus Cognitive Restraint, and (4) Muscularity versus Binge Eating, (5) Muscularity versus Cognitive Restraint, (6) Muscularity versus Negative Attitudes toward Obesity, (7) Muscularity versus Purging, and (8) Muscularity versus Restricting. As shown in Table A16, the resulting model demonstrated an excellent fit to the data.

For men, the initial model demonstrated an excellent fit to the data (χ^2=284.44(87), p<.001, *CFI*=.939, *TLI*=.957, *RMSEA*=.078), but was revised because item 116 ("I used laxatives in order to lose weight") was not endorsed by any male participant and this resulted in a not positive definite residual covariance matrix. The following non-significant correlations for latent variables were set to zero: (1) Restricting versus Body Dissatisfaction, (2) Restricting versus Cognitive Restraint; (3) Cognitive Restraint versus Binge Eating; (4) Negative Attitudes toward Obesity versus Cognitive Restraint, (5) Negative Attitudes toward Obesity versus Binge Eating, (6) Negative Attitudes toward Obesity versus Purging, (7) Muscularity versus Cognitive Restraint, (8) Muscularity versus Restricting. This model resulted in an excellent fit (see Table A16).

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Factorial Invariance Models. Table A16 shows that the invariance of form model produced adequate fit statistics. The next step tested for factor loading and threshold invariance. This model provided an adequate fit to the data, although CFI and RMSEA values still were not within accepted guidelines.

The invariance test comparing model form to factor loadings and thresholds resulted in a significant chi-square. Given that model chi-square tests are overly sensitive to sample size, researchers recommend that changes in other fit indices should also be considered when testing factorial invariance (Cheung & Rensvold, 2002; Dimitrov, 2010; Wu & Zumbo, 2007). In comparing a more restricted to a less restricted model, changes greater than -.01 (*CFI*), -.001 (*Gamma hat*), and -.02 (*NCI*) suggest rejecting the null hypothesis of invariance. For example, a *negative* ΔCFI value lower than -.01 (e.g., ΔCFI = -.02) would indicate factorial variance. CFI, Gamma Hat, and NCI values greater than zero do *not* suggest a lack of invariance and can result from changes in degrees of freedom (Dimitrov, 2010). Based on an examination of fit indices, it appears that the factor loadings and thresholds are invariant across men and women (see Table A17).

Modification indices were used to determine if relaxing between group constraints on factor loadings, thresholds, or latent means might improve model fit. Large modification indices were found for the factor loading and threshold of item 57 ("I wanted a more muscular chest"), factor loadings and thresholds of the observed indicators of Body Dissatisfaction, and for the Body Dissatisfaction and Muscularity latent means. The factor loading and threshold of item 57 and the factor loadings and thresholds for the observed indicators of Body Dissatisfaction were allowed to be freely estimated in both sexes. This resulted in a slightly improved model fit, as indicated by chi-square values and ΔBIC.

Finally, factor means for the latent Body Dissatisfaction and Muscularity factors were also allowed to vary across sexes. Relaxing these constraints resulted in a substantially better fit.

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Upon further inspection of the parameter values, results indicated that: (1) item 57 was a stronger indicator of Muscularity in men (λ=.915, p<.001) compared to women (λ=.661, p<.001), (2) the intercept for the Muscularity factor was higher in men (z=14.11, p<.05), and (3) the latent mean for Body Dissatisfaction was significantly lower in men compared to women (z=-11.42, p<.05). Although the model is invariant across sex, these findings, as well as the results of exploratory factor analyses, suggest that the Muscularity factor is an important aspect of eating pathology in men, but that this scale may not be as useful for understanding eating pathology in women.

Multiple Group Analysis in Obese and Overweight

Configural Invariance. Prior to multiple group analysis each model was tested separately to ensure the model fit was acceptable in both groups. The same procedures used for testing separate CFAs across sex were used to test CFAs across weight categories (i.e., the same 49 items used in configural analyses for men and women were used for invariance testing in normal weight and overweight/obese samples). Thresholds for items 2, 114, 115, 128, 129, and 133 differed between normal weight and overweight/obese participants. To account for differences in these thresholds, categories were collapsed so that the thresholds were equivalent across weight categories.

As shown in Table A18, the initial model demonstrated a good fit to the data in both normal weight and overweight/obese participants. High modification indices were found for items 54 and 57 from the Muscularity factor in normal weight participants, which is consistent with the lack of a Muscularity scale in normal weight participants in exploratory factor analyses. A high modification index was also found for item 57 in the overweight and obese sample. These items were retained so that the final model would be comparable across all samples (including men and women).

Factorial Invariance Models. Table A18 shows that the invariance of form model produced adequate fit statistics. The next step tested for factor loading and threshold invariance. This model provided a good fit to the data. The invariance test comparing

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model form to factor loadings and thresholds resulted in a significant chi-square (see Table A19). Other indices of fit indicated that the factor loadings and thresholds were invariant across weight categories.

Modification indices were used to determine if relaxing between-group constraints on factor loadings, thresholds, or latent means might improve model fit. Moderately large modification indices were found for the Body Dissatisfaction, Binge Eating, and Restricting latent factor means. In addition, the factor loadings and thresholds for items 57, 66, 94, and 107 also had large modification indices. Allowing these parameters to be freely estimated in each group resulted in a substantially improved model fit, as demonstrated by chi-square and ΔBIC.

An examination of these results further indicated that overweight and obese individuals had a higher latent mean for the Body Dissatisfaction factor compared to normal weight participants (z=5.34, p<.001). The intercept for the Restricting factor was significantly lower in overweight and obese participants (z=-6.32, p<.001); however, the intercept for the Binge Eating factor was equivalent between groups (z= 1.87, p=.062). Finally, the factor loadings for items 57, 94, and 107 were higher in the normal weight (λ*'s* ranged from .626 to .843, p's <.001) compared to the overweight/obese sample (λ*'s* ranged from .538 to .737, p's <.001), whereas the factor loading for item 66 was higher in the overweight/obese sample (λ=.847, p <.001) versus the normal weight sample (λ=.737, p <.001).

Internal Consistency

The results of structural analyses were used to create provisional scales for each sample. The basic criteria for an item to be included in a scale were that it had to load |.40| or greater on the primary factor and have cross-loadings of less than |.30| in EFA. Items that met these criteria were summed to form scales. Because different factor solutions were obtained for community versus student participants, two different versions of the scales were created. Internal consistency was calculated using items from each

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scale. Data were examined in each sample separately because different scales were created for each sample. To determine if the scale properties were comparable across samples, coefficient alphas and AICs were computed for both community and student factor solutions in both samples.

Tables A20-A22 present internal consistency reliabilities (coefficient alphas) and average interitem correlations for the community and student samples. Median values are also presented to facilitate comparison across samples, genders, and weight categories. Internal consistency coefficients were highly similar between community and student samples, which may be due to the fact that the scales had overlapping item content. For example, in the community solution, the number of items common to the student sample was: 10/12 (Body Dissatisfaction), 14/17 (Binge Eating), 2/10 (Weight Control Behaviors), 8/8 (Body Building Supplements), 6/6 (Negative Attitudes toward Obesity), 3/7 (Purging), 5/5 (Restricting), and 1/4 (Muscularity). For the student solution, the number of items common to the community sample was: 10/31 (Body Dissatisfaction), 14/19 (Binge Eating), 2/7 (Weight Control Behaviors), 8/8 (Body Building Supplements), 6/6 (Negative Attitudes toward Obesity), 3/3 (Purging), 5/5 (Restricting), and 1/4 (Muscularity). Coefficient alphas were excellent with 59 of the 80 values reaching .80 or above. Moreover, each provisional scale had a coefficient alpha at or above .80 in at least one sample.

Given that extant eating disorder symptom measures generally have lower internal consistency reliability in men versus women and in obese versus normal weight individuals, internal consistency reliabilities were also carried out separately for these subsamples. There were two notable sex differences in the internal consistency reliabilities. The Purging scale had lower internal consistency reliabilities in men (particularly in student men) compared to women, whereas the reverse was true for the provisional Muscularity scale. The lower internal consistency reliabilities for the Purging scale are likely due to the low base rates of inappropriate compensatory behaviors in

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younger men (e.g., Means for Purging scale items ranged from 0-.03 for student men and .07-.22 for student women). There was one notable difference in internal consistency reliabilities across weight categories. The Restricting scale had substantially lower values in overweight and obese participants compared to normal weight participants.

Average interitem correlations (AIC) should fall within the range of .15-.50 (Clark & Watson, 1995). Most scales were within this range in at least one sample, with the exception of the provisional Negative Attitudes toward Obesity, which had AIC values above .50 in all samples. Overall, results suggest that the item content of most scales is moderately interrelated, with the exception of Negative Attitudes toward Obesity (in all samples), Body Building Supplements (in normal weight and overweight/obese participants), and Weight Control Behaviors (in students), which included a narrower range of content.

Convergent and Discriminant Validity

Internal Structure

Tables A23 and A24 present the correlations between the provisional scales in the community and student participants. The scales show good discriminant validity, with correlations generally in the small to moderate range. The highest correlation among the scales was 0.54 in community participants and 0.48 in student participants. Body Dissatisfaction was significantly correlated with all scales, except the Restricting and Body Building Supplements scales in the community sample. These results further suggest that Body Dissatisfaction may represent a general scale that exists at a higher-order level to most other scales, although certain eating pathology dimensions may be distinct from this general scale.

Eating Pathology

As shown in Tables A25-A29 the provisional scales demonstrated excellent convergent and discriminant validity in terms of the patterns of correlations between the scales and existing measures of eating pathology.

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Across both samples, scales demonstrated excellent convergent validity. Body Dissatisfaction was significantly correlated with all the existing eating pathology measures included in this study. Body Dissatisfaction demonstrated high correlations with other measures of body dissatisfaction, as well as moderate to high correlations with the EDI-3, EDE-Q, EDE-QR, DEBQ, and TFEQ, suggesting that this scale captures the majority of the variance associated with current self-report measures of eating disorder symptoms. Body Dissatisfaction was also significantly positively correlated with body mass index and lifetime history of eating disorder symptoms.

Binge Eating was also a relatively broad scale; it demonstrated low to moderate correlations with measures of body dissatisfaction and moderate to strong correlations with binge eating scales from the EDI-3, DEBQ, and TFEQ. Binge Eating was positively correlated with self-reported body mass index in the community sample, but not the student sample. Because the community sample is, on average, older than the student sample, this result may reflect a combination of lowered metabolic rate in the community sample (due to lower metabolic efficiency associated with increased age) and the influence of greater cumulative years of binge eating on weight. Binge eating was associated with a lifetime history of various eating disorder behaviors and these correlations were strongest for binge eating. As expected, Binge Eating was weakly correlated with measures of restrained eating in both samples.

Weight Control Behaviors had small correlations with measures of dietary restraint in the student sample and high correlations with measures of dietary restraint in the community sample. The reason for this finding is likely because there were differences in the content of the Weight Control Behaviors factor for community participants versus student participants. This scale had small, significant positive correlations with fasting in both samples. Weight Control Behaviors was uncorrelated with body mass index in the student sample and had a small, positive correlation with body mass index in the community sample.

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Body Building Supplements had small, yet significant, correlations with the Muscularity scale and Height scale from the MBAS in both samples, although these correlations were stronger for students. These data suggest that individuals who scored high on the Body Building Supplements scale also tended to desire a taller and more muscular body. The Body Building Supplements scale also demonstrated small negative correlations with measures of body dissatisfaction, restrained eating, and the Low Body Fat scale from the MBAS, and a small positive correlation with the Hunger scale from the DEBQ in the student sample. This scale had a significant small positive correlation with body mass index in the student sample and was uncorrelated with body mass index in community adults. Across both samples, Body Building Supplements was not correlated with a lifetime history of eating disorder behaviors.

Negative Attitudes toward Obesity had small correlations with an array of eating pathology measures, including measures of body dissatisfaction and restrained eating, although these correlations generally were stronger in the student sample. Negative Attitudes toward Obesity was uncorrelated with body mass index and had significant, yet small correlations with a lifetime history of all eating disorder behaviors – except self-induced vomiting – in students and a lifetime history of fasting and binge eating in community adults.

Purging was moderately correlated with a variety of eating disorder measures, including scales that assessed body dissatisfaction and dietary restraint. Purging demonstrated small to moderate correlations with the EDI-3 Bulimia scale and had a small correlation with the DEBQ Disinhibition scale. As expected, Purging demonstrated the highest correlations with lifetime histories of self-induced vomiting, laxative use, and diuretic use in both student and community participants and had the highest correlation with fasting in community, but not student participants.

As expected, the Muscularity scale had strong positive correlations with the Muscularity scale from the MBAS, as well as small (in students) to small-moderate (in

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community participants) positive correlations with the MBAS Low Body Fat and Height scales and various other measures of body dissatisfaction.

Overall, the Restricting scale had the weakest correlations with existing self-report measures of eating pathology. Restricting demonstrated very low, albeit significant, positive correlations with most measures of dietary restraint in both the student and community samples. Interestingly, Restraint was the only scale that was significantly *negatively* correlated with body mass index. It is difficult to determine whether Restricting reflects an aspect of eating pathology that previously has been difficult to assess (given that measures of dietary restraint typically are correlated with eating pathology, but uncorrelated with actual caloric intake) or if this scale is capturing a tendency toward being thin or underweight that is not pathological in nature. An examination of this factor in individuals with eating disorders is, therefore, necessary to clarify the clinical meaningfulness of this construct.

General Psychopathology and Personality

In general, scales had excellent discriminant validity from measures of other internalizing disorders and from externalizing disorders. Body Dissatisfaction had the broadest links to general psychopathology and Binge Eating also demonstrated relatively broad links to other measures of psychopathology. Most scales had small to moderate correlations with other symptom measures that were smaller than the correlations between provisional IEBQ scales and relevant measures of eating pathology. Some notable exceptions were (a) the high correlations between the Body Dissatisfaction and Binge Eating scales and the IDAS Appetite Gain scale and (b) the small correlation between the Restricting scale and the IDAS Appetite Loss scale. These correlations were higher than correlations between the IDAS Appetite Gain and Appetite Loss scales and the Hamilton Rating Scale for Depression (Watson, et al., 2007).

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Summary

Findings

The results of Phase I suggest that the factor structure of eating pathology is represented by 8 factors that are quasi-replicable across samples. The factors showed excellent convergent and discriminant validity. Internal consistency reliabilities and average interitem correlations of provisional scales generally were quite good across samples.

Results of CFAs suggest that a hierarchical model, in which Body Dissatisfaction represents a general factor, demonstrates the best fit to the data. This structure is consistent with recent theories of eating pathology, which suggest that body dissatisfaction represents the core psychopathology of eating disorders. Restricting and Body Building Supplements factors demonstrated weak links to the Body Dissatisfaction factor, suggesting that not all aspects of eating pathology can be accounted for by dissatisfaction with one's body. This is particularly interesting given the striking differences between anorexia nervosa and bulimia nervosa in terms of motivation to engage in treatment, course, and outcome (Keel & Herzog, 2004).

Factorial invariance tests indicated that the 8-factor model was invariant across gender and weight categories. Nevertheless, certain items for the Muscularity scale did not perform well in women, and it is unclear how important this construct is in women. Additional items were therefore written given the large number of items removed from this factor.

Given that the content of the Weight Control Behaviors scale was weighted towards excessive exercise in students and subsumed both excessive exercise and avoidance of high calorie and high fat foods in community adults, additional items were written for Phase II to try to better differentiate these constructs. Finally, additional Restricting items were written in Phase II to increase its potential relevance to anorexia nervosa.

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Thus, based on Phase I analyses, 98 items were dropped from the item pool and an additional 26 items were written, resulting in a revised item pool of 88 items. This revised item pool will be tested in Phase II and Phase III. Appendix C shows the items in the revised pool.

Implications of Findings

The Body Dissatisfaction factor emerged across all samples. This scale was relatively broad, internally consistent, and had strong structural replicability between samples; therefore, large changes to this scale are not anticipated. Nevertheless, it will be important to examine the reliability and replicability of this scale in a clinical sample. Based on Phase I analyses, 13 Body Dissatisfaction items were retained for Phase II analyses. These 13 items were selected from the broader pool based on their performance across multiple samples. Ten items that loaded on the Body Dissatisfaction factor in community participants also loaded on this factor in student participants. Given the relatively strong overlap of item content, all 12 items were retained for Phase II analyses. One additional item (Item 69, "I looked at my body in mirrors or windows") loaded moderately on Body Dissatisfaction in all samples and subsamples (except in community adults). This item was retained given its potential relevance to patients with eating disorders and because this item assesses content related to "body checking," which is an important aspect of the treatment of eating disorders (Fairburn, Cooper, Shafran, et al., 2008).

Weight Control Behaviors emerged in all samples, but contained different content in student versus community participants. As previously mentioned, this scale was comprised of excessive exercise items in student participants and was weighted towards efforts to limit caloric intake in community participants. Comparability coefficients indicated that the scale had poor structural replicability between samples. Seven additional Excessive Exercise items were written to better differentiate excessive exercise content from cognitive restraint. Particular attention was paid to emphasizing extreme

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physical exertion (e.g., "I pushed myself extremely hard when exercising") and de-emphasizing exercising when sick/injured, tired, or for specific amounts of time, as these exercise behaviors did not perform well in community adults.

The Restricting factor emerged across all samples, yet had very few items. In addition, the remaining items did not perform well in structural analyses. For example, item 110 ("I was told I am too thin") loaded above |.30| on the Body Dissatisfaction and Muscularity factors in student EFAs and had high modification indices in CFAs. These results suggest that the Restricting scale may be measuring a non-pathological tendency toward low weight, rather than capturing content relevant to eating disorders. Careful attention was paid to writing additional items that would retain applicability to anorexia nervosa, but would be distinct from Weight Control Behaviors (e.g., "I purposely ate less than those around me"). Four Restricting items were retained from the Phase I item pool (i.e., Items 86, 87, 144, and 142) and 12 new items were written for Phase II analyses.

The Negative Attitudes toward Obesity factor emerged across all samples. Item 96 ("I thought to myself that overweight people are unhappy") did not load on the Negative Attitudes toward Obesity scale in student EFAs, so this item was dropped from the scale. Although the five-item Negative Attitudes toward Obesity scale appears to be finalized, this scale had higher AIC values than is typically recommended, which may be due to its narrow range of content. Additional examination of this scale in a patient sample is warranted to further examine its psychometric properties.

The Purging and Binge Eating scales appear to be near finalized. These scales emerged in all samples and generally had good internal consistency. The exception was that Purging had low internal consistency in the male subsample and had low comparability coefficients, indicating poor structural replicability. Because Purging is likely to be more pertinent to patient samples, the seven items that loaded on the Purging factor in the community sample EFA (despite not loading on the Purging scale in the student sample) were included in the Phase II item pools. 13 Binge Eating items were

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retained in the Phase II item pool. These items were chosen because they were represented across multiple samples and subsamples in prior exploratory and confirmatory factor analyses.

The Body Building Supplements and Muscularity scales were more problematic. Subsample EFAs and CFAs indicated that Body Building Supplement scale items tended to cross-load on the Excessive Exercise and Purging factors and that Muscularity scale items tended to cross-load on the Body Dissatisfaction and Body Building Supplement factors. These issues resulted in the Body Building Supplements items being removed from sex-based factorial invariance tests – thus, it is unclear if this scale is invariant between men and women. Given these issues, additional Muscularity items were written to increase their overlap with Body Building Supplements and de-emphasize their overlap with general body dissatisfaction concerns (e.g., "I thought my calves were not muscular enough" and "I wanted more defined muscles"). One Muscularity item ("I would have felt more confident if I had greater muscle mass") was retained and seven new Muscularity items were written for Phase II.

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CHAPTER III

PHASE TWO

Methods

Participants and Recruitment

The University of Pittsburgh, University of Iowa, and University of Notre Dame's Institutional Review Boards approved all study procedures. Participants were (a) individuals receiving inpatient or intensive day hospital treatment for an eating disorder and (b) general psychiatric outpatients. Chart diagnoses were reviewed to determine eating disorder diagnosis. Exclusion criteria were kept to a minimum to obtain data from a broad range of psychiatric patients. Exclusion criteria for patients with eating disorders included not speaking fluent English. Individuals ages 13 and below were excluded, as most study questionnaires have not been validated in young children. Eating disorder patients also had to be medically stable to participate in the study. Individuals with a chart diagnosis of mental retardation were excluded from the study (N=1). Exclusion criteria for the general psychiatric outpatient sample included being younger than age 18 and not speaking fluent English.

Patients were given information on the study and how to enroll. Interested individuals were provided with a packet of study questionnaires, which they completed either in the laboratory, at the hospital (for eating disorder inpatients), or at home.

Eating Disorders Sample

Participants were inpatients (N=32) or intensive day hospital patients (N=39) receiving treatment for an eating disorder. Chart diagnoses indicated that patients were receiving treatment for anorexia nervosa (N=52), bulimia nervosa (N=4), or an eating disorder not otherwise specified (N=15). The inpatient setting provides 24-hour care, whereas the day hospital program operates 32 hours per week (i.e., eight hours on three days per week and four hours on two days per week). Both treatment programs are similar in that they are informed primarily by cognitive behavioral and dialectical

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behavior principles, and the main treatment modalities are group therapy and meal support.

Participants were approached by their primary therapist and provided with study information. Interested individuals or their parents (for minor participants) were followed-up by a study investigator to obtain informed consent. Individuals under age 18 (*n*=17) were followed-up to obtain their assent. When necessary, assessments were delayed to allow participants to achieve medical stability. Participation in the study lasted 1 hour and individuals who completed the study were compensated with a $20.00 gift card.

Mean (SD) body mass index was 16.9 (3.18) at hospital intake and 17.8 (2.73) at the time participants completed study questionnaires. The majority of participants were age 18 and older (76.1%, *n*=54). Participants reported a mean age of 25.1 years (*SD*=8.66). The sample was primarily female (91.5%) and Caucasian (97.2%). Other self-reported ethnicities/races included Hispanic (1.4%, *n*=1) and African American (1.4%, *n*=1). Most (74.6%) participants were prescribed psychotropic medications and 48.1% (*n*= 26) of participants over age 18 were unemployed.

Outpatient Sample

Outpatients were recruited from an ongoing study of individuals seeking treatment at a mental health facility affiliated with the University of Notre Dame in Northern Indiana (*N*=106) or from outpatient mental health clinics in Eastern Iowa and a mass recruitment e-mail sent to University of Iowa staff (*N*=17). Validity checks were included within questionnaire packets, which resulted in the removal of *N*=3 individuals from the Notre Dame sample. Thus, the final sample size of outpatients was *N*=120.

Participation in the Iowa study lasted approximately 1 hour, whereas the Notre Dame study lasted approximately 2 hours. Individuals completing the study were compensated with a $15.00 gift card (Iowa) or a $40.00 gift card or check (Notre Dame) for their time and participation.

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The majority of participants were female (64.8%). Participants self-reported the following ethnic/racial identities: Caucasian (77%), Hispanic (4.6%), African American (19.5%), American Indian/Alaskan Native (1.2%), and Multiracial (2.3%). Participants reported a mean (SD) age of 44.10 (12.61). Most (89.9%) participants were prescribed a psychotropic medication and 64% of outpatients were unemployed. Self-reported body mass index was not available for Notre Dame outpatients. Self-reported mean (SD) body mass index for Iowa outpatients was 26.6 (7.46).

Measures

Eating Pathology Measures

Revised Iowa Eating Behaviors Questionnaire item pool (IEBQ-R). The revised 88-item IEBQ-R was administered to all study participants. Complete IEBQ-R data were available for 190 patients (one participant's data were not analyzed due to greater than 10% missing responses). The IEBQ-R included 62 items from the first phase of the study and 26 items written for the current study phase. Outpatients indicated the frequency with which they experienced each symptom "during the past four weeks, including today." The eating disorder patient sample was in a milieu that required adherence to a meal plan (which sometimes prescribed the consumption of 3,000-4,000 kilocalories per day) and supervision to prevent binge eating and/or purging. Due to these restrictions on participants' eating disorder behaviors, instructions were modified for eating disorder patients so that they indicated the frequency they experienced each symptom "during the four weeks prior to treatment." For all participants, responses were rated on a 5-point scale ranging from *never* to *very often*.

In addition to the abovementioned measure, the EDE-Q and EDE-QR were administered to the eating disorder sample and a subset of outpatients (n=17, Iowa). The EDI-3 was administered to eating disorder patients only. Complete EDI-3 data were available from 68 eating disorder patients. Instructions for the EDE-Q and EDE-QR were modified to encompass the "28 days prior to treatment" (instead of the past 28 days).

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Written permission to modify the instructions was obtained from the EDE copyright holder (Dr. Christopher Fairburn). Participants generally were assessed within 1 week of admission. Instructions were not modified for the EDI-3, as a time frame was not originally provided and items mainly assess attitudes and feelings, rather than current behaviors (e.g., "I have the thought of trying to vomit to lose weight").

Participants were also asked to self-report lifetime history of eating disorder behaviors. Lifetime histories of eating disorder behaviors were available for 88 patients (*n*=71 eating disorder patients and *n*=17 Iowa outpatients).

General Psychopathology and Personality Measures

The IDAS was administered to all participants. Complete IDAS data were available for 160 patients (*n*=71 eating disorder patients, *n*=17 Iowa outpatients, and *n*=72 Notre Dame outpatients). The BFI was only administered to eating disorder patients (*n*=71).

Statistical Analysis

Structural and Internal Consistency Analyses

Exploratory and confirmatory factor analyses and analyses of internal consistency and homogeneity carried out in Phase I were repeated to refine the instrument further. Although large changes to the instrument were not anticipated, an important goal of this phase was to ensure that the measure generalizes across a range of clinical severity and (low) body weights. Data from all samples were combined and analyzed as a group to maximize statistical power.

Descriptive Analyses

Means and standard deviations for the final scales and other eating disorder measures were computed to provide normative information in patients and to characterize the level of both (a) general and (b) eating disorder psychopathology in the sample.

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Convergent and Discriminant Validity.

To examine convergent and discriminant validity of the revised item pool, correlations between the newly created measure and existing measures of eating pathology, depression, anxiety, and neuroticism were examined. Items with very high correlations with neuroticism (i.e., above |.70|) were candidates for removal from the inventory.

Results and Discussion

Missing data were imputed using SAS version 9.2. Maximum-likelihood multiple imputation was carried out if 10% or less of the total responses for the revised item pool were missing (i.e., 8 or fewer items), using 11 imputations. For other study questionnaires, imputation was carried out if 15% or less of the total responses for a questionnaire were missing, using 11 imputations per questionnaire.

Interitem Correlations

Pearson's correlations were computed between variables included in the revised item pool. Most (45) items had at least one correlation of .70-80. Deleting these items would have resulted in too few items to define the full-range of factors identified in Phase I. These high correlations were likely due to the patient sample itself, which was comprised of a combination of severely ill patients with anorexia nervosa and general psychiatric outpatients, which likely increased the variability in the sample, leading to stronger correlations. As these high correlations appear to be due to the composition of the sample, rather than inherent item redundancy, these items were retained and entered into subsequent exploratory factor analyses.

The item pool was examined to determine if there were high correlations with neuroticism (i.e., above |0.70|), as these items would be candidates for removal from the scale. The highest correlation was between Item 33 ("I was self-conscious about the way my body looked") and neuroticism (r=.35). It is noteworthy that this item also had the highest correlation with neuroticism in both the student and community samples. Given

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the moderate magnitude of these associations, no items were removed from the item pool on the basis of their correlations with neuroticism.

Exploratory Factor Analysis

Exploratory factor analysis was conducted on the 88 candidate items. Factor solutions with both oblique and orthogonal rotations were examined. Given that additional excessive exercise items were written for the current study phase, 9 factors were extracted to allow for the possibility of the emergence of a new factor. The 9-factor solution had only two items loading above |.40| on Factor 9, however, indicating that the 9-factor solution was under-defined. Eight factors were extracted, which resulted in an interpretable solution. Items with substantial cross-loadings on other factors |>.30| or low loadings on the primary factor |<.40| were removed from the item pool. This resulted in the removal of the following 41 items: 5, 6, 8, 12, 18, 19, 20, 21, 22, 23, 24, 25, 28, 32, 34, 35, 36, 37, 38, 39, 43, 44, 45, 47, 48, 49, 50, 52, 53, 59, 60, 61, 62, 64, 65, 66, 67, 75, 81, 87, and 88.

All of the Cognitive Restraint items cross-loaded on the Restricting and/or Excessive Exercise factors. All but one of the Muscularity items cross-loaded on the Body Building Supplements factor and, therefore, the Muscularity and Cognitive Restraint factors were not retained. Thus, a 7-factor solution was run using the remaining 47 items. The varimax and promax solutions had at least three marker items per factor and were readily interpretable. Table A30 presents the promax factor loadings for the 7-factor solution.

The initial estimate of common variance constituted 69.51% of the total variance. Most factors were highly similar in content to the factors identified in Phase I. For example, 5 of the identified dimensions – Body Dissatisfaction, Binge Eating, Restricting, Purging, and Negative Attitudes toward Obesity – also emerged in the community and student samples.

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The remaining Muscularity item (Item 26 "I thought my muscles were too small") loaded on the Body Building Supplements factor. Given that the nature of the Body Building Supplements factor had changed, this factor was renamed Muscle Building. The final dimension, Excessive Exercise (e.g., "I engaged in strenuous exercise at least five days per week"), emerged as a separate factor in some, but not all Phase I analyses.

It is noteworthy that item 60 ("I made myself vomit in order to lose weight") did not load on the Purging factor. It is possible that the self-induced vomiting item will perform better in bulimic samples; therefore, item 60 was excluded from subsequent analyses and scale scores, but was retained on the final measure for examination in future studies, as this symptom is a cardinal feature of bulimia nervosa.

The correlation among the 7 factors ranged from -.29 (for Binge Eating and Restricting) to .44 (for Excessive Exercise and Restricting). These data indicate that the IEBQ has good discriminant validity, with correlations generally in the small to moderate range. Body Dissatisfaction had small correlations (*r*'s ranged from -.11 to .32) with all factors. Thus, although there is some evidence to suggest that Body Dissatisfaction may represent a general factor that exists at a higher order level in relation to the other factors, the evidence supporting this assertion is less robust than it was for Phase I analyses.

Confirmatory Factor Analysis

CFA was used to determine how well the revised 7-factor model fit the data. A mean- and standard errors- adjusted chi-square statistic was calculated using WLSMV in Mplus. The best-fitting CFA model from Phase I was examined in patients. In other words, Binge Eating, Muscle Building, Negative Attitudes toward Obesity, Purging, Excessive Exercise, and Restricting were regressed on the latent Body Dissatisfaction factor. For the initial model, all latent endogenous factors were allowed to be correlated.

The initial model had an excellent fit to the data (χ^2= 1468.58 (1013), p<.001, *CFI*=.968, *TLI*=.965, *RMSEA*=.049). All items loaded significantly on their latent factors (p's <.001) and all latent endogenous factors – except Negative Attitudes toward Obesity

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– had significant loadings on the latent exogenous Body Dissatisfaction factor (p's <.04). Negative Attitudes toward Obesity had a marginally significant factor loading on Body Dissatisfaction (λ=.144, p=.055).

Some latent endogenous factors were not significantly correlated with one another in this model. Correlations between: (1) Negative Attitudes toward Obesity and Binge Eating, (2) Purging and Binge Eating, and (3) Purging and Negative Attitudes toward Obesity were set to zero and the model was re-run. This improved model fit (χ^2= 1425.73 (1016), p<.001, *CFI*=.971, *TLI*=.969, *RMSEA*=.046) and was, therefore, retained as the final, best-fitting model. All items loaded significantly on their latent factors (p's <.001) and all latent endogenous factors had significant loadings on the latent exogenous Body Dissatisfaction factor (p's <.04), which ranged from -.19 (Muscle Building) to .62 (Purging) (see Table A31 and Table A32).

Interestingly, Muscle Building was negatively correlated with the latent exogenous Body Dissatisfaction factor. This result indicates that individuals who desire increased muscle mass and use muscle building supplements generally have higher levels of body satisfaction than those who do not. This suggests that muscle-building behaviors may provide a buffer from negative body image. In other words, if individuals scoring highly on Muscle Building did *not* engage in muscle building behaviors, they might have high levels of body dissatisfaction. On the other hand, because this sample includes a substantial proportion of individuals with anorexia nervosa, who generally do not wish to increase muscle mass or body fat, the negative correlation between Body Dissatisfaction and Muscle Building may simply be due to lower levels of body image concerns in those who endorse muscle-building behaviors.

Descriptive Statistics

Items from the best-fitting CFA model were used to develop scales by summing items within each factor. Item 14 ("I thought that my weight was perfect") was reverse-coded because it loaded negatively on the Body Dissatisfaction factor. Table A33

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presents the means and standard deviations for the IEBQ-R scales. For comparison purposes, the means and standard deviations for the EDE-3 and EDE-Q scales are also presented in Table A33.

In patients with anorexia nervosa, mean scores on the EDE have been shown to range from 2.17 (Eating Concerns) to 3.17 (Restraint) (Z. Cooper, et al., 1989) and mean scores on the EDI-3 have been shown to range from 7.95 (Bulimia) to 24.36 (Body Dissatisfaction) (Clausen, Rosenvinge, Friborg, & Rokkedal, 2011). In the present study, scores on these established measures were consistent with severe levels of eating disorder psychopathology, with scores on the EDE-Q and EDI-3 scales generally exceeding published norms for eating disorder patients (EDE-Q scale scores ranged from 3.08 to 4.45 and EDI-3 scale scores ranged from 6.71 to 27.99). Base rates for lifetime histories of eating disorder behaviors are reported in Table A34.

Independent sample *t*-tests were used to compare the mean IEBQ-R scores for eating disorder patients and general psychiatric patients (see Table A35). Results indicated that eating disorder patients had significantly higher mean scores on Body Dissatisfaction, Purging, Restricting, and Excessive Exercise. Eating disorder patients had significantly lower mean scores on Muscle Building and Binge Eating. Negative Attitudes toward Obesity was the only scale that did not significantly distinguish eating disorder from general psychiatric patients.

Scores on the IDAS were consistent with norms for psychiatric patients (see Table A36). Watson et al. (2007) found that mean scores for core IDAS scales ranged from 56.04 to 56.53 (General Depression) and from 28.66 to 28.80 (Dysphoria) in samples of psychiatric patients. Mean scores in the present sample ranged from 7.69 (Appetite Gain) to 59.32 (General Depression) and are suggestive of moderate levels of depression and anxiety (Watson, et al., 2007).

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Internal Consistency and Homogeneity

Table A37 presents internal consistency reliabilities (coefficient alphas) and AICs for the scales. The alpha reliabilities are all high, with all coefficients at or above .80. As previously mentioned, AIC values ideally should range from .15 to .50 (Clark & Watson, 1995). AICs were within the recommended range for Body Dissatisfaction and Muscle Building and were close to the recommend values for the Binge Eating and Purging scales. AICs were over .60 for Excessive Exercise, Negative Attitudes toward Obesity, and Restricting. Although the Negative Attitudes toward Obesity, Excessive Exercise, and Restricting scales may subsume a somewhat narrower range of content, these high AIC values likely reflect the admixture of patient samples with different levels of eating pathology. In support of this hypothesis, separate analyses of internal consistency within each patient sample generally led to decreased coefficient alphas and AICs due to reduced variability (see Table A37).

Internal Structure

Correlations for the IEBQ scales are presented in Table A38. Body Dissatisfaction was significantly correlated ($p<.05$) with all eating disorder scales, except Muscle Building. Binge Eating had significant negative correlations with Restricting and Excessive Exercise, and a significant positive correlation with Body Dissatisfaction. The negative correlation between Binge Eating and Restricting makes sense, given that individuals who restrict their dietary intake would not be expected to engage in frequent episodes of overeating. The negative correlation between Binge Eating and Excessive Exercise is less intuitive; however, because exercise suppresses one's appetite (Stensel, 2010), this may lead to less frequent episodes of overeating in those who exercise to excess. This result also may be explained by the inclusion of patients with anorexia nervosa who may have been both more likely to exercise and less likely to binge. Excessive Exercise was significantly correlated with all eating disorder scales. Muscle Building was significantly positively correlated with Excessive Exercise and Negative

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Attitudes toward Obesity. Negative Attitudes toward Obesity had small, albeit significant, correlations with the Excessive Exercise, Muscle Building, and Restricting scales. Purging had significant positive correlations with Body Dissatisfaction, Restricting, and Excessive Exercise. Finally, Restricting was significantly correlated with all eating disorder scales, except Muscle Building. Although the combination of patient samples with differing levels of eating pathology led to inflated correlations between IEBQ items, the correlations between scales were generally low to moderate. These results indicate that any latent general factor is weak.

These correlations indicate that the scales possess good discriminant validity, with correlations generally in the low to moderate range. In fact, the highest correlation was .50 between Excessive Exercise and Restricting. It was interesting that Excessive Exercise emerged as a dimension that was correlated with all scales. This makes intuitive sense, given that excessive exercise behavior is an effective means for both: (a) decreasing body weight/fat and (b) increasing muscle bulk and definition. This scale, in conjunction with Muscle Building, may be useful for future research seeking to clarify the nature of eating pathology in men who endorse an extreme desire to increase muscle mass, such as body builders.

Convergent and Discriminant Validity

Eating Pathology

As shown in Tables A39-A41, the provisional scales demonstrated good convergent and discriminant validity in terms of the patterns of correlations between the IEBQ-R scales and other measures of eating pathology.

Body Dissatisfaction was significantly correlated with all eating pathology measures. Body Dissatisfaction had high correlations with other scales assessing body dissatisfaction, moderate correlations with the EDE-Q Restraint and EDI-3 Drive for Thinness scales, and a small correlation with EDI-3 Bulimia. Consistent with the findings from the first study phase, Body Dissatisfaction appears to capture most of the variance

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associated with established eating disorder measures. Contrary to findings in students and community participants, Body Dissatisfaction was not significantly correlated with self-reported body mass index. However, Body Dissatisfaction was significantly correlated with a lifetime history of eating disorder behaviors (i.e., fasting, laxative abuse, and excessive exercise).

Binge Eating had excellent convergent and discriminant validity. It was strongly correlated with EDI-3 Bulimia and current binge eating frequency. Binge Eating correlated more moderately with a lifetime history of binge eating and self-reported body mass index. Binge Eating was not significantly correlated with measures of dietary restraint or a lifetime history of fasting.

Excessive Exercise was strongly correlated with current excessive exercise frequency. It also had small to moderate correlations with all eating disorder measures, except for EDI-3 Bulimia and had a small and significant correlation with lifetime history of fasting.

Muscle Building had a small, albeit significant, negative correlation with lifetime history of laxative abuse. Otherwise, Muscle Building was uncorrelated with other eating pathology measures and body mass index. These findings generally are consistent with analyses from the first study phase, as this scale was not strongly correlated with traditional measures of eating pathology. However, a greater number of significant correlations were observed between this scale and self-reported eating disorder behaviors in community members and students. This may be due to lower base-rates of muscle building supplement use, given that the sample was comprised of a substantial number of patients with anorexia nervosa and had fewer male participants.

Negative Attitudes toward Obesity had small correlations with EDE-Q Restraint, EDI-3 Drive for Thinness and Body Dissatisfaction scales, and current excessive exercise frequency.

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Purging had small to moderate significant correlations with all eating disorder measures. Purging was most strongly correlated with lifetime histories of laxative, diet pill, and diuretics abuse. Lifetime history of self-induced vomiting and current excessive exercise and laxative abuse frequencies had small correlations with Purging. This scale had lower correlations with lifetime history of self-induced vomiting than were found for student women. Although the correlation between self-induced vomiting and Purging was expected to be stronger in patients, the IEBQ-R had only one self-induced vomiting item, which—as noted earlier—was not retained for statistical analyses.

Restricting had strong to moderate correlations with EDE-Q Restraint, Shape Concerns, Weight Concerns, and Eating Concerns scales. This scale had small-moderate correlations with EDI-3 Body Dissatisfaction and Drive for Thinness scales. Restricting had small correlations with lifetime histories of self-induced vomiting, laxative abuse, and diuretic abuse, and with current excessive exercise frequency. Finally, this scale had a moderate positive correlation with lifetime history of fasting and a moderate negative correlation with self-reported body mass index. It is particularly interesting that Restricting was significantly negatively correlated with body mass index, as it suggests the future possibility of an accurate assessment of concrete food intake behavior.

General Psychopathology

In general, the scales had excellent discriminant validity from measures of depression and anxiety (see Table A41). Similar to findings from the first study phase, Body Dissatisfaction had relatively broad links to general psychopathology. Contrary to findings for Phase I participants, Binge Eating was not broadly linked to other internalizing symptoms. Restricting had moderate correlations with the IDAS General Depression, Dysphoria, and Panic scales, which suggests that the revised Restricting scale is capturing meaningful psychopathology.

Some notable exceptions to discriminant validity were the moderate-high correlations between the Binge Eating scale and the IDAS Appetite Gain scale and the

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high correlation between the Restricting factor and the IDAS Appetite Loss scale (see Discussion Section for further comment).

Summary

The goal of this study phase was to establish further the convergent and discriminant validity of the multi-level model of eating disorder symptoms developed through scale construction in Phase I and to examine the replicability of the structure in a sample of patients. Results indicated that the scales had good to excellent convergent and discriminant validity. Internal consistency reliabilities and average interitem correlations generally were good, with the caveat that the average interitem correlations were above recommended values for Excessive Exercise, Negative Attitudes toward Obesity, and Restricting. These higher average intercorrelations may reflect the admixture of patients with differing levels of eating disorder symptoms and, in fact, analyses within each patient sample generally led to smaller average intercorrelations.

Results of CFAs indicate that the hierarchical model developed in Phase I had an excellent fit in patients. In contrast to findings from the first study phase, the Restricting and Muscle Building factors had significant loadings on the latent Body Dissatisfaction factor. This finding supports recent theories suggesting that body dissatisfaction represents the core psychopathology of eating disorders. The stronger loadings of these factors on Body Dissatisfaction was likely due to the inclusion of new items written for Phase II and to the higher base-rate of endorsement of eating disorder behaviors in the current sample.

The Body Dissatisfaction, Binge Eating, Muscle Building, Purging, and Negative Attitudes toward Obesity scales were largely unchanged from Phase I. An important exception is that the self-induced vomiting item loaded weakly on the revised Restricting factor in Phase II, rather than loading strongly on the Purging factor. Given that the sample consisted of a substantial portion of clients with anorexia nervosa, it makes sense that purging and self-starvation behaviors were closely linked. This finding is also

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interesting for future studies examining the empirical classification of purging disorder. In fact, recent studies have shown that the binge-purge subtype of anorexia nervosa and purging disorder fall within the same latent class of disorder, whereas bulimia nervosa and binge eating disorder define their own distinct classes (Crosby, 2009; Keel, et al., 2007).

In Phase I, the Weight Control Behaviors scale was weighted toward excessive exercise in students and subsumed both excessive exercise and avoidance of high calorie and high fat foods in community adults. Additional items were written for the current study phase to differentiate these constructs. The results of exploratory factor analyses found that Cognitive Restraint could not be differentiated from the Excessive Exercise and Restricting factors. Nevertheless, the new Excessive Exercise factor had good convergent and discriminant validity and internal consistency reliability, although results also indicated the items on this scale may be somewhat redundant with each other.

Additional Restricting items were written for Phase II and these items performed well in the current sample. Restricting had much higher correlations with other measures of eating pathology and demonstrated stronger and broader links to general psychopathology compared to Phase I analyses. These results verify that Restricting: (a) is not simply capturing a tendency toward being thin or underweight that is not pathological in nature and (b) has relevance to eating disorders.

Muscularity did not emerge as a distinct factor in Phase II analyses. The Muscularity scale included several new items, yet these items cross-loaded with the Body Building Supplements items. This construct may have had less relevance to the current patient sample, which included a sizeable number of individuals with restricting forms of eating pathology and a smaller portion of men. In support of this idea, prior structural analyses conducted separately in sub-samples of normal weight and female participants also found that Muscularity did not emerge as a distinct factor; and in the combined

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sample of community and student women, Muscularity items cross-loaded on the Body Dissatisfaction factor.

Overall, these results establish the IEBQ's structure and psychometric properties in a sample of psychiatric patients. However, it is important to ensure that the measure replicates in an independent group of individuals. Thus, Phase III was undertaken to confirm the IEBQ's structure and further explicate reliability and validity.

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CHAPTER IV

PHASE THREE

Method

Participants and Recruitment

Participants consisted of *N*=275 University of Iowa undergraduates (*N*=196 females and *N*= 79 males). There were no selection criteria aside from being 18 years or older and currently enrolled in Elementary Psychology (31:001). Students were recruited via the University of Iowa Psychology Department research pool. Students who expressed interest in the study were able to sign up for the study through the University of Iowa Sona Experiment Management System. Participation lasted approximately 2 hours (1 hour per visit) and participants received 2 credits towards the completion of their research exposure requirement.

To increase the number of male participants, a mass e-mail was sent to all University of Iowa male students. These men (*N*=59) completed the same set of questionnaires and were compensated with a $15.00 gift card per study visit (for a total of $30.00). Thus, the initial time one sample included *N*=196 women and *N*=138 men.

All students who expressed interest in the study were sent two web URLs to participate online. The second study link was e-mailed to participants 2-4 weeks after the submission of their first survey. Participants who completed the first survey were sent up to three reminder e-mails to encourage them to participate in the second survey. The first e-mail reminder was sent a week prior to their second participation to remind them that they would receive the second study link within a week. The second and third reminders were sent if a participant had not completed the second study link after one and two weeks, respectively. These procedures resulted in an excellent retention rate (97%). The time two sample consisted of *N*=189 women and *N*=135 men who had participated at time one.

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Multiple validity checks were imbedded within the WebSurveyor program to determine if participants were responding randomly to survey items. Participants were excluded from the analysis if they incorrectly responded to one or more of the validity checks. This resulted in the removal of *N*=72 participants at time one and *N*=45 participants at time two. The greater amount of invalid data at time one likely is due to the increased number of items at time one, combined with the presence of an additional invalidity item at this time point. The increased number of invalid responders in this phase, compared to Phase I, is due to the greater number of validity checks within the survey. Some participants provided valid data at time one, but not time two (or vice versa); thus, the final sample size of participants with valid data at both points included *N*=132 women and *N*=95 men.

The mean (SD) age of student participants was 19.8 (3.15). Men reported a mean (SD) body mass index (BMI) of 24.3 (3.65) and women reported a mean (SD) body mass index of 22.6 (3.49). Participants were allowed to self-report multiple racial and ethnic identities. 91.2% of the participants reported they were Caucasian, 3.4% African-American, 5% Asian-American, 0.8% Native American/Alaskan Native, 0.4% Native Hawaiian/Pacific Islander, 0.8% as belonging to another race or ethnicity, and 5% Hispanic or Latino(a) of any race.

Measures

All participants completed the 88-item version of the IEBQ-R that was administered to patients in Phase II. Results are reported for the final 47-item measure that was refined in the patient sample. The BSQ, DEBQ, EDE-Q, EDE-QR, EDI-3, MBAS, RS, and TFEQ also were administered to compare the IEBQ's test-retest reliability to the reliabilities of existing measures of eating disorder symptoms. Written permission was obtained from copyright holders to reproduce measures online. Lifetime histories of eating disorder behaviors were assessed at Time 1 only.

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Preliminary analyses were carried out to establish whether or not Item 60 ("I made myself vomit in order to lose weight") should be included in Purging by examining Pearson's correlations between Item 60 and the IEBQ-R scales.

Statistical Analyses

Test-retest reliability

Temporal stability (2-4 week test-retest reliability) of the newly developed self-report measure was computed using two-tailed Pearson's correlations. To further examine convergent and discriminant validity, the retest correlations were placed in a multitrait-multioccasion matrix. Convergent correlations (i.e., test-retest correlations) were placed in diagonals of a hetero-occasion block within the matrix. Evidence for discriminant validity was demonstrated by retest correlations that were higher than any other values in its row or column of the hetero-occasion block. Significance tests were carried out to determine whether the convergent correlations were significantly higher than the discriminant correlations after Fischer's *r*-to-*z* transformation.

Finally, mean-level change was examined using paired samples *t*-tests to determine the sensitivity of the scales to small changes over time. Cohen's *d* was calculated as $t/\sqrt{(N)}$ to measure the effect size of the change.

Results and Discussion

Missing responses were imputed separately for data at each time point using SAS version 9.2. Maximum-likelihood multiple imputation was carried out if 10% or less of the total responses for the questionnaire were missing (i.e., 8 or fewer items of the 88 original IEBQ-R items), using 11 imputations. For other study questionnaires, imputation was carried out if 15% or less of the total responses for a questionnaire were missing, using 11 imputations per questionnaire.

Preliminary Analyses

Pearson's correlations between Item 60 ("I made myself vomit in order to lose weight") and the IEBQ-R scales were carried out at Time 1 and Time 2. At both

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assessment points, Item 60 had the highest correlation with Purging (Time 1: r=.34, p<.001, Time 2: r=.33, p<.001). However the correlation between Item 60 and Purging was not significantly higher than the correlation between Item 60 and Restricting (Time 1: r=.30, p<.001, Time 2: r=.21, p<.001) at Time 1 (z=.67, p=.50) or Time 2 (z=1.94, p=.052) after Fischer's r-to-z transformation. Based on these data, Item 60 was not included in subsequent structural analyses, but was retained as an item on the final scale.

Structural Analyses

CFA was carried out at Time 1 and Time 2 to determine how well the final 7-factor model fit the data in an independent non-clinical sample. A mean- and standard errors- adjusted chi-square statistic was calculated using WLSMV in Mplus. At Time 1, the model had an excellent fit to the data (χ^2= 1643.01 (1013), p<.001, *CFI*=.966, *TLI*=.964, *RMSEA*=.049). All items loaded significantly on their latent factors (p's <.001). With the exception of Negative Attitudes toward Obesity (λ=.11, p=.07), all latent endogenous factors loaded significantly on the latent exogenous Body Dissatisfaction factor and ranged from -.42 (Muscle Building) to .52 (Purging) (all p's <.04) (see Tables A42-A45).

The model had a good fit at Time 2 (χ^2= 1935.08 (1013), p<.001, *CFI*=.946, *TLI*=.942, *RMSEA*=.057). All items loaded significantly on their latent factors (p's <.001). Factor loadings of endogenous latent factors on the latent exogenous Body Dissatisfaction factor were somewhat lower at Time 2 and ranged from -.27 (Muscle Building) to .77 (Purging) (all p's <.04). The somewhat worse model fit at Time 2 may be due to lower mean scores on eating pathology scales at the second assessment (see section on Mean-level Change, below) (see Table A46).

To establish further whether or not Item 60 should be included in the Purging scale, CFAs were re-run including Item 60 as an indicator of the latent Purging factor. Results suggested that adding Item 60 decreased model fit at Time 1 (χ^2= 1784.29 (1059), p<.001, *CFI*=.960, *TLI*=.958, *RMSEA*=.051) and Time 2 (χ^2= 1986.86 (1059), p<.001,

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CFI=.945, *TLI*=.941, *RMSEA*=.056). These findings provide additional evidence to suggest that Item 60 should not be retained in the final Purging scale.

Descriptive Analyses

Table A46 presents the means and standard deviations for the IEBQ scales at both time points. For comparison purposes, the means and standard deviations for the EDE-3 and EDE-Q scales are also presented in Table A46. These measures were chosen as comparison measures because they have the most normative data available for non-eating disordered young adults (compared to other study questionnaires). Other eating disorder measures were also included for descriptive purposes (see Table A46).

Participant scores on established eating disorder measures were consistent with low levels of eating disorder psychopathology. Male and female participant scores on the EDI-3 Drive for Thinness scale were consistent with published norms for U.S. adults, yet mean scores on the EDI-3 Body Dissatisfaction and EDI-3 Bulimia scales were below published norms (Garner, 2004). There are no EDE-Q published norms for men; however, female participants' mean scores on EDE-Q scales ranged from .87-2.59, which are consistent with those previously reported for undergraduate women (Luce, Crowther, & Pole, 2008) and young adult women recruited from the community (Mond, Hay, Rodgers, & Owen, 2006).

Internal Consistency

Table A47 presents internal consistency reliabilities (coefficient alphas) and AICs for the scales at both assessment points. The alpha reliabilities were generally high, with all coefficients, except Purging, close to or above .80. AICs were within the recommended range for the Binge Eating, Purging, and Restricting scales. The AIC exceeded .60 for Negative Attitudes toward Obesity at Time 2, but not Time 1. These results, combined with the results from previous study phases, suggest that the Negative Attitudes toward Obesity scale may contain somewhat redundant items.

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Convergent Validity

As shown in Tables A48 and A49, the IEBQ scales had excellent convergent validity at Time 1 and Time 2. Body Dissatisfaction was significantly correlated with all eating pathology measures. Body Dissatisfaction demonstrated the highest correlations with other measures of body dissatisfaction and moderate to strong correlations with other measures of eating pathology. Body Dissatisfaction had small correlations with the MBAS Muscularity and Height scales. Consistent with the findings from the first study phase, Body Dissatisfaction appears to capture most of the variance associated with established eating disorder measures. Body Dissatisfaction had a small, significant correlation with self-reported body mass index and with a lifetime history of eating disorder behaviors (i.e., fasting, laxative abuse, and self-induced vomiting) (see Table A50).

Binge Eating had excellent convergent and discriminant validity. It was strongly correlated with EDI-3 Bulimia, TFEQ Disinhibition and Hunger, and DEBQ External Eating and Emotional Eating. Contrary to findings in other study phases, Binge Eating was not correlated with body mass index or a lifetime history of binge eating, yet had small, significant correlations with self-induced vomiting and fasting.

Excessive Exercise had small to moderate correlations with measures of dietary restraint and had small and significant correlations with lifetime history of self-induced vomiting and fasting.

Muscle Building had moderate correlations with the MBAS Muscularity scale and a small, positive correlation with MBAS Height. Muscle Building also had small, albeit significant, positive correlations with body mass index and lifetime history of fasting. Otherwise, Muscle Building was uncorrelated with other eating pathology measures and body mass index.

Negative Attitudes toward Obesity had correlations close to, or above, .30 with MBAS Muscularity at both time points. Negative Attitudes toward Obesity had numerous

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small correlations (i.e., below |.30|) with a variety of other eating disorder symptom measures. Negative Attitudes toward Obesity also had a small, albeit significant, correlation with self-induced vomiting.

Purging had small to moderate significant correlations with measures of body dissatisfaction and dietary restraint. Purging was most strongly correlated with lifetime histories of fasting, self-induced vomiting, and diuretics abuse. Lifetime history of laxative abuse and binge eating frequencies had small correlations with Purging.

Restricting had small to moderate correlations with measures of dietary restraint and body dissatisfaction. Restricting had the strongest correlation with a lifetime history of fasting. Restricting had small correlations with lifetime histories of self-induced vomiting and laxative abuse, but was not significantly correlated with diuretic use. Contrary to previous study phases, Restricting did not have a significant negative correlation with self-reported body mass index.

Reliability Analyses

Retest Correlations

The retest correlations for the final scales are presented in a multitrait-multioccasion matrix (see Table A51). The scales had retest correlations ranging from .70 (Binge Eating and Negative Attitudes toward Obesity) to .84 (Muscle Building). All test-retest correlations were significant at $p<.0001$. These values all met, or exceeded, the minimum recommended level of .70 for short-term test-retest reliabilities (Joiner, Walker, Pettit, Perez, & Cukrowicz, 2005).

These data show excellent discriminant validity. Convergent correlations (i.e., re-test correlations) were substantially higher than any other values in the row or column of the hetero-occasion block. Significance tests were used to compare convergent correlations to each of the 12 discriminant correlations within the hetero-occasion block, resulting in 84 tests of discriminant validity. All tests of discriminant validity were significant (z's ranged from 7.51 to 21.62, p's <.001, two-tailed).

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Mean-level Change

Table A52 reports the paired samples *t*-test and Cohen's *d* values for retest scale means. Participants reported significantly lower levels of eating pathology at Time 2, compared to Time 1, for Binge Eating, Excessive Exercise, and Muscle Building. No significant differences were found for Body Dissatisfaction, Negative Attitudes toward Obesity, Purging, and Restricting. These data are consistent with previous test-retest studies, which have found that participants generally report lower levels of psychological symptoms at the second time point (Watson, et al., 2007). It is noteworthy that the core psychopathology of eating disorders, represented by the Body Dissatisfaction scale, was the most consistent over time. These results indicate that scale scores are strongly stable over a 2-4 week period. As shown in Table A51, the short-term stability of the IEBQ is similar to other measures of eating disorder symptoms. Taken together, these results suggest that repeated short-term administrations of the IEBQ yield highly stable mean scores.

Reliability Comparisons

Correlations were computed so that retest reliabilities of the IEBQ scales could be compared to retest reliabilities of existing self-report eating disorder symptom measures (see Table A53). Retest correlations were significant (*p*'s <.001) and ranged from .61 (EDE-Q Restraint) to .81 (Restraint Scale). Self-report measures of restrained eating generally had reliabilities lower than .70.

Significance tests were carried out to determine if the IEBQ scales had higher retest correlations compared to highly correlated measures from other inventories after Fischer's *r*-to-*z* transformation. Results indicated that the IEBQ Body Dissatisfaction scale was equivalent to the BSQ and the EDE Shape Concerns scale (*z*'s=1.01, *p*'s=.313) and less reliable than the EDI Body Dissatisfaction scale (*z*=2.14, *p*=.032). Binge Eating was equivalent to TFEQ Disinhibition (*z*=1.93, *p*=.053), TFEQ Hunger (*z*=.91, *p*=.363), and DEBQ External Eating (*z*=.85, *p*=.395), but less reliable than the DEBQ Emotional

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Eating and EDI Bulimia scales (z's=3.06, p's=.002). Muscle Building was equivalent to the MBAS Muscularity scale (z=1.80, p=.072). Finally, the IEBQ Restricting scale was significantly more reliable than the EDE-Q Restraint (z=3.62, p<.001), EDE-QR Restraint (z=2.36, p<.02), and TFEQ Cognitive Restraint (z=2.62, p<.01) scales. The IEBQ Restraint scale was equivalent to the DEBQ Restrained Eating scale (z=.64, p=.52) and significantly less reliable than the Restraint Scale (z=2.64, p<.01).

These data suggest that, in general: (a) the short-term reliability of the IEBQ is similar to that of other self-report measures of eating disorder symptoms and (b) the IEBQ provides a more reliable assessment of dietary restraint compared to the TFEQ Cognitive Restraint, EDE-Q Restraint, and EDE-QR Restraint scales. Although the RS had significantly higher retest reliability than the IEBQ Restricting scale, the RS was *positively* correlated with self-reported BMI (Time 1 r=.29, p<.001, Time 2 r=.28, p<.001), corroborating prior evidence that it does a poor job of predicting actual reduced dietary intake (Stice, et al., 2007; Stice, Fisher, & Lowe, 2004). The advantage of the IEBQ Restricting scale is that it is reliable over time and potentially more predictive of reduced caloric intake (although this statement must be tempered by the fact that the IEBQ Restricting scale was uncorrelated with body mass index in Phase III participants).

Summary

Phase III confirmed the replicability of the 7-factor structure of the IEBQ in a sample of undergraduate students. The measure demonstrated evidence of strong convergent and discriminant validity, as shown by significant convergent retest correlations that were significantly higher than discriminant retest correlations. Over the short-term, very little change on mean scores is expected and mean-level analyses indicated that the measure is strongly stable over time. Finally, results suggested that the test-retest reliability of the IEBQ is as good as, or better than, established self-report measures of eating disorder symptoms.

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CHAPTER V

DISCUSSION

Eating disorders are alarmingly prevalent and potentially lethal. The proper assessment of eating disorder symptoms is therefore crucial for the early identification and treatment of these serious disorders. Current measures of eating disorder symptoms are hampered by several problems, including inconsistent factor structures, differential reliability and internal consistency in men and obese individuals, limited scope (e.g., assess only one aspect of eating pathology, such as binge eating), and/or poor discriminant validity. Despite a growing body of research examining the latent structure of eating disorder symptoms, this research is necessarily limited by the lack of assessments explicitly created to elucidate the structure of eating pathology. The goal of this study was to address these limitations through the development of a psychometrically sound structural model of eating disorder symptoms that is supported by a reliable and valid measure of eating disorders.

Findings and Implications

Summary of Results

Exploratory and confirmatory factor analyses indicated the presence of several distinct and readily interpretable symptom dimensions. These dimensions were replicated across a variety of samples. Importantly, the structural model of eating disorder symptoms was found to be invariant across gender and weight categories. The scales were homogeneous and most had evidence of good to excellent internal consistency in each sample. Scales showed good convergent validity when compared to existing self-report measures of eating pathology, as well as discriminant validity from self-reported symptoms of other internalizing disorders. These dimensions were reliable over a 2- to 4-week period. Finally, the scales were able to capture the majority of the variance associated with established self-report measures of eating pathology, yet included

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additional symptom dimensions that are not currently represented by any single eating pathology measure.

Scale Development

Based on theoretical models of eating disorders and the results of prior structural analyses, 160 items were written to assess 20 different content domains of eating pathology. These items were administered to large independent samples of community adults and undergraduate students. On the basis of correlational and structural analyses, the measure was revised and administered to independent samples of psychiatric patients and undergraduate students. Several of the hypothesized eating disorder content domains – Body Dissatisfaction, Binge Eating, Purging, Negative Attitudes toward Obesity, and Dietary Restraint (re-labeled Restricting) – emerged across all samples.

There were, however, several interesting differences between the hypothesized and empirical structure of eating disorder symptoms. First, mindless eating is not part of the *DSM* criteria for eating disorders, yet research indicates that frequent mindless eating may be more descriptive of the actual eating patterns of individuals with binge eating disorder than are discrete episodes of bingeing (for a review, see Marcus, 1993). Further, techniques designed to increase one's awareness of his or her eating, such as mindfulness-based cognitive behavioral strategies, have been shown to be an efficacious treatment for both binge eating disorder and bulimia nervosa (Safer, et al., 2009). Items designed to assess this construct (e.g., "I ate as if I was on auto-pilot," "I snacked throughout the evening without realizing it," and "I did not notice how much I ate until after I had finished eating") loaded significantly on the Binge Eating factor. These results suggest that mindless eating may be an important component of binge eating behavior.

Second, several HICs were created to assess body dissatisfaction. Contrary to popular theoretical models of eating disorders, weight dissatisfaction was not distinct from shape dissatisfaction (Fairburn, 2008). This may explain the excessively high correlation between the EDE/EDE-Q Weight Dissatisfaction and Shape Dissatisfaction

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scales. Desire for different proportions and body/weight self-consciousness domains also did not define their own factors, although several of these items were good markers of the Body Dissatisfaction factor. These results are consistent with the EDE-Q structural analyses, which failed to support a distinction between concerns with one's weight and shape.

Desire for high muscularity emerged as a distinct dimension in both community and student samples, but not in the patient sample. In the patient sample, items designed to assess supplement use to increase muscle mass, as well as an item from the desire for muscularity HIC, formed a Muscle Building factor. Contrary to hypotheses, this construct was distinct from general body image concerns and from purging behaviors.

Third, two HICs – cognitive food restraint and fasting/dietary restraint – were written to assess restrained eating. These item composites were developed because previous literature suggested that current measures of restrained eating do a poor job of predicting short- and long-term caloric intake (Stice, et al., 2007; Stice, Fisher, & Lowe, 2004). It was hypothesized that current restrained eating measures do not accurately reflect dietary intake because they assess global perceived efforts to limit food consumption, rather than concrete food intake behavior. The Restricting factor (which corresponds to the fasting/dietary restraint HIC) emerged across all samples. However, the Weight Control Behaviors factor (which corresponds to the cognitive food restraint HIC) could not be distinguished from restricting and excessive exercise behaviors in students or patients. Interestingly, the Restricting factor was significantly negatively correlated with body mass index (except in Phase III students), whereas the Weight Control Behaviors factor was not. These findings indicate that it is possible to assess actual dietary intake more accurately when symptoms reflecting concrete eating behaviors, rather than global efforts to reduce intake (or increase caloric expenditure through exercise) are emphasized.

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Fourth, items were written to assess various aspects of purging behavior. Only one of the self-induced vomiting items performed well in students ("I made myself vomit in order to lose weight"), yet this item did not load substantially on the Purging factor in community adults and loaded on both the Restricting and Purging factors in the patient sample. However, items assessing diet pill, diuretic, diet/cleansing tea, and laxative use formed a distinct, homogeneous factor. Excessive Exercise items formed their own factor that was distinct from other forms of purging behavior and from Restricting.

Finally, numerous items were written to assess *DSM-IV* symptoms of anorexia nervosa including: (a) fear of fatness, (b) obsession with slimness/refusal to maintain "normal" body weight, and (c) disgust of overweight/intense fear of gaining weight. Of these symptom dimensions, only Negative Attitudes toward Obesity emerged as a distinct factor. The other two dimensions did not emerge as distinct factors, nor were they good markers of Body Dissatisfaction or Restricting. Items written to assess food and weight rituals, which have been hypothesized to be relevant to biological starvation observed in anorexia nervosa (Keys, 1950), also did not form a distinct factor. Interestingly, however, the satiety HIC, which is thought to be important in the development and maintenance of obesity, and the fasting/dietary restraint HIC, combined to form the Restricting factor.

Scale properties

Body Dissatisfaction emerged as a broad scale that had the strongest convergence with existing measures of eating disorder symptoms. Across samples this scale was consistently the most highly correlated with the BSQ, EDI-3 Body Dissatisfaction scale, EDE-QR Body Dissatisfaction, and EDE-Q Shape and Weight Concerns scales and demonstrated significant correlations with all other measures, with the exception of the MBAS Height scale in students (Tables A26, A27, A39, A48, and A49). Body Dissatisfaction also demonstrated the strongest correlations with self-reported symptoms of depression and anxiety, corroborating previous research linking body dissatisfaction to other symptoms of internalizing psychopathology (Ohring, Graber, & Brooks-Gunn,

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2002). Body Dissatisfaction was able to differentiate eating disorder patients from general psychiatric outpatients (see Table A35) and the results of confirmatory factor analyses indicate it exists at a super-ordinate level to other eating disorder symptom scales (see Tables A10, A11, A31, A32, A42, A43, A44, and A45). The Body Dissatisfaction scale, therefore, appears to represent the core psychopathology of eating disorders.

The IEBQ also consists of 6 more specific symptom scales. Two of these dimensions – Binge Eating and Restricting – also had relatively broad links to eating pathology and general psychopathology. These scales had strong convergent validity with established measures of eating pathology (Tables A26, A27, A39, A48, and A49). Across samples the Restricting scale had its highest correlations with EDE-Q Weight Concerns and EDE-Q Restraint, whereas Binge Eating had its highest correlation with EDI-3 Bulimia. Binge Eating and Restricting had relatively strong and broad links to other indicators of internalizing psychopathology, although they demonstrated very high correlations with the IDAS Appetite Gain and Appetite Loss scales, respectively. An examination of the items that comprise these scales indicates overlapping content. For example, IDAS Appetite Gain items include: "I thought a lot about food," "I ate when I wasn't hungry," and "I ate more than usual." The IEBQ also contains items that assess eating when not physically hungry (e.g., "I ate when I was not hungry" and "I ate because other people around me were eating, even though I was not hungry"), which most likely increased the correlation between these scales. IDAS Appetite Loss items include: "I did not have much of an appetite," "I felt like eating less than usual," and "I did not feel much like eating." Although the content of this scale does not directly overlap with the content of the IEBQ Restricting scale, individuals may have endorsed the IDAS Appetite Loss items because of eating disorder concerns, such as a desire for thinness, rather than (or in addition to) depressed mood.

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Most of the specific symptom scales had consistently strong psychometric properties. Most scales had good to excellent internal consistency reliability (see Tables A20, A21, A22, A37, A47). Purging had lower internal consistency in non-clinical samples, which may be due to the low base-rate of these behaviors in students. All scales had strong test-retest reliability over 2- to 4-weeks (see Table A52). The scales were moderately associated with one another, with many correlations falling within the .20 to .40 range (see Tables A23, A24, and A38). IEBQ scales had good convergent and discriminant validity with measures of the same symptom dimensions. Except for Negative Attitudes toward Obesity, all scales were able to differentiate eating disorder patients from general psychiatric patients (see Table A35).

One scale that warrants further attention is the Negative Attitudes toward Obesity scale. This scale had somewhat weaker links with traditional measures of eating pathology (Tables A26, A27, A39, A48, and A49) and with other IEBQ factors (see Tables A23, A24, and A38). Negative Attitudes toward Obesity also had high average interitem correlations across all samples (see Tables A20, A21, A22, A37, and A47) and was not able to distinguish eating disorder from general psychiatric patients. Given that a core feature of anorexia nervosa is a fear of gaining weight or becoming "fat," (often referred to as "fat phobia") it would seem that this scale should differentiate patient groups. On the other hand, this scale is not measuring negative attitudes toward, or disgust of, one's own body or a fear that one will gain weight or become fat; instead, this scale assesses negative attitudes toward the overweight/obese bodies of *others* – which may represent a normative, and somewhat automatic attitude in the U.S. population (Grover, Keel, & Mitchell, 2003; Teachman, Gapinski, Brownell, Rawlins, & Jeyaram, 2003). Overall, this scale needs further validation in future research to determine if it will be clinically useful.

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Current Status of the IEBQ

The final version of the IEBQ is based on the 7-factor/scale model identified in the patient sample. Because the measure was designed to assess eating disorder symptoms, which are most relevant to a sample of individuals with diagnosable eating disorders, greater weight was given to structural analyses in the patient sample (vs. the Phase I community/student samples). Nevertheless, the structure generally was similar across all study phases and the final version of the measure is expected to be useful in both clinical and non-clinical samples.

The self-induced vomiting item (Item 30, see Final Item Pool in Appendix C) did not perform well in community or patient samples. In these samples, self-induced vomiting loaded weakly (i.e., below |.40|) on the Purging factor in EFAs. Preliminary analyses in Phase III students indicated that Item 30 did not correlate significantly higher with the Purging scale compared to the Restricting scale at either assessment point. In addition, including the self-induced vomiting item as an indicator of the latent Purging factor led to reduced model fit in CFAs. These findings suggest that self-induced vomiting may have little relevance to the construct of Purging in non-patient samples and in samples that include substantial numbers of individuals with anorexia nervosa. Further investigation of this item is warranted in samples of individuals with bulimia nervosa and purging disorder (Keel, Haedt, & Edler, 2005), as self-induced vomiting may be especially relevant for these groups. Therefore, the self-induced vomiting item was retained in the final questionnaire, but is not included in the Purging scale score.

Finally, although the results of multiple group analyses found evidence of factor invariance, some analyses suggested that items/scales behaved somewhat differently across sex and weight categories. To increase the applicability of the measure across different groups of participants, the majority of items that performed differently between groups were not included in the final questionnaire. For example, in the overweight/obese sample, some Binge Eating items cross-loaded on the Restricting factor and were not

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retained in the Phase II item pool. The majority of Muscularity items were also removed from the Phase II item pool because these items tended to focus on areas of the body that are of more concern to males (such as the chest and abdomen).

The final measure, therefore, can be used without modification across groups. Nevertheless, the Muscle Building scale may have less relevance to women and the Restricting and Excessive Exercise scales may have little importance for understanding eating pathology in overweight/obese samples. It may be desirable to administer a limited sub-set of scales to a specific sample, given that some scales have less relevance in certain groups. Finally, multiple group analyses indicated that the threshold of the latent Body Dissatisfaction factor was lower in men compared to women. An examination of the item content for this factor shows that some adjustments to these items may improve the generalizability of the measure. Items 14, 15, and 17 (see Final Item Pool in Appendix C) assess dissatisfaction with one's hips, thighs, and buttocks. Given that men may have less dissatisfaction with these body areas, the inclusion of these items may have inadvertently contributed to higher thresholds for the Body Dissatisfaction factor in women.

Diagnostic Implications

Diagnostic and Statistical Manual of Mental Disorders

The item pool included questions to assess all of the current *DSM* criteria for eating disorders, as well as additional dimensions that were theorized to represent important aspects of eating pathology. Thus, the results of this study have interesting implications for the underlying structure of eating disorder symptoms. Three main implications for future editions of the *DSM* are summarized.

First, certain symptoms of binge eating disorder, including: eating much more rapidly than normal (Criterion B1) and eating alone because of being embarrassed by how much one is eating (Criterion B4) did not load on the Binge Eating factor. Other research indicates that these criteria have lower reliabilities (kappa) compared to the other

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symptoms of binge eating disorder (Brody, Walsh, & Devlin, 1994), which indicates that these symptoms may be poor indicators of the diagnosis. Nevertheless, recent research finds that Criterion B4 has strong criterion validity for differentiating individuals with binge eating disorder from non-binge eating disorder controls. Further research is, therefore, needed to clarify the utility of these symptoms for diagnosing binge eating disorder.

Second, the *DSM-IV* distinguishes between purging (i.e., forced expelling of food from the body through self-induced vomiting, laxatives, or diuretics) and inappropriate compensatory behaviors (i.e., behaviors to compensate for food intake, such as excessive exercise and fasting). The current study did not support the *DSM*'s distinction between purging and inappropriate compensatory behaviors. Diet pill misuse currently is not considered a purging or inappropriate compensatory behavior, and is diagnosed in the substance use disorders section of the *DSM-IV*. Results clearly suggest that diet pill misuse is a component of eating pathology, suggesting that this symptom may be misclassified in the current *DSM*.

Third, there is debate about whether or not to retain intense fear of gaining weight or becoming fat (Criterion B) as part of the diagnostic criteria for anorexia nervosa (for a review, see Becker, Thomas, & Pike, 2009). The results of this study suggest that fat phobia is not distinct from body dissatisfaction, nor is it a good marker of the body dissatisfaction dimension. In other words, fat phobia items did not perform well on the Body Dissatisfaction factor and tended to cross-load on other factors, such as Restricting. The Negative Attitudes toward Obesity scale, which is a similar concept to Criterion B, did not differentiate eating disorder patients from general outpatients, indicating that fear of gaining weight or becoming fat may not represent the main motivating force behind self-starvation syndromes. Of course this conclusion must be tempered by the fact that Negative Attitudes toward Obesity does not measure disgust/fear of one's own body per se.

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Research Domain Criteria

In addition to implications for the *DSM*, the National Institute of Mental Health recently released a strategic plan that calls for the development of a novel classification of psychopathology based on dimensions of observable behavior and neurobiological measures. This plan, called the Research Domain Criteria or RDoC (NIMH, 2010), was developed due to evidence suggesting that *DSM* diagnoses do not represent unitary concepts and regarding them as such undermines research seeking to examine their underlying pathophysiology, as well as limits the development of more focused treatments. To move toward a diagnostic system that will be useful for improving our understanding of mental disorders, the RDoC developed three guiding principles: (a) the system will be dimensional, spanning the range of normal to abnormal, (b) the system will be agnostic about diagnostic categories, and (c) RDoC will use several different levels of analysis in defining constructs (e.g., imaging, physiological activity, behavior, and self-reports of symptoms).

The current study fits in well with the goals of the RDoC, as the examination of the internal structure of eating disorder symptoms resulted in a valid and reliable self-report measure. This measure was designed to be more comprehensive than existing measures of eating disorder symptoms and useful in a broader range of clinical and research contexts. Therefore, the IEBQ may be useful when combined with other units of analysis (such as behavioral observation, genetic methodology, etc) for indentifying domains of functioning that: (a) are shared across internalizing disorders and (b) differentiate eating pathology symptoms from other related mental health syndromes.

Theoretical Implications

Currently, there are several theoretical models that describe the hypothesized structure of eating pathology. The best known and most widely used scheme is the *DSM-IV* model of eating disorders, which includes anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified (which includes the provisional diagnostic

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category, binge eating disorder). In addition to the *DSM-IV* model, Williamson, Gleaves, & Stewart (2005) have developed a Three-Dimensional Model of eating disorders. Williamson et al. (2005) reviewed prior factor analytic studies of eating disorder symptoms, and found that two factors emerged across most studies. These factors were labeled "general psychopathology" and "binge eating and purging." In addition, a "restrictive eating" factor was found in approximately 60% of the studies he reviewed. These findings, combined with the results of taxometric analyses of eating disorders, led Williamson et al. to posit three dimensions of eating pathology in which binge eating is viewed as a categorical dimension (high vs. low), whereas fear of fatness/compensatory behaviors and drive for thinness are viewed as continuous variables. Finally, Fairburn's Transdiagnostic Model (Fairburn, 2008) proposes reducing the current diagnostic categories into a single diagnostic class. This model is based on the hypothesis that an overevaluation of eating, shape, and weight (or their control) represents the core psychopathology shared across all disordered eating behaviors.

The results of this study indicate that there is a core psychopathology (i.e., Body Dissatisfaction) that exists at a super-ordinate level to other eating disorder symptoms and that accounts for a substantial amount of variance. This general factor corresponds well to the core psychopathology delineated in the Transdiagnostic Model (Fairburn, 2008). However, results also suggest that there are meaningful sub-factors that can be identified within the broader domain of eating disorder symptoms. For example, Binge Eating, Restricting, Purging, Excessive Exercise, Negative Attitudes toward Obesity, and Muscle Building also emerged as distinct factors. These results provide support for the dimensions identified in the Three-Dimensional Model of Eating Disorders. In fact, many of the IEBQ scales have considerable content overlap with the factors identified by Williamson et al. (2005). It is noteworthy, moreover, that rather than providing support for either the Transdiagnostic or Three-Dimensional Model, these data provide support for both models. These results suggest that the structure of eating disorder symptoms is

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hierarchical. At the higher-order level, eating disorder symptoms all share a common psychopathology marked by extreme concerns with weight and shape. Nevertheless, these behaviors can be differentiated at a lower-order level into several distinct factors.

Utility

As previously mentioned, there currently are numerous measures of eating pathology. This raises the question, why would researchers and clinicians choose to use the IEBQ? First, although the IEBQ is strongly associated with established measures of eating disorder symptoms, suggesting strong convergent validity, it possesses several dimensions beyond those included in traditional inventories. For example, current multidimensional measures of eating pathology, such as the EDI-3 and EDE-Q, do not assess Negative Attitudes toward Obesity or Muscle Building. Muscle Building may be particularly relevant for men and may lead to an improved understanding of eating pathology in this population.

Second, established multidimensional eating disorder measures do not differentiate scale content in a way that allows for conclusions to be drawn about specific eating disorder behaviors. The EDI-3 Bulimia scale contains content that assesses purging, inappropriate compensatory behavior, and binge eating. High scores on this scale could reflect pathological levels of binge eating, purging, inappropriate compensatory behavior, or any combination of these three behaviors. Conversely, because the EDE-Q was developed rationally, its scales may artificially differentiate behaviors that should be grouped together (e.g., Shape Concerns and Weight Concerns). The IEBQ was developed using: (a) theory to guide the selection of eating disorder content domains and (b) modern statistical techniques to refine the measure. As a result, it possesses distinct eating disorder symptom dimensions that have only modest intercorrelations.

Third, the IEBQ shows initial promise of providing superior assessment of dietary restraint relative to established measures. The IEBQ Restraint scale was significantly

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negatively correlated with body mass index in all but one sample, whereas no other popular measure of dietary restraint had a similar direction or strength of association with body weight.

Finally, the IEBQ is relatively brief and easy to complete, score, and interpret. The measure can be made even briefer by administering only the desired scale(s). For example, because Body Dissatisfaction represents a super-ordinate factor, this scale could be administered quickly and easily when researchers or clinicians are interested in assessing a person's general level of eating pathology. The IEBQ, therefore, provides a quick and thorough assessment of eating pathology that can be adjusted to suit a variety of research and clinical contexts.

Strengths and Limitations

The current study has numerous strengths. The most notable strength is that the IEBQ was developed using rigorous methodology according to suggestions outlined by Clark and Watson (1995). No current multidimensional measure of eating pathology was developed using these procedures. The study included several large independent samples and sufficient numbers of men and overweight/obese individuals to examine the underlying structure of the measure in these sub-groups with adequate power. As a result of these strengths, the measure demonstrated good psychometric properties. The final measure had a robust 7-factor structure that replicated across patient and non-patient participants; its scales showed good internal consistency and test-retest reliability, good to excellent convergent and discriminant validity, and (except for Negative Attitudes toward Obesity) were able to differentiate eating disorder from general psychiatric patients. Finally, the IEBQ is the first measure of eating disorder symptoms that was explicitly designed to elucidate the structure of eating pathology and, therefore, has the potential to inform future diagnostic systems.

The study has certain limitations that may affect the interpretation of results. The majority of study participants were Caucasian. Bardone-Cone and Boyd (2007) examined

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the psychometric properties of common measures of eating disorder symptoms in an ethnically diverse sample and found that they demonstrated good internal consistency and strong convergent and discriminant validity in African American women. However, the TFEQ Dietary Restraint scale was less stable over time in African American women compared to Caucasian women. Future studies are needed in more diverse samples, to examine the reliability and stability of the IEBQ across racial and ethnic groups.

A substantial portion of patient participants were diagnosed with anorexia nervosa. This limits the ability to generalize results to bulimia nervosa and binge eating disorder. On the other hand, the inclusion of a substantial number of patients with anorexia nervosa could also be considered one of the strengths of this study, given the rarity of the disorder. Finally, the study is limited in its conclusions because the majority of samples are cross-sectional and causation cannot be inferred.

Future Directions

Assessment and Diagnosis

As discussed in the limitations, it will be important to examine the psychometric properties of the IEBQ in ethnically diverse samples. In addition to examining the properties of the self-report measure, it will be useful to examine the convergence of the measure with structured interviews of *DSM*-defined eating disorders. Informant ratings, such as parent- or spouse-report may also be informative for examining the convergence of the IEBQ with other methods. Together, these data would allow for further testing using multitrait-multimethod confirmatory factor analysis, which is considered the most rigorous test of convergent and discriminant validity (Brown, 2006a).

Examination of criterion-related validity would further establish the IEBQ's utility and psychometric properties. This could include examining the ability of the Restricting scale to predict caloric intake using biomarkers of dietary intake, such as doubly-labeled water. Other tests of criterion-validity could include hospital discharge against medical advice, clinician ratings of dysfunction, and mortality.

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Finally, due to the time constraints of many clinical practitioners, there is often emphasis placed on the development of short assessment measures. The problem with developing short forms is that many suffer from poor psychometric properties (G. T. Smith, McCarthy, & Anderson, 2000). This issue can be circumvented using computerized adaptive testing, which is based on item response theory. This enables researchers to administer fewer items because the computer successively selects questions that maximize the precision of the measure based on the participant's responses to previous questions. Computerized adaptive testing has been used successfully in other areas of psychopathology to shorten the number of items by more than half while retaining the precision of the original version (Reise, et al., 2011). This methodology could be used to develop a psychometrically sound, short-form of the IEBQ.

Theory

Although the results of the current study provide information pertinent to previous theoretical models of eating disorders (see section on Theoretical Implications), future work is needed to understand the concurrent and prospective associations between variables within the structure to further develop theoretical models of eating pathology. For example, the current study indicates that the latent Body Dissatisfaction factor is negatively correlated with Muscle Building and positively correlated with Excessive Exercise. Results also indicate that Muscle Building and Excessive Exercise are positively correlated with each other. This suggests the possible presence of suppressor effects (Paulhus, Robins, Trzesniewski, & Tracy, 2004). Controlling for Excessive Exercise may change the direction of association between Body Dissatisfaction and Muscle Building, given that exercising excessively may result in increased muscularity and low body fat, which may lead to lower levels of body dissatisfaction. A greater understanding of these effects will help to elucidate potential mechanisms that lead to the developmental and maintenance of Muscle Building.

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Future theory would also benefit from longitudinal research to determine if Body Dissatisfaction prospectively predicts increases in other eating disorder symptom domains, which would further validate its role as the core psychopathology of eating disorder symptoms.

Future studies are needed to examine how theoretical models of eating pathology fit within broader models of psychopathology. Forbush et al. (2010) examined the location of eating pathology within the Internalizing-Externalizing model of mental disorders. They found that eating disorders fit best as a sub-class within Internalizing, yet there was also evidence to suggest that binge eating and purging behaviors had links to externalizing disorders. To the extent that the IEBQ represents a more valid phenotype of eating disorder symptoms, this will allow for a more precise understanding of how the full range of eating disorder symptoms fit within theoretical and empirical models of diagnostic taxonomy, and ultimately may lead to an increased understanding of the nature of eating disorders.

Conclusions

The current study fills a major gap in the field of eating disorders. First, as previously mentioned, a psychometrically sound structural model of eating disorders symptoms is crucial for future genetic research, wherein the identification of a meaningful phenotype facilitates the location of the genotype. Second, a state-of-the-art measure of eating disorders will lead to improved assessment of change in clinical trials, thereby advancing eating disorder treatment research. Third, the results of this study allowed for an examination of competing theoretical models of eating pathology and will continue to inform the development of novel theoretical models of eating disorders symptoms. Finally, the development of a valid and reliable multidimensional model of eating disorder symptoms will contribute to a better understanding of the internal structure of eating disorders through the refined assessment of their constituent parts. Overall, the results of this study may inform the development of a more comprehensive

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empirically-based system of eating pathology relevant to future editions of the *DSM*, which is a crucial first step towards the development of more targeted and effective treatments for eating disorders.

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APPENDIX A

TABLES

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Table A1. Internal Consistency of Eating Disorder Symptom Measures in Men and Women

Measure (No. Items)	Sample Size		Coefficient alpha (AIC)		Sample characteristics
	Men	Women	Men	Women	
DEBQ-R (10)					
van Strien et al. (1986)	498	642	.93 (.57)	.95 (.66)	Obese and normal weight adults
DEBQ-EM (13)					
van Strien et al. (1986)	449	602	.92 (.47)	.95 (.59)	Obese and normal weight adults
DEBQ-EX (10)					
van Strien et al. (1986)	513	650	.80 (.29)	.81 (.30)	Obese and normal weight adults
BSQ (14)					
Forbush et al. (unpublished)	118	198	.96 (.63)	.97 (.70)	Psychiatric patients
Varnando-Sullivan et al. (2006)†	200	233	.97 (.70)	.95 (.58)	University students
BULIT (36)					
Forbush et al. (unpublished)	118	198	.93 (.27)	.95 (.35)	Psychiatric patients
Spillane et al. (2004)	214	215	.90 (.20)	.94 (.30)	University students
EAT (26)					
Forbush et al. (unpublished)	118	198	.86 (.19)	.91 (.28)	Psychiatric patients
Forbush et al. (unpublished)	359	708	.89 (.24)	.92 (.31)	University students
Smead and Richert (1990)	310	302	.69 (.08)	.82 (.15)	University students
Boerner et al. (2004)	214	215	.77 (.11)	.88 (.22)	University students
SCID ED (15) *Module*					
Spillane et al. (2004)	214	215	.65 (.11)	.73 (.15)	University students
EDI-DT (7)					
Keel et al. (2007)	276	642	.86 (.47)	.90 (.56)	University students (1982 cohort)
Spillane et al. (2004)	214	215	.82 (.39)	.91 (.59)	University students

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Table A1. Continued

Measure (No. Items)	Sample Size		Coefficient alpha (AIC)		Sample characteristics
	Men	Women	Men	Women	
EDI-BN (8)					
Keel et al. (2007)	276	642	.72 (.24)	.85 (.41)	University students (1982 cohort)
Spillane et al. (2004)	214	215	.63 (.18)	.74 (.26)	University students
EDI-BD (10)					
Spillane et al. (2004)	214	215	.83 (.33)	.93 (.57)	University students
TFEQ-CR (21)					
Spillane et al. (2004)	214	215	.89 (.28)	.90 (.30)	University students
TFEQ-D (16)					
Spillane et al. (2004)	214	215	.70 (.13)	.79 (.19)	University students
TFEQ-H (14)					
Spillane et al. (2004)	214	215	.79 (.21)	.81 (.23)	University students

Note. DEBQ-R = Dutch Eating Behavior Questionnaire Restrained Eating, DEBQ-EME = DEBQ Emotional Eating, DEBQ-EXE = DEBQ External Eating. †Modified version of the BSQ for use in men. EDI-DT=Eating Disorders Inventory Drive for Thinness, EDI-BN=EDI Bulimia, EDI-BD=EDI Body Dissatisfaction. Spillane et al. (2004) and Boerner et al. (2004) were based on the same sample of participants. No. Items = Number of items on the measure/scale. AIC=Average Interitem Correlation.

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Table A2. Sample size and power in the item selection and initial validation of eating disorder measures

	Sample Size		Estimated Power	
Measure	Men	Women	Men	Women
Bulimia Cognitive Distortions Scale Schulman et al. (1986)	*N*=0	*N*=12	.00	.09
Binge Eating Scale Gormally et al. (1982)	*N*=0 [a]	*N*=0 [a]	.00	.00
Binge Scale Hawkins and Clement (1980)	*N*=0 [a]	*N*=0 [a]	.00	.00
Bulimic Thoughts Questionnaire Phelan (1987)	*N*=0	*N*=4	.00	.06
BITE Henderson and Freeman (1987)	*N*=0	*N*=72	.00	.39
Body Shape Questionniare Cooper et al. (1987)	*N*=0	*N*=586	.00	.99
BULIT-Revised Thelen et al. (1991)	*N*=0	*N*=140	.00	.66
Clinical Eating Disorder Rating Instrument Palmer et al. (1987)	*N*=0	*N*=10	.00	.08
Dutch Eating Behavior Questionnaire van Strien et al. (1986)	*N*=678	*N*=969	.99	.99
EAT-40 Garner and Garfinkle (1979)	*N*=0	*N*=66	.00	.37
EAT-26 Garner et al. (1982)	*N*=0	*N*=300	.00	.94
Eating Disorder Diagnostic Scale Stice et al. (2000)	*N*=0	*N*=367	.00	.97
EDE Interview Cooper et al. (1989)	*N*=0	*N*=142	.00	.67
EDE Questionnaire Fairburn and Beglin (1994)	*N*=0	*N*=297	.00	.94
EDI Garner et al. (1983)	*N*=0 [b]	*N*=690	.00	.99
Goldberg Scale Goldberg et al. (1980)	*N*=0 [a]	*N*=0 [a]	.00	.00
Goldfarb Fear of Fatness Scale Goldfarb et al. (1985)	*N*=0 [a]	*N*=0 [a]	.00	.00
Interview for the Diagnosis of Eating Disorders Kutlesic et al. (1998)	*N*=24	*N*=234	.16	.87
MAEDS Anderson et al. (1999)	*N*=0	*N*=507	.00	.99
Mizes Anorectic Cognitions Questionnaire-Revised Mizes et al. (2000)	*N*=0 [b]	*N*=205 [b]	.00	.82

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Table A2. Continued

	Sample Size		Estimated Power	
Measure	Men	Women	Men	Women
Restraint Scale Herman et al. (1978)	*N*=0 [a]	*N*=0 [a]	.00	.00
SCOFF Morgan et al. (1999) and Hill et al. (2009)	*N*=0	*N*=212	.00	.84
Stirling Eating Disorder Scales Williams et al. (1994)	*N*=0 [b]	*N*=142 [b]	.00	.67
Three Factor Eating Questionnaire Stunkard and Messick (1985)	*N*=109	*N*=182	.55	.78
Questionnaire for Eating Disorder Diagnoses Mintz et al. (1997)	*N*=0	*N*=340	.00	.96
Yale-Brown-Cornell Mazure et al. (1994)	*N*=0	*N*=0	.00	.00

Note. [a] Rationally created measure, [b] Sex not reported. Power calculated using G*Power for two-tailed bivariate normal correlations with an effect size=.20, which represents a small-medium effect size, and alpha=.05.

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Table A3. Items Omitted from the EDE-QR

2. Have you gone for long periods of time (8 hours or more) without eating anything at all in order to influence your shape or weight?
5. Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?
6. Have you had a definite desire to have a totally flat stomach?
10. Have you had a definite fear that you might gain weight?
12. Have you had a strong desire to lose weight?
20. On what proportion of the times that you have eaten have you felt guilty (felt that you've done wrong) because of its effect on your shape or weight?...Do not count episodes of binge eating
21. Over the past 28 days, how concerned have you been about other people seeing you eat?...Do not count episodes of binge eating

Note. These items were omitted from the EDE-QR due to low primary factor loadings (i.e., ≤ |.35| or high cross-loadings (i.e., ≥ |.30).

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Table A4. Principal Factor Analysis of EDE-QR with Promax Rotation for Community Participants

Item	BD	E/B Concerns	Restraint
1. Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?	0.08	-0.01	**0.77**
3. Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?	0.01	0.00	**0.82**
4. Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?	-0.05	0.04	**0.79**
7. Has thinking about food, eating or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	-0.03	**0.90**	0.01
8. Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	-0.02	**0.91**	0.04
9. Have you had a definite fear of losing control over eating?	0.25	**0.50**	0.07
19. Over the past 28 days, on how many days have you eaten in secret (i.e., furtively)?…Do not count episodes of binge eating	0.26	**0.46**	-0.06
11. Have you felt fat?	**0.83**	-0.02	0.00
22. Has your weight influenced how you think about (judge) yourself as a person?	**0.77**	0.13	0.03
23. Has your shape influenced how you think about (judge) yourself as a person?	**0.80**	0.15	-0.02
24. How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?	**0.35**	0.15	0.02
25. How dissatisfied have you been with your weight?	**0.86**	-0.07	0.11
26. How dissatisfied have you been with your shape?	**0.90**	-0.04	0.05
27. How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?	**0.91**	0.04	-0.06
28. How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?	**0.90**	0.00	-0.04

Note. *N*=407. BD=Body Dissatisfaction, E/B Concerns=Eating/Body Concerns. Factor loadings ≥ |.35| are bolded.

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Table A5. Principal Factor Analysis of EDE-QR with Promax Rotation for Student Participants

Item	BD	E/B Concerns	Restraint
1. Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?	0.09	0.05	**0.77**
3. Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?	0.03	-0.02	**0.86**
4. Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?	-0.07	0.03	**0.84**
7. Has thinking about food, eating or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	-0.07	**0.86**	0.07
8. Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	0.13	**0.80**	-0.03
9. Have you had a definite fear of losing control over eating?	0.04	**0.69**	0.10
19. Over the past 28 days, on how many days have you eaten in secret (i.e., furtively)? …Do not count episodes of binge eating	0.16	**0.38**	-0.07
11. Have you felt fat?	**0.71**	0.11	0.13
22. Has your weight influenced how you think about (judge) yourself as a person?	**0.73**	0.14	0.02
23. Has your shape influenced how you think about (judge) yourself as a person?	**0.74**	0.07	0.02
24. How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?	**0.61**	0.06	-0.09
25. How dissatisfied have you been with your weight?	**0.87**	-0.06	0.08
26. How dissatisfied have you been with your shape?	**0.79**	0.01	0.08
27. How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?	**0.91**	-0.03	-0.02
28. How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?	**0.85**	0.02	-0.04

Note. *N*=433. BD=Body Dissatisfaction, E/B Concerns=Eating/Body Concerns. Factor loadings ≥ |.35| are bolded.

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Table A6. Final Factor Solution for Combined Community Sample

Item	HIC	BD	Binge	WC	BBS	NA	Purging	Restricting	Muscularity
44. I thought that my weight was perfect	BD	**-0.48**	-0.14	-0.10	0.06	0.10	0.05	0.19	-0.15
46. I did not like how my body looked	BD	**0.69**	0.11	0.04	0.00	-0.02	-0.02	-0.08	0.22
49. I did not like how clothes fit the shape of my body	BD	**0.72**	0.11	0.01	-0.01	0.01	-0.03	-0.02	0.14
50. I wished the shape of my body was different	BD	**0.70**	0.06	-0.01	-0.02	0.05	-0.03	-0.02	0.21
51. I tried on different outfits, because I did not like how I looked	BD	**0.63**	0.06	0.01	0.02	0.05	0.05	0.14	0.01
59. I was not satisfied with the size of my hips	BD	**0.86**	-0.05	-0.05	-0.02	0.02	0.03	0.01	-0.11
61. I did not like the size of my thighs	BD	**0.93**	-0.01	-0.03	0.01	-0.03	0.00	0.02	-0.16
62. I wanted to be so thin that my thighs would not touch	BD	**0.75**	0.00	0.03	0.02	0.06	0.07	0.03	-0.19
63. I thought my arms were too fat	BD	**0.79**	0.08	0.02	-0.01	-0.15	-0.05	0.02	-0.09
66. I thought my butt was too big	BD	**0.86**	-0.06	-0.05	-0.01	0.06	0.04	-0.05	-0.16
68. Parts of my body seemed disproportionate	BD	**0.65**	0.06	-0.09	0.01	0.01	0.08	0.01	0.16
70. I was self-conscious about the way my body looked	BD	**0.72**	0.06	0.01	0.08	0.06	0.00	0.01	0.15
1. I ate a very large amount of food in a short period of time (e.g., within 2 hours)	BE	0.02	**0.70**	0.03	0.07	0.06	-0.13	-0.11	-0.06
2. I stuffed myself with food to the point of feeling sick	BE	0.22	**0.58**	-0.12	0.18	0.09	-0.06	0.03	-0.11
4. I ate until I was uncomfortably full	BE	0.06	**0.71**	0.01	0.00	0.03	-0.03	-0.04	-0.16
5. I ate large amounts of food	BE	-0.11	**0.72**	-0.03	0.06	0.08	0.00	-0.24	-0.06

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Table A6. Continued

Item	HIC	BD	Binge	WC	BBS	NA	Purging	Restricting	Muscularity
6. I ate a lot more than people who are my same sex and height	BE	0.04	**0.65**	-0.10	0.06	0.06	0.04	-0.24	-0.10
10. If someone offered me food, I felt that I could not resist eating it	BE	0.03	**0.61**	0.07	-0.05	0.06	0.03	-0.06	0.06
11. I could not stop snacking throughout the day	BE	0.00	**0.62**	0.09	-0.04	-0.16	-0.02	0.05	0.10
12. I was not able to resist eating second helpings at meals	BE	-0.09	**0.72**	0.07	-0.04	0.02	-0.02	-0.09	-0.04
14. I ate when I was not hungry	BE	0.11	**0.63**	0.09	-0.14	-0.02	-0.04	0.05	-0.07
15. I had a strong urge to eat after seeing a commercial about food	BE	0.03	**0.54**	-0.09	0.04	-0.01	-0.04	0.18	0.14
16. If food tasted good, I ate a lot more of it than I should have	BE	0.08	**0.70**	-0.05	-0.05	0.06	-0.08	0.00	0.05
17. I ate because other people around me were eating, even though I was not hungry	BE	0.04	**0.60**	0.00	-0.17	-0.03	0.06	0.16	-0.01
34. I ate as if I was on auto-pilot	BE	0.07	**0.69**	0.01	-0.05	-0.08	0.08	-0.01	0.00
36. I snacked throughout the evening without realizing it	BE	0.05	**0.67**	0.00	-0.10	-0.06	0.00	0.12	0.08
37. I ate an entire bag of chips or cookies without realizing it	BE	-0.03	**0.62**	-0.06	-0.08	0.01	0.03	0.11	0.13
38. I did not notice how much I ate until after I had finished eating	BE	0.05	**0.66**	-0.02	-0.08	0.04	0.12	0.10	0.05
143. No matter how much I ate, I never seemed to get full	BE	-0.02	**0.51**	-0.03	0.06	-0.04	0.13	-0.07	0.04
76. I tried to avoid foods with a high fat content	CFR	0.02	-0.21	**0.69**	-0.08	0.07	-0.04	-0.03	-0.05
77. I tried to avoid eating between meals	CFR	0.08	-0.10	**0.44**	-0.12	0.13	0.02	0.06	0.02

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Table A6. Continued

Item	HIC	BD	Binge	WC	BBS	NA	Purging	Restricting	Muscularity
79. I tried to exclude "unhealthy" foods from my diet	CFR	-0.05	-0.24	**0.67**	0.06	0.05	0.01	-0.01	-0.05
82. I tried to avoid foods with high calorie content	CFR	0.02	-0.06	**0.78**	-0.17	0.07	-0.01	-0.02	0.02
84. I counted the calories of foods I ate	DR	-0.04	0.18	**0.71**	0.07	-0.11	0.04	0.10	0.05
91. I ate small portions at meals in order to control my weight	DR	0.07	0.02	**0.60**	-0.11	-0.02	-0.01	0.19	0.08
93. I chose a low-calorie snack	DR	0.03	-0.13	**0.66**	-0.11	-0.05	0.03	0.05	-0.06
138. I felt guilty when I missed a workout or exercise class	EE	0.00	0.15	**0.42**	0.22	0.09	0.03	0.00	-0.12
159. I recorded the calories of foods I ate	FWR	-0.03	0.24	**0.65**	0.12	-0.11	0.01	-0.02	0.10
160. I kept a list of foods I ate each day	FWR	0.10	0.21	**0.57**	0.09	-0.13	-0.02	0.01	0.05
117. I thought about taking steroids as a way to get more muscular	PRG/SU	0.02	0.02	-0.03	**0.43**	0.00	0.06	0.03	0.24
118. I took weight gainers	PRG/SU	0.07	-0.11	-0.02	**0.81**	-0.15	0.02	0.05	0.07
119. I thought about taking weight gainers	PRG/SU	0.02	-0.04	-0.06	**0.77**	-0.11	-0.05	0.18	0.13
120. I tried to eat at least 25 grams of protein per meal	PRG/SU	-0.01	-0.08	0.01	**0.55**	0.04	-0.01	0.10	0.01
121. I tried to eat as many calories as I could each day	PRG/SU	-0.05	0.08	-0.17	**0.59**	-0.09	-0.05	0.20	0.06
122. I used muscle building supplements	PRG/SU	0.04	-0.11	0.07	**0.88**	0.05	-0.02	-0.09	0.02

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Table A6. Continued

Item	HIC	BD	Binge	WC	BBS	NA	Purging	Restricting	Muscularity
123. I considered taking a muscle building supplement	PRG/SU	-0.06	-0.02	0.06	**0.81**	0.05	-0.02	-0.10	0.11
127. I used protein supplements	PRG/SU	0.12	-0.05	0.04	**0.72**	-0.01	0.06	-0.08	-0.04
95. I was disgusted by the sight of obese people	DO	0.02	-0.04	-0.02	-0.01	**0.76**	-0.03	0.08	0.02
96. I thought to myself that overweight people are unhappy	DO	0.16	0.07	0.08	0.00	**0.68**	-0.06	0.06	0.01
97. I felt that overweight people are lazy	DO	0.01	0.02	-0.06	0.01	**0.77**	0.04	0.04	0.08
98. I thought that obese people lack self-control	DO	-0.03	0.01	0.01	-0.06	**0.80**	0.05	0.00	0.11
99. I felt that overweight people are unattractive	DO	-0.06	0.00	0.08	-0.04	**0.77**	-0.07	-0.04	0.08
101. I was disgusted by the sight of an overweight person wearing tight clothes	DO	0.04	0.00	-0.06	-0.08	**0.73**	0.02	0.09	0.10
114. I made myself vomit in order to lose weight	PRG/SU	0.09	0.09	0.03	0.08	0.02	0.32	0.01	-0.14
115. I thought laxatives are a good way to lose weight	PRG/SU	0.00	0.04	0.00	0.00	0.05	**0.73**	0.00	-0.11
116. I used laxatives in order to lose weight	PRG/SU	-0.03	-0.01	0.04	0.01	-0.01	**0.84**	-0.05	-0.13
125. I used diet pills	PRG/SU	0.12	0.05	0.04	0.02	0.01	**0.48**	0.04	0.02
128. I used diuretics in order to lose weight	PRG/SU	-0.03	-0.05	-0.02	0.01	-0.06	**0.77**	-0.01	0.09
129. I considered taking diuretics to lose weight	PRG/SU	0.06	-0.07	0.00	-0.07	0.08	**0.69**	0.00	0.12
133. I used diet teas or cleansing teas to lose weight	PRG/SU	0.07	0.05	-0.01	-0.02	-0.13	**0.54**	0.00	0.11

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Table A6. Continued

Item	HIC	BD	Binge	WC	BBS	NA	Purging	Restricting	Muscularity
86. I ate less than people I was with	DR	0.05	-0.13	0.22	-0.05	0.00	-0.07	**0.49**	-0.08
87. People told me that I do not eat very much	DR	-0.01	0.00	0.07	0.05	0.07	-0.01	**0.70**	-0.04
110. I was told that I am too thin	FF	-0.23	0.11	-0.18	0.23	0.13	0.10	**0.42**	-0.07
142. I got full more easily than most people	SAT	-0.02	0.03	0.04	0.10	0.04	-0.02	**0.76**	-0.13
144. I got full after eating what most people would consider a small amount of food	SAT	0.00	-0.03	0.05	0.05	0.04	0.03	**0.70**	-0.01
54. I would have felt more confident if I had greater muscle mass	DM	0.25	0.01	-0.01	0.13	0.14	-0.02	-0.02	**0.56**
56. I wanted more defined abdominal muscles	DM	0.26	0.03	0.04	0.10	0.11	0.04	-0.07	**0.55**
57. I wanted a more muscular chest	DM	-0.19	0.03	-0.03	0.20	0.18	-0.03	-0.14	**0.64**
58. I wished my body was more toned	DM	**0.45**	0.05	0.10	0.04	-0.01	0.04	0.01	**0.50**

Note. *N*=407. Promax rotation. BD=Body Dissatisfaction, WC=Weight Control Behaviors, BBS=Bodybuilding Supplements, NA=Negative Attitudes toward Obesity. Factor loadings ≥ |.40| are highlighted in bold. HIC=Homogeneous item composite. DM=Desire for high muscularity, BE=Binge Eating, CFR=Cognitive Food Restraint, DR=Fasting/Dietary Restraint, EE=Excessive Exercise, FWR=Food/Weight Rituals, PRG/SU=Purging Behavior/Supplement Use/Recurrent Inappropriate Compensatory Behavior, DO= Disgust of Obesity, FF=Fear of Fatness, SAT=Satiety.

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Table A7. Final Factor Solution for Combined Student Sample

Item	HIC	BD	Binge	WC	BBS	NA	Purging	Restricting	Muscularity
40. I was not satisfied with my weight	BD	**0.87**	0.03	-0.02	0.12	-0.04	-0.05	-0.05	0.05
41. I wished I could lose five or more pounds	BD	**0.91**	-0.04	0.01	-0.05	-0.04	-0.07	-0.14	-0.11
42. I would have been happier if I lost some weight	BD	**0.86**	0.01	0.03	-0.03	0.02	-0.01	-0.12	-0.03
43. I felt dissatisfied because I could not reach my target weight	BD	**0.82**	0.05	0.03	0.09	0.02	-0.04	-0.02	0.03
44. I thought that my weight was perfect	BD	**-0.80**	0.09	0.13	-0.09	0.05	0.09	0.15	-0.05
45. I thought about my weight so much that it interfered with my life	BD	**0.54**	0.08	0.14	0.04	-0.04	0.20	0.15	0.04
46. I did not like how my body looked	BD	**0.84**	0.03	-0.06	0.08	0.02	-0.07	-0.03	0.10
47. I felt uncomfortable in the clothes I was wearing	BD	**0.75**	0.13	0.00	-0.06	-0.04	-0.09	0.03	0.03
48. I thought my body shape was attractive	BD	**-0.59**	0.03	0.11	-0.09	0.21	0.06	0.10	-0.10
49. I did not like how clothes fit the shape of my body	BD	**0.75**	0.13	-0.07	-0.05	-0.03	-0.09	0.04	0.03
50. I wished the shape of my body was different	BD	**0.83**	0.05	-0.10	0.11	-0.05	-0.09	0.00	0.10
51. I tried on different outfits, because I did not like how I looked	BD	**0.62**	0.13	0.02	-0.08	-0.03	-0.02	0.12	0.01
59. I was not satisfied with the size of my hips	BD	**0.76**	-0.03	-0.11	0.03	-0.06	0.00	0.07	-0.03
60. I wished I had a smaller waist	BD	**0.88**	-0.05	-0.04	-0.05	-0.03	-0.03	-0.06	-0.12
61. I did not like the size of my thighs	BD	**0.67**	0.02	-0.14	-0.04	-0.06	0.03	0.17	-0.11
63. I thought my arms were too fat	BD	**0.68**	0.05	-0.03	-0.10	-0.01	0.09	-0.01	-0.08
66. I thought my butt was too big	BD	**0.47**	-0.01	-0.02	-0.05	-0.09	0.09	0.06	0.05

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Table A7. Continued

Item	HIC	BD	Binge	WC	BBS	NA	Purging	Restricting	Muscularity
67. I wished my stomach was flatter	BD	**0.79**	-0.01	0.03	-0.09	0.03	-0.08	-0.07	-0.03
68. Parts of my body seemed disproportionate	BD	**0.61**	0.11	-0.06	0.07	-0.03	0.06	0.10	-0.01
69. I looked at my body in mirrors or windows	BD	**0.51**	0.02	0.02	0.06	0.13	-0.03	0.14	0.00
70. I was self-conscious about the way my body looked	BD	**0.74**	0.06	-0.05	0.05	0.05	-0.01	0.10	0.16
73. I avoided looking at my body	BD	**0.57**	0.11	-0.08	0.00	-0.04	0.13	0.02	0.07
74. I avoided certain activities because people would see my body	BD	**0.61**	0.11	-0.09	0.03	0.07	0.15	-0.03	0.04
81. I thought about food or calories	CFR	**0.62**	-0.04	0.24	0.06	0.09	-0.08	-0.01	0.06
82. I tried to avoid foods with high calorie content	CFR	**0.63**	-0.13	0.28	-0.05	0.10	-0.08	0.02	0.00
94. I was very afraid of gaining weight	FF	**0.75**	-0.03	0.10	-0.07	0.09	0.07	0.05	-0.05
100. I felt like I would never stop gaining weight	FF	**0.58**	0.13	0.02	-0.13	0.07	0.15	-0.09	-0.02
102. I would have done anything to keep myself from gaining weight	FF	**0.52**	-0.07	0.12	-0.14	0.19	0.25	0.05	0.01
103. I thought gaining weight would ruin my life	FF	**0.43**	0.03	0.12	-0.11	0.22	0.20	0.08	-0.01
106. I motivated myself by looking at pictures of very thin people	FF	**0.55**	-0.01	0.15	-0.01	-0.02	0.18	0.06	0.00
107. I wanted to be as thin as possible	FF	**0.61**	-0.01	0.08	-0.08	-0.04	0.18	0.06	0.04
1. I ate a very large amount of food in a short period of time (e.g., within 2 hours)	BE	-0.09	**0.58**	0.16	0.03	0.02	0.03	-0.23	-0.01

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Table A7. Continued

Item	HIC	BD	Binge	WC	BBS	NA	Purging	Restricting	Muscularity
2. I stuffed myself with food to the point of feeling sick	BE	0.00	**0.58**	0.06	-0.03	0.09	0.06	-0.13	0.01
3. People would have been surprised if they knew how much I ate in one sitting	BE	-0.23	**0.57**	0.13	0.00	0.04	0.08	-0.24	0.12
4. I ate until I was uncomfortably full	BE	0.13	**0.53**	0.02	0.05	0.02	0.01	-0.14	0.03
10. If someone offered me food, I felt that I could not resist eating it	BE	0.07	**0.64**	0.02	0.05	0.11	-0.05	0.02	-0.06
11. I could not stop snacking throughout the day	BE	0.01	**0.64**	0.01	-0.01	0.00	-0.15	0.12	0.03
12. I was not able to resist eating second helpings at meals	BE	-0.01	**0.60**	0.05	0.02	0.08	-0.08	-0.13	0.03
14. I ate when I was not hungry	BE	0.18	**0.61**	-0.04	-0.08	-0.10	-0.12	0.06	-0.08
15. I had a strong urge to eat after seeing a commercial about food	BE	-0.07	**0.51**	-0.04	0.02	0.07	-0.07	0.13	0.01
16. If food tasted good, I ate a lot more of it than I should have	BE	-0.01	**0.71**	0.03	-0.08	0.12	-0.09	-0.05	-0.01
17. I ate because other people around me were eating, even though I was not hungry	BE	0.12	**0.65**	0.02	-0.02	0.06	-0.06	0.14	-0.04
19. I ate a lot when there was nothing else to do	BE	0.06	**0.76**	-0.01	0.00	0.00	-0.07	0.05	-0.01
33. I ate without being aware of how much I was eating	BE	0.16	**0.54**	0.00	0.04	-0.01	0.10	-0.07	-0.05
34. I ate as if I was on auto-pilot	BE	0.04	**0.58**	-0.02	0.03	0.02	0.16	-0.17	0.05

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Table A7. Continued

Item	HIC	BD	Binge	WC	BBS	NA	Purging	Restricting	Muscularity
35. I found myself snacking without thinking about it	BE	0.11	**0.67**	-0.01	-0.01	-0.10	-0.01	0.14	-0.04
36. I snacked throughout the evening without realizing it	BE	0.13	**0.59**	-0.06	0.10	-0.04	0.09	0.09	-0.12
37. I ate an entire bag of chips or cookies without realizing it	BE	0.05	**0.54**	-0.03	0.02	-0.10	0.18	-0.03	0.03
38. I did not notice how much I ate until after I had finished eating	BE	0.11	**0.63**	0.01	-0.01	-0.03	0.12	-0.11	0.04
39. I ate when I was bored	BE	0.14	**0.68**	-0.03	-0.04	-0.10	-0.11	0.13	-0.04
134. I exercised even when I was sick	EE	0.04	0.00	**0.79**	0.06	-0.04	-0.07	0.04	-0.05
135. I exercised even though I was very tired	EE	0.10	-0.01	**0.81**	0.01	-0.07	-0.11	0.00	0.06
136. I exercised even when I had an injury	EE	-0.02	0.10	**0.73**	0.07	-0.07	-0.01	0.05	-0.02
137. Other people thought I exercised too much	EE	-0.04	0.03	**0.74**	-0.02	-0.06	0.02	0.10	-0.04
139. My exercise schedule interfered with my life	EE	0.07	0.16	**0.58**	0.14	-0.01	0.10	0.01	-0.05
140. Sometimes I lost track of how long I was exercising	EE	-0.04	-0.02	**0.71**	0.00	-0.08	-0.05	0.09	0.06
141. I exercised for more than 2 hours at a time	EE	-0.18	0.03	**0.71**	-0.07	-0.04	0.02	0.02	0.03
117. I thought about taking steroids as a way to get more muscular	PRG/SU	0.01	0.02	-0.02	**0.53**	-0.03	0.10	0.00	-0.01
118. I took weight gainers	PRG/SU	0.04	-0.01	-0.08	**0.79**	-0.05	0.08	0.08	-0.11
119. I thought about taking weight gainers	PRG/SU	-0.06	0.03	-0.12	**0.80**	-0.06	0.04	0.14	0.03

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Table A7. Continued

Item	HIC	BD	Binge	WC	BBS	NA	Purging	Restricting	Muscularity
120. I tried to eat at least 25 grams of protein per meal	PRG/SU	0.01	-0.01	0.16	**0.67**	0.06	-0.03	-0.01	-0.03
121. I tried to eat as many calories as I could each day	PRG/SU	-0.16	0.13	-0.05	**0.55**	-0.02	-0.02	0.15	0.09
122. I used muscle building supplements	PRG/SU	0.04	-0.07	0.09	**0.84**	0.07	-0.01	-0.11	-0.03
123. I considered taking a muscle building supplement	PRG/SU	-0.04	-0.01	0.08	**0.76**	0.08	-0.02	-0.08	0.06
127. I used protein supplements	PRG/SU	0.02	-0.03	0.15	**0.76**	0.06	0.03	-0.08	-0.02
95. I was disgusted by the sight of obese people	DO	0.08	0.05	-0.08	0.02	**0.73**	-0.07	0.11	-0.02
97. I felt that overweight people are lazy	DO	-0.03	0.00	-0.03	0.05	**0.77**	-0.02	0.05	-0.02
98. I thought that obese people lack self-control	DO	0.00	0.03	-0.11	0.05	**0.83**	-0.06	0.00	-0.03
99. I felt that overweight people are unattractive	DO	-0.03	0.02	-0.08	0.05	**0.69**	0.02	-0.05	0.10
101. I was disgusted by the sight of an overweight person wearing tight clothes	DO	-0.05	0.07	-0.09	-0.07	**0.68**	0.01	0.09	0.01
114. I made myself vomit in order to lose weight	PRG/SU	0.02	0.03	0.00	-0.01	-0.02	**0.60**	-0.03	0.08
115. I thought laxatives are a good way to lose weight	PRG/SU	0.19	-0.01	-0.08	0.05	0.00	**0.66**	-0.01	-0.01
116. I used laxatives in order to lose weight	PRG/SU	0.05	-0.07	-0.07	0.13	-0.07	**0.73**	0.10	-0.05
86. I ate less than people I was with	DR	0.26	-0.21	0.10	0.08	0.05	-0.07	**0.50**	0.03

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Table A7. Continued

Item	HIC	BD	Binge	WC	BBS	NA	Purging	Restricting	Muscularity
87. People told me that I do not eat very much	DR	0.14	-0.07	0.05	0.05	0.04	0.06	**0.68**	0.00
110. I was told that I am too thin	DR	-0.33	0.20	-0.03	-0.03	-0.08	0.05	**0.49**	0.32
142. I got full more easily than most people	SAT	0.00	-0.08	0.10	-0.02	0.10	0.01	**0.73**	0.01
144. I got full after eating what most people would consider a small amount of food	SAT	-0.02	-0.05	0.07	0.00	0.04	0.03	**0.75**	-0.06
52. I wished my body was more muscular	DM	0.17	-0.10	0.00	-0.03	0.01	0.03	-0.02	**0.81**
54. I would have felt more confident if I had greater muscle mass	DM	0.15	-0.06	0.04	0.00	0.02	0.00	-0.02	**0.81**
55. I wished my arms were more muscular	DM	0.12	-0.03	0.04	-0.07	0.03	0.00	-0.01	**0.81**
65. I thought my arms were too thin	DM	-0.22	0.15	-0.10	0.11	-0.03	-0.04	0.19	**0.55**

Note. *N*=433 Students. Promax rotation. BD=Body Dissatisfaction, WC=Weight Control Behaviors, BBS=Bodybuilding Supplements, NA= Negative Attitudes toward Obesity. Factor loadings ≥ |.40| are highlighted in bold. HIC=Homogeneous item composite. DM=Desire for high muscularity, BE=Binge Eating, CFR=Cognitive Food Restraint, DR=Fasting/Dietary Restraint, EE=Excessive Exercise, FWR=Food/Weight Rituals, PRG/SU=Purging Behavior/Supplement Use/Recurrent Inappropriate Compensatory Behavior, DO= Disgust of Obesity, FF=Fear of Fatness, SAT=Satiety.

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Table A8. Comparability Coefficients from Promax-Rotated 8-Factor Principal Factor Analyses in Community Sample

	Community Factors Scores							
	BD	BE	WC	BBS	NA	Purging	Restricting	Muscularity
Student Factor Scores								
BD	**0.94**	0.52	0.42	-0.17	0.19	0.34	0.01	0.35
BE	0.52	**0.97**	0.05	0.08	0.24	0.29	-0.01	0.25
WC	0.03	0.26	**0.46**	0.43	0.36	0.18	0.07	-0.27
BBS	-0.17	0.07	-0.06	**0.96**	0.22	0.02	-0.02	0.18
NA	0.23	0.29	0.14	0.24	**0.96**	0.23	0.18	0.20
Purging	0.38	0.31	0.09	0.17	0.32	**0.75**	0.30	-0.21
Restricting	0.10	-0.13	0.21	0.02	0.18	0.23	**0.96**	-0.04
Muscularity	0.21	0.26	-0.26	0.38	0.30	0.13	0.18	**0.53**

Note. *N*=407. BD=Body Dissatisfaction, BE=Binge Eating, WC=Weight Control Behaviors, BBS=Bodybuilding Supplements, NA= Negative Attitudes toward Obesity. Convergent correlations are in bold. Correlations ≥ |.10| were significant at $p<.05$, correlations ≥ |.13| were significant at $p<.01$, and correlations ≥ |.17| were significant at $p<.001$.

Table A9. Comparability Coefficients from Promax-Rotated 8-Factor Principal Factor Analyses in Student Sample

	Community Factor Scores							
	BD	BE	WC	BBS	NA	Purging	Restricting	Muscularity
Student Factor Scores								
BD	**0.95**	0.41	0.54	-0.22	0.34	0.35	0.09	0.33
BE	0.41	**0.96**	0.20	0.03	0.29	0.21	0.09	0.18
WC	-0.02	0.28	**0.64**	0.33	0.19	0.21	0.09	0.15
BBS	-0.24	0.08	0.10	**0.99**	0.20	0.04	-0.04	0.27
NA	0.27	0.30	0.40	0.22	**0.97**	0.23	0.15	0.33
Purging	0.31	0.27	0.25	0.04	0.20	**0.84**	0.11	-0.04
Restricting	0.20	0.00	0.08	-0.05	0.17	0.07	**0.98**	-0.08
Muscularity	0.12	0.18	0.05	0.35	0.26	0.02	0.07	**0.79**

Note. *N*=433. BD=Body Dissatisfaction, BE=Binge Eating, WC=Weight Control Behaviors, BBS=Bodybuilding Supplements, NA= Negative Attitudes toward Obesity. Convergent correlations are in bold. Correlations ≥ |.10| were significant at $p<.05$, correlations ≥ |.15| were significant at $p<.01$, and correlations ≥ |.17| were significant at $p<.001$.

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Table A10. Confirmatory Factor Analysis in Student Participants

	Overall Fit Indices					
Model	χ^2	*df*	*CFI*	*TLI*	*RMSEA*	
Model 1	887.176	184	0.901	0.955	0.094	
Model 2	615.208	166	0.938	0.971	0.079	
Model 2b	579.041	165	0.943	0.974	0.076	
	χ^2	*df*	*CFI*	*TLI*	*RMSEA*	*BIC*
Model 2c	579.016	165	0.943	0.974	0.076	-422.66
Model 3	641.178	178	0.936	0.973	0.078	-439.41
Model 3b	599.522	171	0.941	0.974	0.076	-438.57
Model 4	771.120	165	0.916	0.961	0.092	-230.55

Note. *N*=433. Model 1; included all items from the final exploratory factor solution for the combined student sample (see Table A7). Model 2: omitted items 3, 14, 61, 65, 81, 121, 139, and 141. Model 2b: omitted item 110. Model 2c: did not allow the latent Restricting and Muscularity factors to correlate. Model 3: latent factors were regressed on Body Dissatisfaction. Model 3b: latent factors regressed on Body Dissatisfaction with correlations set to zero for latent factors that were uncorrelated in Model 3. Model 4: all latent endogenous factors regressed on latent exogenous eating pathology factor. BIC was not calculated for Model 1 through Model 2b because these models had different numbers of items.

Table A11. Confirmatory Factor Analysis in Community Participants

	Overall Fit Indices					
Model	χ^2	*df*	*CFI*	*TLI*	*RMSEA*	
Model 1	809.957	153	0.887	0.922	0.103	
Model 2	390.560	141	0.955	0.973	0.066	
	χ^2	*df*	*CFI*	*TLI*	*RMSEA*	*BIC*
Model 2b	336.452	126	0.962	0.974	0.064	-420.66
Model 3	390.560	141	0.955	0.973	0.066	-456.68
Model 3b	384.686	129	0.953	0.970	0.070	-390.45
Model 4	464.825	136	0.940	0.963	0.077	-352.37
Model 4b	392.850	119	0.950	0.965	0.075	-322.20

Note. *N*=407. Model 1: included all items from the final exploratory factor solution for the combined community sample (see Table A6). Model 2: omitted items 5, 76, 79, 86, 93, 96, 110, 117, 121, 122, 127, 135, 159, and 160. Model 2b: non-significant latent factor correlations in Model 2 were fixed to zero. Model 3: latent factors were regressed on Body Dissatisfaction. Model 3b; non-significant latent factor correlations in Model 3 were set to zero, Model 4: all latent endogenous factors regressed on latent exogenous eating pathology factor. Model 4b: factor loadings for Body Building Supplements and Restricting on Body Dissatisfaction were set to zero. BIC was not calculated for Model 1 and Model2 because these models had different numbers of items.

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Table A12. Final Factor Solution for Men

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	Muscularity
40. I was not satisfied with my weight	BD	**0.67**	0.17	0.09	-0.01	-0.09	-0.08	-0.06	0.11
41. I wished I could lose five or more pounds	BD	**0.68**	0.13	0.20	-0.12	-0.12	-0.11	-0.11	-0.08
42. I would have been happier if I lost some weight	BD	**0.72**	0.12	0.17	-0.07	-0.08	-0.05	-0.08	-0.01
43. I felt dissatisfied because I could not reach my target weight	BD	**0.66**	0.09	0.08	0.10	-0.06	-0.02	-0.03	0.17
44. I thought that my weight was perfect	BD	**-0.56**	-0.10	-0.09	0.07	0.13	0.08	0.17	-0.10
45. I thought about my weight so much that it interfered with my life	BD	**0.63**	0.03	-0.01	0.22	-0.01	0.12	0.00	0.05
47. I felt uncomfortable in the clothes I was wearing	BD	**0.53**	0.24	0.09	-0.04	-0.04	-0.10	-0.07	0.12
49. I did not like how clothes fit the shape of my body	BD	**0.53**	0.20	0.09	-0.08	-0.02	-0.01	-0.07	0.14
59. I was not satisfied with the size of my hips	BD	**0.76**	-0.18	-0.08	0.02	0.01	0.02	0.06	0.13
60. I wished I had a smaller waist	BD	**0.80**	0.02	0.14	-0.09	-0.07	-0.03	-0.05	-0.05
61. I did not like the size of my thighs	BD	**0.72**	-0.09	-0.07	0.02	0.08	0.06	0.00	0.03
62. I wanted to be so thin that my thighs would not touch	FF	**0.64**	-0.03	-0.09	-0.02	0.17	0.15	0.00	-0.08
63. I thought my arms were too fat	BD	**0.55**	0.11	0.01	0.05	-0.09	0.22	-0.09	-0.06
66. I thought my butt was too big	BD	**0.69**	-0.07	-0.11	0.03	0.02	0.05	-0.01	0.00
67. I wished my stomach was flatter	BD	**0.62**	0.03	0.18	-0.09	-0.08	-0.08	-0.08	0.13
68. Parts of my body seemed disproportionate	BD	**0.66**	0.06	-0.09	0.04	-0.07	0.04	0.05	0.17

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Table A12. Continued

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	Muscularity
73. I avoided looking at my body	BD	**0.60**	0.16	-0.10	-0.02	0.07	0.08	-0.06	-0.07
74. I avoided certain activities because people would see my body	BD	**0.68**	0.04	-0.12	0.03	0.06	-0.04	-0.11	0.09
94. I was very afraid of gaining weight	FF	**0.76**	-0.06	0.13	0.07	0.03	-0.04	0.12	-0.03
100. I felt like I would never stop gaining weight	FF	**0.66**	0.13	-0.04	-0.01	0.14	0.04	0.03	-0.12
102. I would have done anything to keep myself from gaining weight	FF	**0.58**	-0.04	0.04	0.04	0.23	0.14	0.21	-0.09
103. I thought gaining weight would ruin my life	FF	**0.68**	-0.07	-0.13	0.09	0.22	0.09	0.20	-0.10
107. I wanted to be as thin as possible	FF	**0.62**	-0.09	-0.07	0.09	0.06	0.13	0.07	-0.05
2. I stuffed myself with food to the point of feeling sick	BE	-0.05	**0.48**	-0.12	0.13	0.21	0.08	-0.17	0.03
4. I ate until I was uncomfortably full	BE	-0.02	**0.58**	-0.02	0.06	0.17	-0.06	-0.17	-0.04
10. If someone offered me food, I felt that I could not resist eating it	BE	0.06	**0.54**	0.07	0.02	0.14	-0.01	0.01	0.05
11. I could not stop snacking throughout the day	BE	0.02	**0.62**	0.00	0.03	-0.16	-0.05	0.18	0.16
12. I was not able to resist eating second helpings at meals	BE	-0.01	**0.65**	0.07	0.04	0.04	-0.01	-0.06	-0.03
14. I ate when I was not hungry	BE	-0.03	**0.66**	0.04	-0.02	-0.05	-0.05	0.00	-0.02
15. I had a strong urge to eat after seeing a commercial about food	BE	-0.20	**0.42**	0.03	-0.09	0.08	0.08	0.15	0.26
16. If food tasted good, I ate a lot more of it that I should have	BE	-0.04	**0.72**	0.05	-0.03	0.15	-0.10	0.02	0.02

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Table A12. Continued

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	Muscularity
17. I ate because other people around me were eating, even though I was not hungry	BE	-0.04	**0.65**	0.00	0.00	0.06	-0.03	0.20	-0.01
19. I ate a lot when there was nothing else to do	BE	0.05	**0.72**	0.00	0.02	0.00	-0.04	0.00	0.05
21. People told me that I ate really fast	BE	0.05	**0.37**	-0.04	0.18	0.00	-0.12	-0.09	0.04
33. I ate without being aware of how much I was eating	BE	0.14	**0.60**	-0.02	-0.09	0.09	0.06	0.00	-0.20
34. I ate as if I was on auto-pilot	BE	0.15	**0.64**	-0.04	-0.03	0.05	0.09	-0.06	-0.16
35. I found myself snacking without thinking about it	BE	0.08	**0.72**	-0.09	-0.05	-0.14	0.03	0.20	-0.06
36. I snacked throughout the evening without realizing it	BE	0.10	**0.64**	-0.03	-0.09	-0.11	0.10	0.16	-0.02
38. I did not notice how much I ate until after I had finished eating	BE	0.16	**0.60**	-0.02	0.02	0.05	0.08	0.02	-0.14
39. I ate when I was bored	BE	0.07	**0.64**	-0.08	0.05	-0.15	-0.02	0.11	0.14
76. I tried to avoid foods with a high fat content	CFR	0.05	-0.17	**0.78**	0.00	0.01	-0.06	0.13	-0.06
77. I tried to avoid eating between meals	CRF	0.28	-0.10	**0.49**	-0.11	0.07	-0.02	0.19	-0.12
79. I tried to exclude "unhealthy" foods from my diet	CFR	-0.08	-0.10	**0.78**	0.08	0.08	0.00	0.02	-0.08
81. I thought about food or calories	CFR	0.13	0.09	**0.64**	0.06	0.05	0.00	-0.13	0.09
82. I tried to avoid foods with high calorie content	CFR	0.18	-0.06	**0.83**	-0.03	0.04	-0.06	0.10	-0.08
84. I counted the calories of foods I ate	DR	-0.10	0.15	**0.69**	0.07	0.00	0.12	-0.15	0.02

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Table A12. Continued

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	Muscularity
93. I chose a low-calorie snack	DR	-0.06	-0.01	**0.76**	-0.02	-0.09	0.05	0.23	-0.04
159. I recorded the calories of foods I ate	DR	-0.19	0.15	**0.57**	0.15	-0.01	0.17	-0.19	0.13
160. I kept a list of foods I ate each day	FWR	-0.20	0.17	**0.53**	0.13	0.00	0.22	-0.11	0.12
120. I tried to eat at least 25 grams of protein per meal	PRG/SU	-0.19	-0.09	0.14	**0.40**	0.06	0.10	0.06	0.26
134. I exercised even when I was sick	EE	0.10	-0.04	0.02	**0.81**	-0.06	-0.01	0.07	-0.07
135. I exercised even though I was very tired	EE	-0.01	0.02	0.09	**0.80**	0.00	-0.07	-0.02	-0.03
136. I exercised even when I had an injury	EE	0.05	0.05	-0.03	**0.78**	-0.06	-0.08	-0.04	-0.10
137. Other people thought I exercised too much	EE	0.04	-0.02	0.00	**0.71**	-0.02	-0.02	0.05	-0.09
138. I felt guilty when I missed a workout or exercise class	EE	0.07	-0.05	0.18	**0.67**	0.10	-0.03	-0.03	0.02
139. My exercise schedule interfered with my life	EE	0.13	0.01	0.05	**0.62**	-0.02	0.01	0.05	0.04
140. Sometimes I lost track of how long I was exercising	EE	0.01	0.04	-0.07	**0.67**	-0.06	-0.01	0.10	0.06
141. I exercised for more than 2 hours at a time	EE	-0.10	0.07	-0.03	**0.67**	-0.03	-0.01	-0.01	-0.04
95. I was disgusted by the sight of obese people	DO	0.05	0.01	0.05	-0.05	**0.80**	-0.06	0.12	-0.02
96. I thought to myself that overweight people are unhappy	DO	0.13	0.13	0.02	-0.06	**0.70**	-0.10	-0.01	0.04

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Table A12. Continued

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	Muscularity
97. I felt that overweight people are lazy	DO	-0.04	-0.01	0.05	0.04	**0.79**	0.03	0.00	0.08
98. I thought that obese people lack self-control	DO	-0.07	0.07	0.13	-0.06	**0.82**	0.01	-0.03	0.03
99. I felt that overweight people are unattractive	DO	0.06	-0.05	-0.01	0.01	**0.74**	-0.04	-0.13	0.09
101. I was disgusted by the sight of an overweight person wearing tight clothes	DO	0.02	0.03	-0.08	-0.01	**0.66**	-0.03	0.07	0.08
114. I made myself vomit in order to lose weight	PRG/SU	0.19	-0.01	-0.02	-0.03	0.12	**0.48**	-0.17	-0.04
115. I thought laxatives are a good way to lose weight	PRG/SU	0.02	0.08	0.12	0.00	-0.08	**0.70**	0.04	0.00
116. I used laxatives in order to lose weight	PRG/SU	0.03	-0.05	0.02	0.02	-0.08	**0.73**	-0.12	0.02
128. I used diuretics in order to lose weight	PRG/SU	0.00	-0.03	0.00	-0.08	0.05	**0.73**	-0.05	0.04
129. I considered taking diuretics to lose weight	PRG/SU	0.09	-0.08	0.04	-0.07	-0.03	**0.66**	0.11	0.03
133. I used diet teas or cleansing teas to lose weight	PRG/SU	0.19	0.02	0.03	-0.01	-0.13	**0.54**	0.10	0.02
86. I ate less than people I was with	DR	-0.06	-0.01	0.30	-0.09	-0.05	-0.02	**0.63**	0.01
87. People told me that I do not eat very much	DR	-0.05	0.06	0.12	0.01	0.02	0.01	**0.70**	0.19
142. I got full more easily than most people	SAT	-0.08	0.13	-0.05	0.10	0.05	0.00	**0.75**	0.06

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Table A12. Continued

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	Muscularity
144. I got full after eating what most people would consider a small amount of food	SAT	0.06	0.12	-0.10	0.16	0.00	-0.04	**0.69**	0.01
52. I wished my body was more muscular	DM	0.17	-0.05	-0.03	-0.02	0.02	-0.01	-0.01	**0.82**
54. I would have felt more confident if I had greater muscle mass	DM	0.11	0.02	0.01	-0.04	0.07	0.03	0.06	**0.79**
55. I wished my arms were more muscular	DM	0.07	-0.05	0.00	-0.03	0.07	0.00	0.00	**0.88**
57. I wanted a more muscular chest	DM	0.19	-0.07	-0.11	0.02	0.03	-0.03	0.01	**0.82**
65. I thought my arms were too thin	DM	-0.17	0.06	-0.04	-0.05	0.05	0.06	0.19	**0.67**

Note. *N*=376. Promax rotation. BD=Body Dissatisfaction, CR=Cognitive Restraint, Exercise = Excessive Exercise, NA= Negative Attitudes toward Obesity. Factor loadings ≥ |.40| are highlighted in bold. HIC=Homogeneous item composite. DM=Desire for high muscularity, BE=Binge Eating, CFR=Cognitive Food Restraint, DR=Fasting/Dietary Restraint, EE=Excessive Exercise, FWR=Food/Weight Rituals, PRG/SU=Purging Behavior/Supplement Use/Recurrent Inappropriate Compensatory Behavior, DO= Disgust of Obesity, FF=Fear of Fatness, SAT=Satiety.

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Table A13. Final Factor Solution for Women

Item	HIC	BD	BE	CR	Exercise	NA	BBS	Purging	Restricting
40. I was not satisfied with my weight	BD	**0.75**	0.07	0.18	-0.09	-0.06	0.03	-0.03	-0.13
41. I wished I could lose five or more pounds	BD	**0.70**	0.02	0.23	-0.06	-0.03	-0.04	-0.04	-0.26
42. I would have been happier if I lost some weight	BD	**0.71**	0.07	0.19	-0.08	0.02	0.00	-0.01	-0.16
43. I felt dissatisfied because I could not reach my target weight	BD	**0.72**	0.08	0.20	-0.04	0.01	0.02	-0.03	-0.07
44. I thought that my weight was perfect	BD	**-0.71**	0.05	-0.10	0.15	0.10	-0.02	0.03	0.20
45. I thought about my weight so much that it interfered with my life	BD	**0.55**	0.13	0.00	0.17	-0.04	0.02	0.13	0.18
46. I did not like how my body looked	BD	**0.86**	0.02	0.03	-0.07	-0.03	0.01	-0.02	-0.02
47. I felt uncomfortable in the clothes I was wearing	BD	**0.79**	0.11	-0.03	0.04	-0.07	0.02	-0.04	0.01
49. I did not like how clothes fit the shape of my body	BD	**0.86**	0.04	-0.07	-0.03	-0.03	0.03	-0.08	0.04
50. I wished the shape of my body was different	BD	**0.84**	0.01	0.00	-0.08	-0.01	0.08	-0.06	0.01
51. I tried on different outfits, because I did not like how I looked	BD	**0.67**	0.01	-0.06	0.06	0.05	-0.01	0.01	0.13
56. I wanted more defined abdominal muscles	DM	**0.50**	-0.06	-0.11	0.17	0.12	-0.05	-0.06	-0.01
57. I wanted a more muscular chest	DM	**0.43**	-0.03	-0.11	0.10	-0.01	0.12	-0.13	0.05
58. I wished my body was more toned	DM	**0.60**	0.03	0.03	-0.07	0.01	-0.09	0.00	0.08
59. I was not satisfied with the size of my hips	BD	**0.81**	-0.08	-0.10	-0.01	-0.02	0.05	0.01	-0.04
60. I wished I had a smaller waist	BD	**0.77**	-0.04	0.06	-0.07	0.04	-0.09	-0.02	-0.13
61. I did not like the size of my thighs	BD	**0.78**	-0.02	-0.09	-0.03	-0.06	0.01	0.00	0.02
62. I wanted to be so thin that my thighs would not touch	FF	**0.68**	-0.09	-0.05	0.09	0.03	-0.04	0.15	0.06

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Table A13. Continued

Item	HIC	BD	BE	CR	Exercise	NA	BBS	Purging	Restricting
63. I thought my arms were too fat	BD	**0.68**	0.04	0.07	-0.06	-0.03	-0.04	0.03	-0.12
66. I thought my butt was too big	BD	**0.64**	-0.08	-0.10	0.05	-0.04	0.06	0.03	-0.06
67. I wished my stomach was flatter	BD	**0.72**	0.01	0.06	-0.02	0.04	-0.08	-0.05	-0.10
68. Parts of my body seemed disproportionate	BD	**0.70**	0.02	-0.17	0.01	0.01	0.07	0.04	0.10
69. I looked at my body in mirrors or windows	BD	**0.43**	-0.07	0.03	0.13	0.11	-0.07	-0.04	0.13
70. I was self-conscious about the way my body looked	BD	**0.84**	-0.01	-0.04	0.04	0.07	0.02	-0.04	0.10
73. I avoided looking at my body	BD	**0.64**	0.13	-0.10	0.03	-0.02	0.05	0.00	0.03
74. I avoided certain activities because people would see my body	BD	**0.64**	0.12	-0.13	0.00	0.04	0.05	0.15	0.02
94. I was very afraid of gaining weight	FF	**0.59**	-0.04	0.23	0.10	0.14	-0.04	0.00	0.08
100. I felt like I would never stop gaining weight	FF	**0.59**	0.18	-0.01	0.01	0.04	-0.07	0.10	-0.08
102. I would have done anything to keep myself from gaining weight	FF	**0.44**	-0.10	0.09	0.14	0.22	-0.10	0.16	0.12
106. I motivated myself by looking at pictures of very thin people	FF	0.35	0.06	0.17	0.14	0.09	0.00	0.10	0.09
107. I wanted to be as thin as possible	FF	**0.49**	0.02	0.08	0.19	0.03	-0.09	0.04	0.15
1. I ate a very large amount of food in a short period of time (e.g., within 2 hours)	BE	-0.07	**0.65**	-0.02	0.17	0.04	0.00	-0.04	-0.13
2. I stuffed myself with food to the point of feeling sick	BE	0.11	**0.60**	-0.12	0.10	0.05	0.00	0.01	0.02
3. People would have been surprised if they knew how much I ate in one sitting	BE	-0.09	**0.62**	-0.19	0.20	0.06	0.05	0.04	-0.13

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Table A13. Continued

Item	HIC	BD	BE	CR	Exercise	NA	BBS	Purging	Restricting
4. I ate until I was uncomfortably full	BE	0.11	**0.56**	-0.01	0.09	-0.02	0.03	0.03	-0.13
5. I ate large amounts of food	BE	-0.01	**0.64**	-0.12	0.15	0.05	0.05	0.00	-0.17
10. If someone offered me food, I felt that I could not resist eating it	BE	-0.08	**0.74**	0.10	-0.04	0.09	-0.02	0.01	-0.04
11. I could not stop snacking throughout the day	BE	-0.14	**0.78**	0.15	-0.14	0.00	-0.05	-0.12	0.08
12. I was not able to resist eating second helpings at meals	BE	-0.12	**0.70**	0.06	0.00	0.07	-0.05	-0.05	-0.10
14. I ate when I was not hungry	BE	0.00	**0.73**	0.15	-0.15	-0.02	-0.04	-0.04	-0.03
15. I had a strong urge to eat after seeing a commercial about food	BE	0.05	**0.60**	-0.11	-0.08	0.03	0.02	-0.03	0.17
16. If food tasted good, I ate a lot more of it than I should have	BE	0.02	**0.75**	-0.08	-0.03	0.10	-0.05	-0.05	-0.06
17. I ate because other people around me were eating, even though I was not hungry	BE	0.02	**0.69**	0.09	-0.08	0.04	-0.06	0.04	0.07
19. I ate a lot when there was nothing else to do	BE	-0.01	**0.82**	0.04	-0.08	0.05	-0.04	-0.02	0.06
33. I ate without being aware of how much I was eating	BE	0.16	**0.64**	0.01	0.00	-0.10	0.07	0.03	0.02
35. I found myself snacking without thinking about it	BE	0.11	**0.75**	0.04	-0.08	-0.06	-0.01	-0.08	0.12
36. I snacked throughout the evening without realizing it	BE	0.09	**0.71**	0.02	-0.04	-0.04	0.06	-0.03	0.09
37. I ate an entire bag of chips or cookies without realizing it	BE	0.10	**0.60**	-0.08	0.01	-0.06	0.09	0.02	0.10
38. I did not notice how much I ate until after I had finished eating	BE	0.20	**0.65**	-0.12	0.06	-0.03	0.00	0.07	0.09

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Table A13. Continued

Item	HIC	BD	BE	CR	Exercise	NA	BBS	Purging	Restricting
39. I ate when I was bored	BE	0.01	**0.79**	0.04	-0.10	0.02	-0.05	-0.03	0.05
143. No matter how much I ate, I never seemed to get full	BE	-0.04	**0.49**	-0.04	0.17	0.04	-0.07	0.13	-0.09
76. I tried to avoid foods with a high fat content	CFR	-0.03	-0.09	**0.85**	-0.02	0.04	0.07	-0.06	-0.01
77. I tried to avoid eating between meals	CFR	0.12	-0.15	**0.56**	-0.03	0.09	-0.04	0.06	-0.05
79. I tried to exclude "unhealthy" foods from my diet	CFR	-0.12	-0.10	**0.75**	0.08	0.05	0.12	-0.01	0.11
82. I tried to avoid foods with high calorie content	CFR	0.04	0.02	**0.88**	0.02	0.02	0.01	-0.07	0.03
84. I counted the calories of foods I ate	DR	-0.01	0.17	**0.65**	0.13	-0.05	0.02	0.09	0.10
91. I ate small portions at meals in order to control my weight	DR	0.17	0.00	**0.68**	-0.03	0.00	0.01	-0.05	0.16
93. I chose a low-calorie snack	DR	-0.14	-0.02	**0.76**	0.05	-0.03	-0.09	0.01	0.01
159. I recorded the calories of foods I ate	FWR	0.01	0.21	**0.49**	0.20	-0.09	0.16	0.10	0.01
160. I kept a list of foods I ate each day	FWR	0.00	0.24	**0.47**	0.16	-0.15	0.04	0.16	-0.04
134. I exercised even when I was sick	EE	0.00	-0.02	0.05	**0.82**	0.03	-0.02	-0.06	-0.03
135. I exercised even though I was very tired	EE	0.03	-0.04	0.12	**0.78**	-0.02	-0.02	-0.04	-0.10
136. I exercised even when I had an injury	EE	0.05	0.03	-0.06	**0.77**	0.01	0.01	-0.06	-0.04
137. Other people thought I exercised too much	EE	-0.04	0.00	0.07	**0.78**	-0.02	0.05	-0.07	0.03
138. I felt guilty when I missed a workout or exercise class	EE	0.08	-0.02	0.28	**0.61**	-0.01	0.03	-0.03	-0.06
139. My exercise schedule interfered with my life	EE	0.06	0.11	0.03	**0.63**	0.02	0.03	0.03	-0.01

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Table A13. Continued

Item	HIC	BD	BE	CR	Exercise	NA	BBS	Purging	Restricting
140. Sometimes I lost track of how long I was exercising	EE	0.07	-0.06	0.09	**0.66**	-0.11	-0.05	-0.03	0.13
141. I exercised for more than 2 hours at a time	EE	-0.08	-0.05	-0.04	**0.71**	-0.01	-0.06	0.00	0.03
95. I was disgusted by the sight of obese people	DO	0.10	0.00	-0.05	0.02	**0.76**	0.00	-0.04	0.04
96. I thought to myself that overweight people are unhappy	DO	0.08	0.07	0.05	0.02	**0.70**	0.04	0.00	0.01
97. I felt that overweight people are lazy	DO	0.00	0.01	-0.05	0.02	**0.81**	0.06	0.03	-0.02
98. I thought that obese people lack self-control	DO	-0.04	0.04	0.04	-0.06	**0.84**	0.07	0.00	-0.09
99. I felt that overweight people are unattractive	DO	0.02	0.05	0.08	-0.05	**0.74**	0.02	-0.01	0.02
101. I was disgusted by the sight of an overweight person wearing tight clothes	DO	0.01	0.05	-0.02	-0.07	**0.78**	-0.01	0.01	0.07
117. I thought about taking steroids as a way to get more muscular	PRG/SU	0.01	-0.10	0.11	-0.11	0.06	**0.82**	-0.02	-0.06
118. I took weight gainers	PRG/SU	-0.03	-0.04	0.09	-0.08	0.03	**0.75**	0.00	-0.04
119. I thought about taking weight gainers	PRG/SU	0.11	-0.05	-0.12	-0.11	-0.01	**0.56**	-0.09	0.28
120. I tried to eat at least 25 grams of protein per meal	PRG/SU	0.00	-0.03	0.09	0.04	0.05	**0.61**	0.01	0.00
121. I tried to eat as many calories as I could each day	PRG/SU	0.01	0.04	-0.15	-0.03	0.01	**0.54**	-0.10	0.24
122. I used muscle building supplements	PRG/SU	-0.08	0.00	0.07	0.07	0.03	**0.68**	0.09	-0.13
123. I considered taking a muscle building supplement	PRG/SU	-0.05	0.05	-0.01	0.10	0.04	**0.67**	0.06	-0.04
127. I used protein supplements	PRG/SU	0.08	0.06	0.03	0.11	-0.04	**0.52**	0.14	-0.04

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Table A13. Continued

Item	HIC	BD	BE	CR	Exercise	NA	BBS	Purging	Restricting
114. I made myself vomit in order to lose weight	PRG/SU	-0.10	0.08	0.06	0.05	-0.08	0.02	**0.61**	0.02
115. I thought laxatives are a good way to lose weight	PRG/SU	0.03	0.01	0.01	-0.10	0.04	0.04	**0.76**	0.00
116. I used laxatives in order to lose weight	PRG/SU	-0.04	-0.04	0.03	-0.07	-0.06	0.19	**0.81**	0.04
125. I used diet pills	PRG/SU	0.08	0.02	-0.01	-0.03	0.10	0.02	**0.51**	-0.06
128. I used diuretics in order to lose weight	PRG/SU	0.04	-0.12	-0.09	-0.06	-0.04	-0.08	**0.83**	0.04
129. I considered taking diuretics to lose weight	PRG/SU	0.02	0.02	-0.02	-0.06	0.09	-0.09	**0.76**	-0.02
65. I thought my arms were too thin	DM	0.06	0.10	-0.21	0.02	-0.09	0.18	-0.13	**0.53**
87. People told me that I do not eat very much	DR	0.10	-0.07	0.16	-0.03	0.02	-0.07	0.06	**0.72**
110. I was told that I am too thin	DR	-0.16	0.14	-0.20	0.09	0.03	0.00	-0.01	**0.62**
142. I got full more easily than most people	SAT	-0.05	-0.05	0.21	0.02	0.02	-0.06	0.02	**0.78**
144. I got full after eating what most people would consider a small amount of food	SAT	-0.05	-0.06	0.21	-0.11	0.01	-0.02	0.07	**0.76**

Note. *N*=462. Promax rotation. BD=Body Dissatisfaction, BBS=Body Building Supplements, CR=Cognitive Restraint, Exercise = Excessive Exercise, NA= Negative Attitudes toward Obesity. Factor loadings ≥ |.40| are highlighted in bold. HIC=Homogeneous item composite. DM=Desire for high muscularity, BE=Binge Eating, CFR=Cognitive Food Restraint, DR=Fasting/Dietary Restraint, EE=Excessive Exercise, FWR=Food/Weight Rituals, PRG/SU=Purging Behavior/Supplement Use/Recurrent Inappropriate Compensatory Behavior, DO=Disgust of Obesity, FF=Fear of Fatness, SAT=Satiety.

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Table A14. Final Factor Solution for Normal Weight Participants

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	MB
40. I was not satisfied with my weight	BD	**0.83**	0.02	0.12	-0.04	-0.06	-0.05	-0.02	0.14
41. I wished I could lose five or more pounds	BD	**0.76**	-0.03	0.15	0.00	-0.05	-0.04	-0.13	-0.20
42. I would have been happier if I lost some weight	BD	**0.74**	0.00	0.13	-0.02	0.04	0.02	-0.11	-0.11
43. I felt dissatisfied because I could not reach my target weight	BD	**0.78**	0.03	0.11	0.03	0.01	-0.01	-0.04	0.13
45. I thought about my weight so much that it interfered with my life	BD	**0.48**	0.10	0.06	0.15	-0.04	0.21	0.11	0.08
46. I did not like how my body looked	BD	**0.87**	0.00	0.03	-0.03	-0.04	-0.07	-0.01	0.18
47. I felt uncomfortable in the clothes I was wearing	BD	**0.76**	0.13	0.06	-0.02	-0.06	-0.09	-0.01	0.00
49. I did not like how clothes fit the shape of my body	BD	**0.80**	0.07	0.00	-0.07	-0.03	-0.11	0.04	-0.01
44. I thought that my weight was perfect	BD	**-0.76**	0.06	-0.10	0.14	0.08	0.04	0.15	-0.13
50. I wished the shape of my body was different	BD	**0.84**	0.00	0.03	-0.10	-0.01	-0.09	0.02	0.19
51. I tried on different outfits, because I did not like how I looked	BD	**0.65**	0.12	0.03	-0.06	-0.03	0.00	0.09	-0.01
56. I wanted more defined abdominal muscles	DM	**0.62**	0.01	-0.19	0.14	0.08	-0.13	-0.02	0.13
58. I wished my body was more toned	DM	**0.63**	0.06	-0.04	-0.03	0.04	-0.11	0.07	0.15
59. I was not satisfied with the size of my hips	BD	**0.83**	-0.07	-0.08	-0.04	-0.01	-0.03	-0.01	-0.02

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Table A14. Continued

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	MB
60. I wished I had a smaller waist	BD	**0.77**	-0.04	0.08	-0.05	0.03	-0.04	-0.09	-0.13
61. I did not like the size of my thighs	BD	**0.77**	-0.01	-0.06	-0.05	-0.08	-0.01	0.07	-0.10
62. I wanted to be so thin that my thighs would not touch	FF	**0.65**	-0.04	-0.08	0.06	0.00	0.22	0.05	-0.17
63. I thought my arms were too fat	BD	**0.65**	0.01	0.02	0.00	-0.03	0.14	-0.04	-0.15
66. I thought my butt was too big	BD	**0.59**	-0.07	-0.07	0.06	-0.01	-0.02	0.00	-0.08
67. I wished my stomach was flatter	BD	**0.77**	-0.02	0.04	-0.01	0.02	-0.08	-0.09	-0.13
68. Parts of my body seemed disproportionate	BD	**0.76**	0.07	-0.15	-0.03	-0.07	0.01	0.08	0.07
69. I looked at my body in mirrors or windows	BD	**0.55**	-0.05	0.06	0.03	0.10	-0.03	0.00	0.11
70. I was self-conscious about the way my body looked	BD	**0.85**	0.00	-0.04	0.01	0.05	-0.06	0.08	0.20
73. I avoided looking at my body	BD	**0.58**	0.15	-0.09	0.01	-0.06	0.05	0.01	0.05
74. I avoided certain activities because people would see my body	BD	**0.62**	0.08	-0.09	-0.04	0.04	0.20	-0.06	0.08
94. I was very afraid of gaining weight	FF	**0.64**	-0.03	0.15	0.10	0.06	0.08	0.04	-0.11
100. I felt like I would never stop gaining weight	FF	**0.55**	0.14	-0.07	0.04	0.08	0.19	-0.10	-0.14
102. I would have done anything to keep myself from gaining weight	FF	**0.43**	-0.06	0.02	0.09	0.24	0.25	0.11	-0.14
103. I thought gaining weight would ruin my life	FF	0.39	0.01	-0.04	0.18	0.26	0.16	0.13	-0.17
106. I motivated myself by looking at pictures of very thin people	FF	**0.44**	0.11	0.07	0.08	0.00	0.21	0.05	-0.05

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Table A14. Continued

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	MB
107. I wanted to be as thin as possible	FF	**0.56**	0.01	-0.01	0.13	0.05	0.13	0.05	-0.12
1. I ate a very large amount of food in a short period of time (e.g., within 2 hours)	BE	-0.01	**0.64**	0.00	0.09	0.00	0.01	-0.19	0.05
2. I stuffed myself with food to the point of feeling sick	BE	0.17	**0.57**	-0.08	0.02	0.06	0.07	-0.09	0.07
3. People would have been surprised if they knew how much I ate in one sitting	BE	-0.07	**0.63**	-0.06	0.11	0.04	0.00	-0.25	0.09
4. I ate until I was uncomfortably full	BE	0.14	**0.58**	0.06	0.01	-0.01	-0.03	-0.10	0.10
5. I ate large amounts of food	BE	0.02	**0.61**	-0.07	0.06	0.02	-0.02	-0.28	0.14
6. I ate a lot more than people who are my same sex and height	BE	-0.04	**0.63**	-0.07	0.09	0.09	-0.05	-0.27	0.03
10. If someone offered me food, I felt that I could not resist eating it	BE	-0.03	**0.72**	0.14	-0.10	0.05	-0.03	0.02	0.04
11. I could not stop snacking throughout the day	BE	-0.04	**0.73**	0.10	-0.08	-0.10	-0.06	0.11	0.01
12. I was not able to resist eating second helpings at meals	BE	-0.15	**0.68**	0.17	-0.04	0.06	-0.07	-0.04	0.03
14. I ate when I was not hungry	BE	0.11	**0.64**	0.11	-0.05	-0.10	-0.07	0.09	-0.17
15. I had a strong urge to eat after seeing a commercial about food	BE	-0.04	**0.59**	-0.04	-0.12	0.02	-0.01	0.17	0.08
16. If food tasted good, I ate a lot more of it than I should have	BE	0.04	**0.75**	0.00	-0.06	0.09	-0.10	-0.03	-0.03

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Table A14. Continued

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	MB
17. I ate because other people around me were eating, even though I was not hungry	BE	0.03	**0.67**	0.05	-0.07	0.02	0.00	0.19	-0.10
19. I ate a lot when there was nothing else to do	BE	0.09	**0.75**	0.05	-0.06	-0.03	-0.05	0.08	0.00
33. I ate without being aware of how much I was eating	BE	0.05	**0.58**	-0.02	0.02	0.01	0.12	-0.01	-0.07
34. I ate as if I was on auto-pilot	BE	-0.02	**0.59**	0.04	0.01	0.05	0.13	-0.09	0.00
35. I found myself snacking without thinking about it	BE	0.09	**0.68**	-0.03	0.02	-0.02	0.00	0.13	-0.15
36. I snacked throughout the evening without realizing it	BE	0.03	**0.66**	-0.03	0.02	-0.04	0.13	0.09	-0.08
37. I ate an entire bag of chips or cookies without realizing it	BE	0.04	**0.54**	-0.17	0.07	0.00	0.11	0.05	-0.06
38. I did not notice how much I ate until after I had finished eating	BE	0.13	**0.65**	-0.13	0.04	0.04	0.09	0.01	-0.10
39. I ate when I was bored	BE	0.23	**0.64**	0.01	0.01	-0.14	-0.08	0.11	-0.05
"143. No matter how much I ate, I never seemed to get full"	BE	0.05	**0.45**	-0.08	0.23	0.03	0.04	-0.10	0.02
76. I tried to avoid foods with a high fat content	CFR	-0.07	-0.07	**0.88**	-0.06	0.01	0.00	-0.01	0.02
77. I tried to avoid eating between meals	CFR	0.12	-0.08	**0.54**	-0.05	0.04	0.03	0.03	-0.08
79. I tried to exclude “unhealthy” foods from my diet	CFR	-0.17	-0.07	**0.81**	0.06	0.02	0.01	0.07	0.05
81. I thought about food or calories	CFR	0.25	0.05	**0.69**	0.00	-0.01	-0.04	-0.05	0.15
82. I tried to avoid foods with high calorie content	CFR	0.09	0.02	**0.84**	0.00	0.01	-0.04	0.03	-0.11

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Table A14. Continued

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	MB
84. I counted the calories of foods I ate	DR	0.00	0.13	**0.66**	0.05	0.02	0.12	0.02	0.08
91. I ate small portions at meals in order to control my weight	DR	0.23	-0.03	**0.54**	0.02	0.06	-0.05	0.22	-0.11
93. I chose a low-calorie snack	DR	-0.03	0.01	**0.78**	0.02	-0.06	-0.06	0.10	-0.10
159. I recorded the calories of foods I ate	FWR	0.03	0.16	**0.51**	0.10	-0.02	0.17	-0.07	0.14
160. I kept a list of foods I ate each day	FWR	0.05	0.12	**0.49**	0.10	-0.03	0.22	-0.08	0.03
134. I exercised even when I was sick	EE	-0.02	0.02	0.05	**0.80**	-0.02	-0.07	0.00	0.01
135. I exercised even though I was very tired	EE	-0.01	0.00	0.14	**0.78**	-0.01	-0.11	-0.02	0.02
136. I exercised even when I had an injury	EE	0.00	0.01	-0.07	**0.78**	-0.06	0.00	0.03	0.04
137. Other people thought I exercised too much	EE	0.00	-0.01	0.05	**0.83**	-0.05	-0.10	0.03	-0.07
138. I felt guilty when I missed a workout or exercise class	EE	0.10	-0.06	0.25	**0.65**	0.05	-0.08	-0.05	0.07
139. My exercise schedule interfered with my life	EE	-0.01	0.11	0.02	**0.67**	0.06	0.03	0.03	0.03
140. Sometimes I lost track of how long I was exercising	EE	0.02	-0.04	-0.01	**0.71**	-0.11	-0.07	0.12	0.11
141. I exercised for more than 2 hours at a time	EE	-0.12	0.00	-0.12	**0.73**	-0.03	0.00	0.06	-0.01
95. I was disgusted by the sight of obese people	DO	0.02	0.02	0.02	-0.03	**0.78**	-0.10	0.09	0.01

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Table A14. Continued

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	MB
96. I thought to myself that overweight people are unhappy	DO	0.06	0.09	0.08	0.02	**0.70**	-0.03	0.02	-0.03
97. I felt that overweight people are lazy	DO	0.01	0.00	-0.03	-0.02	**0.79**	0.02	0.03	0.07
98. I thought that obese people lack self-control	DO	-0.05	0.03	0.10	-0.12	**0.85**	-0.05	-0.02	0.04
99. I felt that overweight people are unattractive	DO	-0.08	0.02	0.03	-0.05	**0.81**	0.03	-0.07	0.06
101. I was disgusted by the sight of an overweight person wearing tight clothes	DO	0.05	0.00	-0.14	0.00	**0.74**	-0.02	0.11	-0.03
114. I made myself vomit in order to lose weight	PRG/SU	-0.08	0.09	0.06	-0.02	-0.11	**0.69**	0.07	0.03
115. I thought laxatives are a good way to lose weight	PRG/SU	0.09	0.03	0.02	-0.10	-0.05	**0.78**	0.01	0.06
116. I used laxatives in order to lose weight	PRG/SU	-0.06	-0.01	0.01	-0.08	-0.09	**0.83**	0.09	0.09
125. I used diet pills	PRG/SU	0.08	0.06	0.05	0.03	-0.04	**0.42**	-0.04	0.11
128. I used diuretics in order to lose weight	PRG/SU	0.00	-0.12	-0.06	-0.09	0.04	**0.72**	0.03	0.06
129. I considered taking diuretics to lose weight	PRG/SU	0.05	0.02	0.03	-0.09	0.12	**0.63**	-0.03	0.01
86. I ate less than people I was with	DR	0.01	-0.08	0.25	-0.03	0.02	0.02	**0.56**	0.06
87. People told me that I do not eat very much	DR	0.05	-0.02	0.10	-0.01	0.04	0.06	**0.76**	0.12
110. I was told that I am too thin	DR	-0.13	0.22	-0.14	0.05	-0.01	-0.09	**0.49**	0.27

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Table A14. Continued

Item	HIC	BD	BE	CR	Exercise	NA	Purging	Restricting	MB
142. I got full more easily than most people	SAT	-0.05	-0.02	0.01	0.13	0.05	0.06	**0.79**	-0.01
144. I got full after eating what most people would consider a small amount of food	SAT	0.03	-0.08	-0.01	0.07	0.04	0.06	**0.76**	0.03
57. I wanted a more muscular chest	DM	0.04	-0.03	-0.16	0.06	0.18	-0.12	0.02	**0.51**
117. I thought about taking steroids as a way to get more muscular	PRG/SU	0.15	-0.10	-0.13	0.07	-0.02	0.08	0.00	**0.52**
118. I took weight gainers	PRG/SU	0.08	-0.03	0.01	-0.03	-0.05	0.05	0.07	**0.76**
119. I thought about taking weight gainers	PRG/SU	0.07	0.04	-0.04	-0.04	-0.03	-0.02	0.10	**0.83**
120. I tried to eat at least 25 grams of protein per meal	PRG/SU	-0.08	-0.02	0.10	0.05	0.02	0.07	0.02	**0.66**
121. I tried to eat as many calories as I could each day	PRG/SU	0.03	0.11	-0.10	-0.05	-0.05	-0.02	0.17	**0.72**
122. I used muscle building supplements	PRG/SU	-0.03	-0.10	0.10	0.05	0.05	0.12	-0.10	**0.80**
123. I considered taking a muscle building supplement	PRG/SU	-0.06	-0.02	0.03	0.07	0.04	0.10	-0.04	**0.81**
127. I used protein supplements	PRG/SU	-0.03	-0.06	0.10	0.06	-0.01	0.17	-0.11	**0.74**
65. I thought my arms were too thin	DM	-0.02	0.10	-0.05	-0.07	0.04	-0.18	0.24	**0.57**

Note. *N*=508. Promax rotation. BD=Body Dissatisfaction, CR=Cognitive Restraint, Exercise = Excessive Exercise, NA= Negative Attitudes toward Obesity, MB=Muscle Building. Factor loadings ≥ |.40| are highlighted in bold. HIC=Homogeneous item composite. DM=Desire for high muscularity, BE=Binge Eating, CFR=Cognitive Food Restraint, DR=Fasting/Dietary Restraint, EE=Excessive Exercise, FWR=Food/Weight Rituals, PRG/SU=Purging Behavior/Supplement Use/Recurrent Inappropriate Compensatory Behavior, DO= Disgust of Obesity, FF=Fear of Fatness, SAT=Satiety.

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Table A15. Final Factor Solution for Overweight and Obese Participants

Item	HIC	BD	BE	CR	BBS	NA	Purging	Restricting	Muscularity
40. I was not satisfied with my weight	BD	**0.64**	0.14	0.15	-0.09	-0.02	-0.06	-0.19	0.02
42. I would have been happier if I lost some weight	BD	**0.60**	0.12	0.13	-0.17	-0.01	-0.05	-0.10	0.22
43. I felt dissatisfied because I could not reach my target weight	BD	**0.63**	0.09	0.19	-0.07	0.03	-0.03	-0.05	0.10
45. I thought about my weight so much that it interfered with my life	BD	**0.70**	0.10	-0.02	0.11	0.10	0.00	0.02	-0.03
46. I did not like how my body looked	BD	**0.75**	0.02	0.08	-0.08	0.03	-0.09	-0.12	0.12
47. I felt uncomfortable in the clothes I was wearing	BD	**0.73**	0.16	0.02	0.00	-0.05	-0.07	-0.04	0.04
49. I did not like how clothes fit the shape of my body	BD	**0.77**	0.11	0.00	-0.01	0.00	-0.07	-0.07	0.01
50. I wished the shape of my body was different	BD	**0.80**	0.02	-0.04	-0.03	0.01	-0.06	-0.12	0.09
51. I tried on different outfits, because I did not like how I looked	BD	**0.74**	0.02	0.01	0.07	-0.02	-0.01	0.19	-0.04
59. I was not satisfied with the size of my hips	BD	**0.86**	-0.10	-0.06	0.02	-0.10	0.08	0.00	-0.06
60. I wished I had a smaller waist	BD	**0.77**	-0.05	0.04	-0.17	-0.01	-0.03	-0.04	0.03
61. I did not like the size of my thighs	BD	**0.89**	-0.04	-0.05	0.02	-0.08	0.05	0.05	-0.14
62. I wanted to be so thin that my thighs would not touch	FF	**0.80**	-0.09	-0.11	0.03	0.08	0.09	0.11	-0.14
63. I thought my arms were too fat	BD	**0.83**	0.04	0.00	0.03	-0.21	0.03	0.03	-0.16
66. I thought my butt was too big	BD	**0.76**	0.02	-0.06	0.03	-0.06	0.10	0.03	-0.07
67. I wished my stomach was flatter	BD	**0.58**	0.00	0.08	-0.20	-0.01	-0.04	-0.03	0.27
68. Parts of my body seemed disproportionate	BD	**0.63**	0.02	-0.04	0.00	0.01	0.10	-0.02	0.10
69. I looked at my body in mirrors or windows	BD	**0.47**	-0.13	0.17	0.11	-0.08	-0.03	0.04	0.19

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Table A15. Continued

Item	HIC	BD	BE	CR	BBS	NA	Purging	Restricting	Muscularity
70. I was self-conscious about the way my body looked	BD	**0.83**	0.05	-0.02	0.05	0.02	-0.01	-0.04	0.08
73. I avoided looking at my body	BD	**0.67**	0.16	-0.06	0.00	0.12	0.04	-0.02	-0.16
74. I avoided certain activities because people would see my body	BD	**0.69**	0.13	-0.14	-0.01	0.11	0.02	0.06	-0.03
94. I was very afraid of gaining weight	FF	**0.64**	-0.06	0.14	-0.04	0.18	-0.11	0.19	0.01
100. I felt like I would never stop gaining weight	FF	**0.57**	0.19	0.04	-0.10	0.18	0.06	0.03	-0.11
106. I motivated myself by looking at pictures of very thin people	FF	**0.60**	-0.17	0.10	0.19	0.04	0.00	0.12	0.02
107. I wanted to be as thin as possible	FF	**0.57**	-0.11	0.01	0.05	0.09	0.08	0.05	0.02
2. I stuffed myself with food to the point of feeling sick	BE	0.14	**0.50**	-0.05	0.25	0.12	-0.08	-0.08	-0.05
3. People would have been surprised if they knew how much I ate in one sitting	BE	0.00	**0.57**	0.00	0.16	0.08	-0.01	-0.24	-0.11
10. If someone offered me food, I felt that I could not resist eating it	BE	-0.01	**0.60**	0.16	0.01	0.14	0.04	-0.16	-0.04
11. I could not stop snacking throughout the day	BE	-0.06	**0.68**	0.05	-0.05	-0.10	-0.10	0.10	0.13
14. I ate when I was not hungry	BE	0.06	**0.67**	0.05	-0.06	-0.02	0.00	-0.12	-0.13
15. I had a strong urge to eat after seeing a commercial about food	BE	0.09	**0.47**	-0.10	0.11	0.05	0.01	0.06	0.08
16. If food tasted good, I ate a lot more of it than I should have	BE	-0.06	**0.70**	0.05	-0.08	0.13	-0.08	-0.09	0.01
17. I ate because other people around me were eating, even though I was not hungry	BE	0.08	**0.62**	0.04	0.00	0.04	0.04	0.06	-0.09

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Table A15. Continued

Item	HIC	BD	BE	CR	BBS	NA	Purging	Restricting	Muscularity
19. I ate a lot when there was nothing else to do	BE	-0.06	**0.79**	0.04	-0.05	0.11	0.02	-0.03	-0.05
21. People told me that I ate really fast	BE	-0.26	**0.39**	0.00	-0.07	0.16	0.01	0.18	0.15
33. I ate without being aware of how much I was eating	BE	0.09	**0.66**	-0.01	-0.07	-0.01	0.03	0.03	-0.01
34. I ate as if I was on auto-pilot	BE	0.03	**0.74**	-0.01	-0.02	-0.07	0.05	-0.08	0.02
35. I found myself snacking without thinking about it	BE	0.06	**0.75**	-0.11	-0.06	-0.14	-0.03	0.20	0.03
36. I snacked throughout the evening without realizing it	BE	0.09	**0.71**	-0.11	-0.03	-0.08	-0.10	0.21	0.03
37. I ate an entire bag of chips or cookies without realizing it	BE	0.10	**0.56**	-0.16	0.02	-0.09	0.07	0.16	0.18
38. I did not notice how much I ate until after I had finished eating	BE	0.08	**0.63**	-0.01	0.04	-0.01	0.08	0.08	0.06
39. I ate when I was bored	BE	0.08	**0.71**	-0.07	-0.06	0.02	-0.02	0.04	-0.07
143. No matter how much I ate, I never seemed to get full	BE	-0.09	**0.60**	0.14	0.15	-0.03	0.17	-0.09	-0.06
76. I tried to avoid foods with a high fat content	CFR	-0.01	-0.16	**0.75**	-0.02	0.07	-0.04	0.05	-0.12
77. I tried to avoid eating between meals	CFR	0.14	-0.17	**0.51**	-0.05	0.16	0.02	0.06	-0.10
79. I tried to exclude “unhealthy” foods from my diet	CFR	-0.06	-0.06	**0.78**	0.08	0.06	0.01	0.07	-0.07
81. I thought about food or calories	CFR	0.15	0.13	**0.70**	0.03	0.05	-0.07	-0.11	0.04
82. I tried to avoid foods with high calorie content	CFR	-0.01	-0.03	**0.88**	-0.09	0.06	-0.01	0.04	0.00
84. I counted the calories of foods I ate	DR	0.01	0.20	**0.68**	0.09	-0.14	0.07	-0.05	-0.02

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Table A15. Continued

Item	HIC	BD	BE	CR	BBS	NA	Purging	Restricting	Muscularity
91. I ate small portions at meals in order to control my weight	DR	0.12	0.03	**0.62**	-0.03	-0.11	0.05	0.21	0.04
93. I chose a low-calorie snack	DR	-0.06	-0.01	**0.69**	0.09	-0.17	0.09	0.06	-0.03
159. I recorded the calories of foods I ate	FWR	0.05	0.22	**0.47**	0.18	-0.18	0.07	0.05	0.04
118. I took weight gainers	PRG/SU	0.09	-0.09	-0.10	**0.79**	-0.04	0.00	-0.02	-0.08
119. I thought about taking weight gainers	PRG/SU	0.04	-0.06	-0.08	**0.79**	-0.04	0.01	0.00	-0.10
120. I tried to eat at least 25 grams of protein per meal	PRG/SU	-0.04	0.02	0.17	**0.69**	-0.01	-0.01	0.03	0.08
122. I used muscle building supplements	PRG/SU	-0.04	0.02	0.05	**0.89**	0.05	-0.08	0.00	0.06
123. I considered taking a muscle building supplement	PRG/SU	-0.16	0.06	0.08	**0.76**	0.05	-0.06	0.00	0.18
127. I used protein supplements	PRG/SU	0.02	0.10	0.03	**0.83**	0.03	0.03	0.04	0.04
95. I was disgusted by the sight of obese people	DO	0.08	-0.05	-0.04	0.00	**0.79**	0.02	0.10	0.03
96. I thought to myself that overweight people are unhappy	DO	0.19	0.08	-0.05	0.02	**0.72**	-0.01	-0.03	-0.02
97. I felt that overweight people are lazy	DO	0.03	0.01	-0.06	0.09	**0.80**	0.05	0.05	0.03
98. I thought that obese people lack self-control	DO	-0.05	0.04	0.02	0.00	**0.78**	0.10	-0.01	0.04
99. I felt that overweight people are unattractive	DO	0.01	-0.03	0.03	0.05	**0.77**	-0.12	-0.08	0.02
101. I was disgusted by the sight of an overweight person wearing tight clothes	DO	-0.02	0.04	-0.03	-0.10	**0.74**	0.06	0.19	0.05

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Table A15. Continued

Item	HIC	BD	BE	CR	BBS	NA	Purging	Restricting	Muscularity
115. I thought laxatives are a good way to lose weight	PRG/SU	0.04	0.05	0.04	-0.05	0.14	**0.74**	-0.05	-0.05
116. I used laxatives in order to lose weight	PRG/SU	-0.01	-0.01	0.09	-0.03	-0.02	**0.83**	-0.05	0.03
128. I used diuretics in order to lose weight	PRG/SU	-0.03	-0.04	0.02	-0.04	-0.02	**0.90**	-0.01	0.08
129. I considered taking diuretics to lose weight	PRG/SU	0.03	-0.02	-0.03	-0.04	0.06	**0.82**	-0.02	0.06
133. I used diet teas or cleansing teas to lose weight	PRG/SU	0.12	0.12	0.01	0.07	-0.10	**0.45**	0.12	0.02
87. People told me that I do not eat very much	DR	0.13	0.02	0.09	0.01	0.08	-0.04	**0.70**	0.00
114. I made myself vomit in order to lose weight	PRG/SU	0.14	0.08	-0.02	0.18	0.13	0.17	-0.20	-0.02
142. I got full more easily than most people	SAT	0.03	0.01	0.10	0.08	0.07	-0.06	**0.74**	-0.01
144. I got full after eating what most people would consider a small amount of food	SAT	-0.03	0.06	0.11	-0.03	0.04	0.04	**0.76**	-0.03
52. I wished my body was more muscular	DM	0.15	-0.04	-0.01	0.04	-0.04	0.08	-0.06	**0.78**
54. I would have felt more confident if I had greater muscle mass	DM	0.15	0.03	-0.03	0.03	0.04	0.02	-0.03	**0.75**
55. I wished my arms were more muscular	DM	0.15	0.00	-0.04	0.00	-0.09	0.08	-0.04	**0.81**
56. I wanted more defined abdominal muscles	DM	0.25	-0.10	0.03	0.07	0.06	0.00	0.08	**0.62**
57. I wanted a more muscular chest	DM	-0.21	-0.02	-0.04	0.10	0.12	-0.05	-0.09	**0.79**

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Table A15. Continued

Item	HIC	BD	BE	CR	BBS	NA	Purging	Restricting	Muscularity
65. I thought my arms were too thin	DM	-0.27	0.07	-0.10	-0.08	0.09	0.02	0.12	**0.61**

Note. *N*=304. Promax rotation. BD=Body Dissatisfaction, CR=Cognitive Restraint, BBS=Body Building Supplements, NA = Negative Attitudes toward Obesity. Factor loadings ≥ |.40| are highlighted in bold. HIC=Homogeneous item composite. DM=Desire for high muscularity, BE=Binge Eating, CFR=Cognitive Food Restraint, DR=Fasting/Dietary Restraint, EE=Excessive Exercise, FWR=Food/Weight Rituals, PRG/SU=Purging Behavior/Supplement Use/Recurrent Inappropriate Compensatory Behavior, DO=Disgust of Overweight, FF=Fear of Fatness, SAT=Satiety.

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Table A16. Multiple Group Analysis across Sex

		Overall fit indices							
	Configural Invariance	*WLSMV* χ^2	*df*	*CFI*	*TLI*	*RMSEA*	*BIC*		
	Men	259.96	100	.955	.969	.065	-333.00		
	Women	585.58	141	.929	.965	.070	-279.53		
Mode	Test of Measurement Invariance	*MLE* χ^2	*df*	*CFI*	*TLI*	*RMSEA*	*Gamma Hat*	*NCI*	*BIC*
1	Form	4373.67	1762	.846	.914	.111	.935	.467	-7486.38
2	Factor Loadings and Thresholds	5937.04	1843	.855	.916	.109	.939	.490	-6468.23
2b	Factor Loadings and Thresholds [a]	4763.12	1819	.857	.918	.108	.940	.494	-7480.60
2c	Factor Loadings and Thresholds [b]	4634.98	1817	.922	.955	.080	.965	.679	-7595.28

Note. *N*=376 for men, *N*=462 for women. [a] The factor loading and threshold for item 57 ("I wanted a more muscular chest") and the factor loadings and thresholds for items that comprised the Body Dissatisfaction factor were estimated to be unequal across sexes. [b] The factor loading and threshold for item 57 ("I wanted a more muscular chest"), the factor loadings and thresholds for items that comprised the Body Dissatisfaction factor, and the latent factor means for Body Dissatisfaction and Muscularity were estimated to be unequal across sexes. Robust weighted least squares chi-square tests and mean- and standard-error adjusted degrees of freedom are reported under configural invariance. Maximum-likelihood bootstrapped chi-squares and actual degrees of freedom are reported under tests of measurement invariance.

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Table A17. Invariance Testing across Gender

Model Comparison	$\Delta\chi^2$	*Δdf*	*p*	*ΔCFI*	*Δ Gamma Hat*	*ΔNCI*	*ΔBIC*
2 vs. 1	1563.37	81	<.001	.009	.004	.023	1018.16
2b vs. 1	389.45	57	<.001	.011	.005	.027	5.78
2c vs. 1	261.32	55	<.001	.076	.030	.212	-108.89

Note. $\Delta\chi^2$ for model comparisons was computed by calculating maximum likelihood bootstrapped chi-squares. *BIC* values were computed from $\Delta\chi^2$ values.

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Table A18. Multiple Group Analysis across Weight Categories

		Overall fit indices							
	Sample	*WLSMV* χ^2	*df*	*CFI*	*TLI*	*RMSEA*	*BIC*		
	Normal Weight	562.55	133	.918	.960	.080	-266.10		
	Overweight/Obese	316.58	109	.938	.962	.079	-306.58		
Model Number	Test of Measurement Invariance	*MLE* χ^2	*df*	*CFI*	*TLI*	*RMSEA*	*Gamma Hat*	*NCI*	*BIC*
1	Form	4580.49	1762	.911	.952	.087	.958	.626	-7224.03
2	Factor Loadings and Thresholds	5148.78	1843	.914	.953	.080	.959	.637	-7198.40
2b	Factor Loadings and Thresholds [a]	5080.79	1840	.925	.960	.080	.965	.674	-7246.29
2c	Factor Loadings and Thresholds [b]	5002.16	1836	.929	.963	.077	.967	.690	-7298.12

Note. *N*=508 for Normal Weight Sample, *N*=304 for Overweight/Obese sample. Underweight participants (*N*=26) were excluded from these analyses. *N*=2 Normal Weight participants did not complete enough items to be included in these analyses. [a] The latent factor means for Body Dissatisfaction, Binge Eating, and Restricting were estimated to be unequal for normal weight and overweight/obese participants. In addition to the parameters estimated to be unequal in Model 2b, items 57, 66, 94, and 107 were free to vary across groups. Robust weighted least squares chi-square tests and mean- and standard-error adjusted degrees of freedom are reported under configural invariance. Maximum-likelihood bootstrapped chi-squares and actual degrees of freedom are reported under tests of measurement invariance.

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Table A19. Invariance Testing across Weight Categories

Model Comparison	$\Delta\chi^2$	Δdf	p	ΔCFI	Δ Gamma Hat	ΔNCI	ΔBIC
2 vs. 1	568.29	81	<.001	.003	.001	.011	25.63
2b vs. 1	500.30	78	<.001	.014	.007	.048	-74.10
2c vs. 1	421.66	74	<.001	.018	.009	.064	-464.02

Note. $\Delta\chi^2$ for model comparisons was computed by calculating maximum likelihood bootstrapped chi-squares. *BIC* values were computed from $\Delta\chi^2$ values.

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Table A20. Internal Consistency Reliabilities (Coefficient Alphas) and Average Interitem Correlations of Provisional Scales Derived from Exploratory Factor Analyses in Combined Community and Student Samples

	Community Solution					Student Solution				
		Community Participants		Student Participants			Student Participants		Community Participants	
Scale	Items	α	AIC	α	AIC	Items	α	AIC	α	AIC
BD	12	.90	.43	.89	.40	31	.96	.44	.95	.38
Binge	17	.93	.44	.91	.37	19	.92	.38	.94	.45
WC	10	.86	.38	.89	.45	7	.89	.54	.83	.41
BBS	8	.87	.46	.89	.50	8	.89	.50	.87	.46
NA	6	.89	.57	.87	.53	5	.87	.53	.89	.57
Purging	7	.80	.36	.78	.34	3	.75	.50	.77	.53
Restrict	5	.77	.40	.78	.41	5	.78	.41	.77	.40
Muscular	4	.79	.48	.77	.46	4	.84	.57	.81	.52
Median Values		.87	.44	.88	.43		.88	.50	.85	.46

Note. *N*=407 community adults and *N*=431 students. BD=Body Dissatisfaction, Binge=Binge Eating, WC=Weight Control Behaviors, BBS=Body Building Supplements, Negative Attitudes toward Obesity=NA, Restrict=Restricting, Muscular=Muscularity. For the community solution, the number of items common to students was: 10 (Body Dissatisfaction), 14 (Binge Eating), 2 (Weight Control Behaviors), 8 (Body Building Supplements), 6 (Negative Attitudes toward Obesity), 3 (Purging), 5 (Restricting), and 1 (Muscularity). For the student solution, the number of items common to community members was: 8 (Body Dissatisfaction), 14 (Binge Eating), 2 (Weight Control Behaviors), 8 (Body Building Supplements), 6 (Negative Attitudes toward Obesity), 3 (Purging), 5 (Restricting), and 1 (Muscularity).

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Table A21. Internal Consistency Reliabilities (Coefficient Alphas) and Average Interitem Correlations of Provisional Scales Derived from Exploratory Factor Analyses across Sex

	Community Sample					Student Sample				
		Men		Women			Men		Women	
Provisional Scale	Items	α	AIC	α	AIC	Items	α	AIC	α	AIC
BD	12	.86	.34	.89	.40	31	.94	.34	.95	.38
Binge	17	.92	.40	.94	.48	19	.89	.30	.94	.45
WC	10	.83	.33	.87	.40	7	.86	.47	.90	.56
BBS	8	.88	.48	.55	.13	8	.87	.46	.83	.38
NA	6	.89	.57	.90	.60	5	.85	.53	.86	.55
Purging	7	.76	.31	.80	.36	3	.33	.14	.77	.53
Restrict	5	.76	.39	.77	.40	5	.72	.34	.80	.44
Muscular	4	.89	.67	.76	.44	4	.88	.65	.77	.46
Median Values		.87	.40	.84	.40		.87	.40	.85	.46

Note. *N*=214 community men and *N*=193 community women and *N*=162 student men and *N*=269 student women. BD=Body Dissatisfaction, Binge=Binge Eating, WC=Weight Control Behaviors, BBS=Body Building Supplements, NA= Negative Attitudes toward Obesity, Restrict=Restricting, Muscular=Muscularity.

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Table A22. Internal Consistency Reliabilities (Coefficient Alphas) and Average Interitem Correlations of Provisional Scales Derived from Exploratory Factor Analyses Across Weight Categories

	Normal Weight			Overweight/ Obese		
Provisional Scale	Items	α	AIC	Items	α	AIC
BD	24	.96	.50	24	.96	.50
Binge	21	.93	.38	21	.93	.38
WC	9	.90	.50	9	.87	.43
BBS	6	.89	.57	6	.89	.57
NA	6	.88	.55	6	.89	.57
Purging	5	.73	.35	5	.80	.44
Restrict	4	.75	.43	4	.69	.35
Muscular	6	.84	.47	6	.86	.51
Median Values		.89	.49		.88	.47

Note. *N*=508 for Normal Weight Sample, *N*=304 for Overweight/Obese sample. BD=Body Dissatisfaction, Binge=Binge Eating, WC=Weight Control Behaviors, BBS=Body Building Supplements, NA=Negative Attitudes toward Obesity, Restrict=Restricting, Muscular=Muscularity.

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Table A23. Correlations between IEBQ Scales in Community Participants

Factor	BD	Binge	WC	BBS	NA	Purging	Restrict.	Muscular.
BD	1.00							
Binge	**.54**	1.00						
WC	**.32**	.09	1.00					
BBS	-.09	.08	-.03	1.00				
NA	.24	.26	.11	.22	1.00			
Purging	**.41**	**.31**	.23	.06	.19	1.00		
Restrict.	.00	-.10	.19	.12	.19	.15	1.00	
Muscular.	**.43**	**.36**	.04	.23	**.31**	.15	-.04	1.00

Note. *N*=407. BD=Body Dissatisfaction, WC=Weight Control Behaviors, BBS=Body Building Supplements, NA= Negative Attitudes toward Obesity, Restrict=Restricting, Musclar=Muscularity. Correlations ≥ |.11| were significant at $p<.05$, correlations ≥ |.15| were significant at $p<.01$, and correlations ≥ |.19| were significant at $p<.001$.Correlations ≥ |.30| are bolded.

Table A24. Correlations between IEBQ Scales in Student Participants

Factor	BD	Binge	WC	BBS	NA	Purging	Restrict.	Muscular.
BD	1.00							
Binge	**.48**	1.00						
WC	.12	.21	1.00					
BBS	-.16	.03	**.30**	1.00				
NA	**.33**	**.30**	.14	.19	1.00			
Purging	**.33**	.22	.12	.02	.15	1.00		
Restrict.	.12	.06	.14	.03	.19	.10	1.00	
Muscular.	.20	.16	.02	.29	.25	.05	.17	1.00

Note. *N*=433. BD=Body Dissatisfaction, WC=Weight Control Behaviors, BBS=Body Building Supplements, NA= Negative Attitudes toward Obesity, Restrict=Restricting, Musclar=Muscularity. Correlations ≥ |.10| were significant at $p<.05$, correlations ≥ |.14| were significant at $p<.01$, and correlations ≥ |.16| were significant at $p<.001$.Correlations ≥ |.30| are bolded.

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Table A25. Correlations between IEBQ Scales, Body Mass Index, and Lifetime History of Eating Disorder Behaviors

	BD	Binge	WC	BBS	NA	Purging	Restrict.	Muscular.
Community Participants								
BMI	**.40**	**.36**	.10	-.05	-.03	.11	-.23	.14
Laxatives	.29	.20	.18	-.02	.02	**.67**	.05	.00
Diuretics	.24	.20	.12	.03	.09	**.58**	.10	.09
Vomiting	.23	.19	.10	.01	.07	**.39**	.02	-.01
Fasting	.23	.19	.14	.01	.15	**.32**	.01	.16
Bingeing	**.35**	**.43**	.27	-.06	.10	.15	-.03	.11
Student Participants								
BMI	.29	.06	.01	.16	.06	.00	-.23	.02
Laxatives	.29	.13	.07	-.01	.13	**.58**	.11	.05
Diuretics	.21	.09	.07	.04	.13	.26	.06	.05
Vomiting	.24	.17	.04	-.05	.08	**.53**	.00	.10
Fasting	**.42**	.23	.11	-.06	.15	**.32**	.15	.07
Bingeing	**.51**	**.53**	.16	.01	.18	.29	.00	.09

Note. *N*=407 for community participants and *N*=433 for student participants. BMI=Body Mass Index, BD=Body Dissatisfaction, WC=Weight Control Behaviors, BBS=Body Building Supplements, NA= Negative Attitudes toward Obesity, Restrict=Restricting, Muscular=Muscularity. In community participants, correlations ≥ |.11| are significant at $p<.05$, correlations ≥ |.14| were significant at $p<.01$, and correlations ≥ |.17| were significant at $p<.001$. In student participants, correlations ≥ |.11| are significant at $p<.05$, correlations ≥ |.13| were significant at $p<.01$, and correlations ≥ |.17| were significant at $p<.001$. Correlations ≥ |.30| are bolded.

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Table A26. Correlations between IEBQ Scores and Eating Pathology Measures in Combined Community Sample

	BD	Binge	WC	BBS	NA	Purging	Restrict.	Muscular
EDI-3								
DT	**0.70**	**0.44**	**0.50**	-0.06	**0.31**	**0.41**	0.11	**0.31**
Bulimia	**0.61**	**0.68**	0.18	-0.02	0.25	**0.38**	-0.10	**0.30**
BD	**0.89**	**0.51**	0.26	-0.12	0.16	**0.35**	-0.10	**0.35**
EDE-Q								
Restraint	**0.40**	0.26	**0.61**	-0.02	0.19	0.25	0.09	0.19
Eat. Concern	**0.62**	**0.51**	**0.31**	-0.05	0.21	**0.33**	0.03	0.23
Shp. Concern	**0.84**	**0.55**	**0.32**	-0.08	0.28	**0.37**	-0.03	**0.47**
Wt. Concern	**0.79**	**0.55**	**0.40**	-0.10	0.25	**0.41**	-0.05	**0.39**
Total	**0.77**	**0.54**	**0.48**	-0.08	0.27	**0.39**	0.01	**0.38**
EDE-QR								
BD	**0.86**	**0.59**	0.28	-0.08	0.25	**0.38**	-0.08	**0.44**
Restraint	**0.36**	0.22	**0.63**	-0.03	0.17	0.20	0.08	0.16
EB Concern	**0.52**	**0.41**	**0.32**	-0.03	0.22	**0.32**	0.08	0.20
DEBQ								
RE	**0.46**	0.20	**0.71**	-0.18	0.13	0.26	0.17	0.11
EE	**0.58**	**0.63**	0.17	-0.04	0.18	0.26	-0.05	**0.30**
EXTE	**0.48**	**0.68**	0.10	0.00	0.19	0.19	-0.07	**0.33**
TFEQ								
CR	**0.25**	-0.03	**0.76**	-0.05	0.07	0.22	0.19	0.04
Disinhib.	**0.62**	**0.75**	0.20	-0.04	0.16	**0.32**	-0.18	**0.37**
Hunger	**0.40**	**0.67**	0.05	0.09	0.15	0.15	-0.16	**0.38**
BSQ	**0.86**	**0.56**	**0.36**	-0.13	0.25	**0.34**	-0.06	**0.45**
MBAS								
Muscularity	**0.56**	**0.42**	0.06	0.25	0.27	0.23	-0.02	**0.72**
Body Fat	**0.84**	**0.53**	**0.30**	-0.11	0.17	**0.31**	-0.14	**0.50**
Height	**0.30**	0.22	0.17	0.16	0.27	0.16	0.15	**0.38**
Total	**0.80**	**0.50**	0.25	-0.04	0.18	0.28	-0.08	**0.44**

Note. *N*= 407. EDI-3=Eating Disorders Inventory-3, DT=Drive for Thinness, BD=Body Dissatisfaction, EDE-QR=Revised Eating Disorders Examination-Questionnaire, EB Concern=Eating/Body Concerns, EDE-Q=Eating Disorders Examination-Questionnaire, Eat. Concern = Eating Concerns, Shp. Concern=Shape Concerns, Wt. Concern=Weight Concerns. DEBQ=Dutch Eating Behavior Questionnaire. RE=Restrained Eating, EE=Emotional Eating, EXTE=External Eating, TFEQ=Three Factor Eating Questionnaire, CR=Cognitive Restraint, Disinhib.=Disinhibition, BSQ=Body Shape Questionnaire, MBAS=Male Body Attitudes Survey. Correlations ≥ |.10| are significant at $p<.05$, correlations ≥ |.13| were significant at $p<.01$, and correlations ≥ |.17| were significant at $p<.001$. Correlations ≥ |0.30| are in bold.

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Table A27. Correlations between IEBQ Scores and Eating Pathology Measures in Combined Student Sample

	BD	Binge	WC	BBS	NA	Purging	Restrict.	Muscular.
EDI-3								
DT	**0.84**	**0.38**	0.20	-0.06	**0.33**	**0.37**	0.14	0.12
Bulimia	**0.58**	**0.64**	0.25	0.01	0.25	**0.45**	0.04	0.07
BD	**0.83**	**0.36**	-0.03	-0.13	0.20	0.29	0.02	0.12
EDE-Q								
Restraint	**0.61**	0.28	**0.30**	0.15	0.27	**0.38**	0.16	0.11
Eat. Concern	**0.65**	**0.45**	**0.30**	-0.02	0.26	**0.46**	0.08	0.08
Shp. Concern	**0.89**	**0.42**	0.17	-0.05	**0.38**	**0.34**	0.11	0.20
Wt. Concern	**0.86**	**0.38**	0.16	-0.09	**0.33**	**0.35**	0.08	0.14
Total	**0.86**	**0.42**	0.25	-0.01	**0.35**	**0.42**	0.12	0.16
EDE-QR								
BD	**0.88**	**0.38**	0.09	-0.08	**0.34**	**0.31**	0.09	0.16
Restraint	**0.57**	0.27	**0.32**	0.16	0.26	**0.33**	0.13	0.10
EB Concern	**0.59**	**0.40**	**0.33**	0.05	0.27	**0.46**	0.08	0.11
DEBQ								
RE	**0.77**	**0.33**	0.25	-0.07	**0.33**	**0.30**	0.19	0.08
EE	**0.54**	**0.65**	0.13	-0.15	0.22	0.26	0.08	0.07
EXTE	**0.42**	**0.65**	0.13	-0.03	0.29	0.18	0.12	0.08
TFEQ								
CR	**0.60**	0.15	0.25	0.05	0.27	0.18	0.19	0.13
Disinhib.	**0.58**	**0.63**	0.21	-0.02	0.25	0.19	-0.10	0.07
Hunger	**0.33**	**0.62**	0.19	0.11	0.27	0.08	-0.05	0.11
BSQ	**0.91**	**0.43**	0.14	-0.10	**0.37**	0.29	0.05	0.15
MBAS								
Muscularity	**0.51**	**0.33**	0.09	**0.30**	**0.34**	0.17	0.14	**0.71**
Body Fat	**0.91**	**0.42**	0.06	-0.12	**0.31**	0.26	0.04	0.24
Height	0.14	0.06	0.09	0.18	0.14	0.13	0.14	0.23
Total	**0.82**	**0.41**	0.06	-0.11	**0.30**	0.23	0.08	0.22

Note. *N*= 433. EDI-3=Eating Disorders Inventory-3, DT=Drive for Thinness, BD=Body Dissatisfaction, EDE-QR=Revised Eating Disorders Examination-Questionnaire, EB Concern=Eating/Body Concerns, EDE-Q=Eating Disorders Examination-Questionnaire, Eat. Concern = Eating Concerns, Shp. Concern=Shape Concerns, Wt. Concern=Weight Concerns. DEBQ=Dutch Eating Behavior Questionnaire. RE=Restrained Eating, EE=Emotional Eating, EXTE=External Eating, TFEQ=Three Factor Eating Questionnaire, CR=Cognitive Restraint, Disinhib.=Disinhibition, BSQ=Body Shape Questionnaire, MBAS=Male Body Attitudes Survey. Correlations ≥ |.10| are significant at $p<.05$, correlations ≥ |.13| were significant at $p<.01$, and correlations ≥ |.17| were significant at $p<.001$. Correlations ≥ |0.30| are in bold.

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Table A28. Correlations between IEBQ Scores and Psychopathology Measures in Combined Community Sample

	BD	Binge	WC	BBS	NA	Purging	Restrict.	Muscular.
IDAS								
Depression	**0.47**	**0.40**	0.06	0.07	0.25	0.23	0.12	**0.37**
Dysphoria	**0.44**	**0.41**	0.06	0.12	0.24	0.21	0.10	**0.36**
Lassitude	**0.30**	**0.34**	0.01	-0.01	0.11	0.17	0.03	0.26
Insomnia	0.23	0.21	0.06	0.03	0.15	0.10	0.10	0.19
Suicidality	0.22	0.23	-0.05	0.07	0.13	0.14	0.02	0.19
Appetite	0.21	0.09	0.04	-0.03	0.11	0.19	**0.34**	0.13
Loss								
Appetite	**0.56**	**0.69**	0.20	0.02	0.17	**0.33**	-0.07	**0.30**
Gain								
Ill Temper	**0.31**	**0.30**	-0.01	0.10	0.22	0.15	0.05	0.29
Wellbeing	**-0.42**	-0.27	-0.01	0.02	-0.23	-0.13	0.05	-0.28
Soc. Anx.	**0.39**	**0.39**	0.05	0.05	0.23	0.23	0.09	**0.31**
Panic	0.26	**0.33**	-0.01	0.09	0.15	0.22	0.11	0.24
Intrusions	0.17	0.27	-0.06	0.21	0.17	0.14	0.11	0.29
FQ								
Agor.	**0.30**	0.22	0.10	-0.03	0.17	0.10	0.19	0.11
Blood-Inj	0.06	0.14	0.02	0.03	0.17	0.06	0.14	0.15
Social	**0.34**	**0.32**	0.10	-0.03	0.21	0.18	0.17	0.12
Total	**0.34**	**0.37**	0.10	0.05	0.29	0.20	0.22	0.24
APPQ								
Intero.	**0.36**	0.25	0.10	-0.08	0.15	0.16	0.14	0.15
Agor.	0.26	0.20	-0.03	-0.08	0.07	0.02	0.05	0.04
Social	**0.34**	**0.37**	0.02	0.02	0.22	0.16	0.11	0.24
Total	**0.40**	**0.35**	0.04	-0.04	0.19	0.15	0.12	0.20
SCOPI								
Checking	0.25	**0.30**	0.03	0.09	0.15	0.07	0.18	**0.32**
Cleaning	0.19	0.16	0.14	0.04	0.12	0.12	0.21	0.14
Rituals	0.07	0.15	0.03	0.11	0.13	0.02	0.16	0.18
Hoarding	0.07	0.20	-0.08	0.01	0.02	-0.01	0.03	0.20
Impulses	0.09	**0.31**	-0.11	0.24	0.21	0.06	0.03	**0.30**
Total	0.22	0.26	0.08	0.10	0.17	0.08	0.22	0.28
DAST	-0.03	0.10	-0.11	0.17	0.09	-0.01	0.10	0.12
AUDIT	-0.05	0.12	-0.08	0.18	0.12	0.03	0.02	0.18
FROST								
CM	0.27	**0.31**	0.13	0.11	0.30	0.07	0.14	0.23
PS	-0.05	0.04	0.18	0.09	0.18	0.02	0.21	0.01
PE	0.05	0.16	0.05	0.08	0.11	0.03	0.18	0.00
PC	0.23	0.29	-0.01	0.09	0.19	0.10	0.15	0.17
DA	0.27	**0.33**	0.03	0.10	0.16	0.07	0.10	0.23
ORG	0.02	-0.07	0.23	-0.03	0.09	0.10	0.20	-0.03

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Table A28. Continued

	BD	Binge	WC	BBS	NA	Purging	Restrict.	Muscular.
Total	0.20	0.26	0.17	0.11	0.28	0.10	0.25	0.16

Note. *N*= 407. BD=Body Dissatisfaction, BE=Binge Eating, WC=Weight Control Behaviors, BBS=Body Building Supplements, NA= Negative Attitudes toward Obesity, Restrict.=Restricting, Muscular.=Muscularity, IDAS=Inventory of Depression and Anxiety Symptoms, Soc. Anxiety=Social Anxiety, Intrusions= Traumatic Intrusions, FQ=The Fear Questionnaire, Agor.=Agoraphobia, Social=Social Phobia, APPQ=The Albany Panic and Phobia Questionnaire, Intero.=Interoceptive, SCOPI=The Schedule of Compulsions, Obsessions and Pathological Impulses, Impulses=Pathological Impulses, DAST=Drug Abuse Screening Test, AUDIT=Alcohol Use Disorders Identification Test, CM=Concern over Mistakes, PS=Personal Standards, PE=Parental Expectations, PC=Parental Criticism, DA=Doubt , ORG=Organization. Correlations ≥ |.10| are significant at $p<.05$, correlations ≥ |.13| were significant at $p<.01$, and correlations ≥ |.17| were significant at $p<.001$. Correlations ≥ |0.30| are in bold.

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Table A29. Correlations between IEBQ Scores and Psychopathology Measures in Combined Student Sample

	BD	Binge	WC	BBS	NA	Purging	Restrict.	Muscular.
IDAS								
Depression	**0.49**	**0.35**	0.18	0.02	0.25	0.17	0.26	0.23
Dysphoria	**0.49**	**0.39**	0.17	0.00	0.24	0.19	0.25	0.22
Lassitude	**0.36**	**0.33**	0.16	0.05	0.22	0.13	0.17	0.19
Insomnia	0.27	0.24	0.23	0.05	0.22	0.10	**0.30**	0.16
Suicidality	0.23	0.06	0.00	-0.01	0.11	0.14	0.05	0.08
Appetite	**0.32**	0.08	0.11	0.03	0.24	0.12	**0.36**	0.14
Loss								
Appetite	**0.55**	**0.63**	0.22	-0.01	0.26	0.19	0.06	0.10
Gain								
Ill Temper	**0.31**	**0.31**	0.15	0.09	0.26	0.22	0.20	0.18
Wellbeing	**-0.31**	-0.21	0.01	-0.04	-0.06	-0.14	0.00	-0.14
Soc. Anx.	**0.45**	**0.38**	0.11	0.06	0.25	0.27	0.16	0.19
Panic	0.26	0.22	0.11	0.02	0.19	0.25	0.19	0.07
Intrusions	0.28	0.27	0.17	0.08	0.29	0.21	0.22	0.13
FQ								
Agor.	0.22	0.16	0.02	-0.07	0.19	0.17	0.18	-0.02
Blood-Inj	0.20	0.15	-0.02	-0.07	0.10	0.13	0.16	-0.04
Social	**0.32**	0.23	0.00	-0.03	0.13	0.16	0.15	0.10
Total	**0.39**	**0.31**	0.06	-0.02	0.23	0.22	0.28	0.09
APPQ								
Intero.	0.17	0.13	-0.08	-0.06	0.09	0.18	0.16	-0.01
Agor.	0.28	0.30	-0.06	-0.10	0.16	0.18	0.19	-0.02
Social	**0.35**	**0.34**	0.02	0.05	0.22	0.17	0.16	0.14
Total	**0.34**	**0.34**	-0.04	-0.03	0.20	0.22	0.21	0.06
SCOPI								
Checking	0.24	**0.32**	0.17	0.14	0.26	0.13	0.22	0.21
Cleaning	0.19	0.22	0.11	0.03	0.22	0.15	0.22	0.11
Rituals	0.16	0.21	0.12	0.12	0.18	0.08	0.24	0.12
Hoarding	0.24	0.34	0.12	0.04	0.17	0.12	0.12	0.13
Impulses	0.09	0.21	0.17	0.25	0.15	0.14	0.18	0.27
Total	0.24	**0.31**	0.16	0.12	0.27	0.14	0.26	0.19
DAST	0.10	0.15	0.15	0.28	0.13	0.08	0.06	0.25
AUDIT	0.15	0.22	0.19	**0.35**	0.18	0.13	0.02	0.22
FROST								
CM	**0.38**	0.28	0.20	0.15	**0.32**	0.18	0.17	0.16
PS	0.16	0.14	0.26	0.14	0.23	0.07	0.10	0.05
PE	0.14	0.06	0.16	0.16	0.11	0.13	0.07	0.07
PC	0.18	0.09	0.08	0.11	0.05	0.14	0.01	0.10
DA	0.26	0.26	0.14	0.14	0.16	0.11	0.13	0.16
ORG	0.07	0.06	0.13	0.02	0.13	-0.02	0.12	0.00
Total	**0.30**	0.22	0.25	0.17	0.27	0.15	0.16	0.13

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Table A29. Continued

Note. *N*= 433. BD=Body Dissatisfaction, BE=Binge Eating, WC=Weight Control Behaviors, BBS=Body Building Supplements, NA=Negative Attitudes toward Obesity, Restr.=Restricting, Musc.=Muscularity, Purge=Purging, IDAS=Inventory of Depression and Anxiety Symptoms, Soc. Anxiety=Social Anxiety, Intrusions= Traumatic Intrusions, FQ=The Fear Questionnaire, Agor.=Agoraphobia, Social=Social Phobia, APPQ=The Albany Panic and Phobia Questionnaire, Intero.=Interoceptive, SCOPI=The Schedule of Compulsions, Obsessions and Pathological Impulses, Impulses=Pathological Impulses, DAST=Drug Abuse Screening Test, AUDIT=Alcohol Use Disorders Identification Test, CM=Concern over Mistakes, PS=Personal Standards, PE=Parental Expectations, PC=Parental Criticism, DA=Doubt , ORG=Organization. Correlations ≥ |.10| are significant at $p<.05$, correlations ≥ |.13| were significant at $p<.01$, and correlations ≥ |.18| were significant at $p<.001$. Correlations ≥ |0.30| are in bold.

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Table A30. Exploratory Factor Analysis in Patient Sample

Item	BD	BE	Exercise	MB	NA	Purging	Restricting
14. I thought that my weight was perfect	**-0.52**	0.04	0.19	0.00	0.15	-0.01	-0.06
15. I did not like how my body looked	**0.82**	-0.05	-0.05	0.03	0.08	-0.02	-0.04
16. I did not like how clothes fit the shape of my body	**0.84**	0.08	-0.04	0.11	-0.10	-0.02	0.04
17. I wished the shape of my body was different	**0.87**	-0.05	-0.04	0.08	-0.02	-0.04	-0.06
27. I was not satisfied with the size of my hips	**0.66**	-0.05	0.06	-0.14	0.03	0.04	0.03
29. I thought my arms were too fat	**0.68**	0.02	0.02	-0.12	0.05	0.12	0.02
30. I thought my butt was too big	**0.66**	-0.02	0.16	-0.20	0.05	0.11	-0.13
31. Parts of my body seemed disproportionate	**0.62**	0.18	0.07	0.05	0.00	-0.05	0.16
33. I was self-conscious about the way my body looked	**0.75**	0.07	-0.02	0.01	-0.05	-0.08	0.14
1. I ate a very large amount of food in a short period of time (e.g., within 2 hours)	0.00	**0.76**	0.01	0.09	-0.05	0.08	-0.07
2. I stuffed myself with food to the point of feeling sick	-0.06	**0.83**	0.00	0.02	-0.05	0.08	0.18
3. I ate until I was uncomfortably full	-0.01	**0.73**	-0.06	-0.03	0.01	0.16	0.05
4. If someone offered me food, I felt that I could not resist eating it	-0.03	**0.75**	0.00	0.02	0.02	0.06	-0.08
7. I ate when I was not hungry	-0.04	**0.74**	0.02	-0.11	-0.01	-0.07	-0.16
9. I ate because other people around me were eating, even though I was not hungry	0.04	**0.63**	0.02	0.00	0.06	-0.03	-0.13
10. I ate as if I was on auto-pilot	0.11	**0.71**	-0.06	0.01	0.02	0.04	-0.02
11. I snacked throughout the evening without realizing it	0.10	**0.63**	0.00	0.01	-0.01	-0.18	-0.17
13. I did not notice how much I ate until after I had finished eating	0.04	**0.78**	-0.01	0.06	-0.01	-0.11	0.04
76. Other people thought I exercised too much	0.02	-0.02	**0.80**	-0.02	-0.04	0.00	0.14
77. I exercised a lot more than most people my age	-0.07	-0.01	**0.86**	-0.05	0.01	-0.01	0.09
78. I pushed myself extremely hard when I exercised	0.02	-0.02	**0.84**	0.09	0.07	0.05	-0.05
79. I engaged in strenuous exercise at least five days per week	-0.04	-0.04	**0.92**	0.00	-0.10	0.00	-0.05
80. I exercised to the point of exhaustion	-0.04	0.04	**0.85**	0.01	-0.01	0.01	0.13
82. I planned my days around exercising	0.02	-0.01	**0.85**	0.08	-0.04	0.01	0.00
83. I felt that I needed to exercise nearly every day	0.04	0.02	**0.84**	-0.02	0.03	-0.07	-0.02

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Table A30. Continued

Item	BD	BE	Exercise	MB	NA	Purging	Restricting
26. I thought my muscles were too small	0.02	0.17	0.01	**0.52**	0.00	-0.05	0.12
63. I thought about taking steroids as a way to get more muscular	-0.20	0.11	-0.04	**0.46**	-0.02	0.03	0.18
68. I used muscle building supplements	0.07	-0.13	0.00	**0.88**	-0.01	0.03	-0.06
69. I considered taking a muscle building supplement	0.06	-0.10	0.03	**0.91**	0.01	0.01	-0.13
71. I used protein supplements	-0.02	0.04	0.03	**0.67**	0.09	0.10	0.02
54. I was disgusted by the sight of obese people	0.06	-0.09	-0.09	0.01	**0.85**	0.02	-0.01
55. I felt that overweight people are lazy	-0.07	0.03	0.07	0.00	**0.87**	-0.02	0.06
56. I thought that overweight people lack self-control	-0.11	0.07	-0.01	0.01	**0.87**	0.01	0.09
57. I felt that overweight people are unattractive	0.08	0.02	0.00	0.03	**0.83**	-0.01	-0.18
58. I was disgusted by the sight of an overweight person wearing tight clothes	0.01	-0.04	-0.05	0.06	**0.78**	-0.04	0.07
70. I used diet pills	-0.03	0.04	-0.04	0.12	-0.05	**0.78**	-0.01
72. I used diuretics in order to lose weight	-0.05	0.04	-0.08	0.00	-0.02	**0.84**	0.01
73. I considered taking diuretics to lose weight	0.08	-0.04	0.00	-0.09	0.05	**0.75**	0.10
74. I used diet or cleansing teas to lose weight	0.12	-0.02	0.23	0.01	0.00	**0.56**	-0.13
40. People would be surprised if they knew how little I ate	0.03	-0.03	0.03	-0.08	-0.02	0.01	**0.71**
41. People encouraged me to eat more	-0.01	-0.03	0.00	0.09	-0.12	0.00	**0.81**
42. I purposely ate less than those around me	0.11	0.02	0.08	-0.10	0.10	0.02	**0.69**
46. I enjoyed having an empty stomach	0.15	-0.01	0.07	-0.04	0.06	-0.01	**0.63**
51. People told me that I do not eat very much	-0.05	-0.05	0.01	0.08	-0.04	-0.01	**0.85**
84. I skipped two meals in a row	0.06	0.10	0.10	0.09	0.08	0.06	**0.69**
85. I got full more easily than most people	0.06	-0.18	-0.05	0.00	0.02	-0.03	**0.78**
86. I got full after eating what most people would consider a small amount of food	-0.01	-0.06	0.00	0.01	0.01	-0.06	**0.86**

Note. *N*=190. Promax rotation. BD=Body Dissatisfaction, BE=Binge Eating, Exercise = Excessive Exercise, MB=Muscle Building, and NA=Negative Attitudes toward Obesity. Factor loadings ≥ |.40| are highlighted in bold.

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Table A31. Factor Loadings from Confirmatory Factor Analysis in Patient Sample

Item	Factor Loading	*z*-value
Body Dissatisfaction		
14. I thought that my weight was perfect	-.54	-8.53
15. I did not like how my body looked	.85	30.47
16. I did not like how clothes fit the shape of my body	.89	44.59
17. I wished the shape of my body was different	.88	37.67
27. I was not satisfied with the size of my hips	.78	22.19
29. I thought my arms were too fat	.85	29.42
30. I thought my butt was too big	.81	25.14
31. Parts of my body seemed disproportionate	.79	25.15
33. I was self-conscious about the way my body looked	.81	25.77
Binge Eating		
1. I ate a very large amount of food in a short period of time (e.g., within 2 hours)	.84	31.81
2. I stuffed myself with food to the point of feeling sick	.85	32.36
3. I ate until I was uncomfortably full	.83	30.26
4. If someone offered me food, I felt that I could not resist eating it	.80	27.47
7. I ate when I was not hungry	.81	28.78
9. I ate because other people around me were eating, even though I was not hungry	.72	16.26
10. I ate as if I was on auto-pilot	.83	26.74
11. I snacked throughout the evening without realizing it	.80	23.25
13. I did not notice how much I ate until after I had finished eating	.79	25.77
Excessive Exercise		
76. Other people thought I exercised too much	.86	52.71
77. I exercised a lot more than most people my age	.93	55.86
78. I pushed myself extremely hard when I exercised	.91	56.68
79. I engaged in strenuous exercise at least five days per week	.92	48.12
80. I exercised to the point of exhaustion	.95	76.61

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Table A31. Continued

Item	Factor Loading	*z*-value
82. I planned my days around exercising	.91	49.57
83. I felt that I needed to exercise nearly every day	.89	39.98
Muscle Building		
26. I thought my muscles were too small	.60	9.35
63. I thought about taking steroids as a way to get more muscular	.61	7.43
68. I used muscle building supplements	.97	38.28
69. I considered taking a muscle building supplement	.98	43.40
71. I used protein supplements	.84	18.59
Negative Attitudes toward Obesity		
54. I was disgusted by the sight of obese people	.86	32.17
55. I felt that overweight people are lazy	.93	57.95
56. I thought that overweight people lack self-control	.93	57.27
57. I felt that overweight people are unattractive	.84	34.87
58. I was disgusted by the sight of an overweight person wearing tight clothes	84	32.49
Purging		
70. I used diet pills	.80	13.69
72. I used diuretics in order to lose weight	.89	24.23
73. I considered taking diuretics to lose weight	.98	26.89
74. I used diet or cleansing teas to lose weight	.83	11.88
Restricting		
40. People would be surprised if they knew how little I ate	.78	20.97
41. People encouraged me to eat more	.84	30.71
42. I purposely ate less than those around me	.84	27.28
46. I enjoyed having an empty stomach	.77	20.44
51. People told me that I do not eat very much	.80	41.25
84. I skipped two meals in a row	.81	26.38
85. I got full more easily than most people	.93	66.24

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Table A31. Continued

Item	Factor Loading	*z*-value
86. I got full after eating what most people would consider a small amount of food	.94	75.44

Latent Endogenous Factors	Factor Loading on Body Dissatisfaction	z-value
Binge Eating	.25	3.68
Excessive Exercise	.16	2.12
Muscle Building	-.19	-2.39
Negative Attitudes toward Obesity	.17	2.26
Purging	.52	6.73
Restricting	.38	5.83

Note. N=190. All two-tailed z-values are significant at p<.05.

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Table A32. Correlations among Latent Endogenous Factors from Confirmatory Factor Analysis in Patient Sample

	BE	EE	MB	NA	Purging	Restricting
BE	1.00					
EE	**-.31**	1.00				
MB	.15	**.38**	1.00			
DO	.00	.18	**.36**	1.00		
Purging	.00	.25	**.42**	.00	1.00	
Restricting	**-.56**	**.53**	.13	.15	.20	1.00

Note. *N*=190. BD=Body Dissatisfaction, BE=Binge Eating, Exercise = Excessive Exercise, MB=Muscle Building, and NA= Negative Attitudes toward Obesity. Non-significant correlations were set to zero for Binge Eating versus Negative Attitudes toward Obesity, Binge Eating versus Purging, and Negative Attitudes toward Obesity versus Purging. Correlations > |.00| are significant at $p<.05$.

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Table A33. Descriptive Analyses for Eating Pathology Measures in Patients

Scale	Mean	SD
Iowa Eating Behaviors Questionnaire		
Body Dissatisfaction	31.75	9.53
Binge Eating	19.72	8.50
Excessive Exercise	15.24	8.91
Muscle Building	7.61	3.50
Negative Attitudes toward Obesity	14.03	6.20
Purging	5.43	2.76
Restricting	21.81	9.88
Eating Disorders Examination Questionnaire		
Restraint	3.78	1.91
Eating Concerns	3.08	1.74
Shape Concerns	4.45	1.50
Weight Concerns	4.13	1.58
Total Score	3.86	1.49
Eating Disorders Examination Questionnaire-Revised		
Body Dissatisfaction	4.20	2.10
Restraint	2.92	1.87
Eating/Body Weight Concerns	4.45	1.48
Eating Disorders Inventory-3		
Drive for Thinness	21.31	7.51
Body Dissatisfaction	27.99	10.97
Bulimia	6.71	7.53

Note. *N*=190 participants completed the Iowa Eating Behaviors Questionnaire, *N*=88 participants completed the Eating Disorders Examination Questionnaire and Eating Disorders Examination Questionnaire-Revised, and *N*=68 participants completed the Eating Disorders Inventory-3.

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Table A34. Frequencies/Base Rates for Lifetime History of Eating Disorder Behaviors

	Absent		Present	
	N	*Percent*	*N*	*Percent*
Laxatives	57	64.8%	31	35.2%
Diuretics	73	83.0%	15	17%
Self-Induced Vomiting	45	51.1%	43	48.9%
Fasting	18	20.5%	70	79.5%
Diet Pills	62	70.5%	26	29.5%
Binge Eating	44	50.0%	44	50.0%

Note. *N*=88.

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Table A35. Comparison of IEBQ Scale Scores between Eating Disorder Patients and General Psychiatric Outpatients

	Eating Disorder Patients		General Psychiatric Outpatients		Independent Samples Test		
Scale	Mean	SD	Mean	SD	*t*	*p*-value	Cohen's *d*
Body Dissatisfaction	35.53	8.11	29.53	9.65	4.36	<.001	.64
Binge Eating	16.51	8.51	21.64	7.92	-4.20	<.001	-.61
Excessive Exercise	20.23	10.49	12.26	6.16	6.60	<.001	.96
Muscle Building	6.92	2.61	8.03	3.90	-2.13	.034	-.31
Negative Attitudes toward Obesity	14.23	6.97	13.91	5.72	.34	.734	.05
Purging	6.20	3.54	4.97	2.05	3.04	.003	.44
Restricting	30.85	8.03	16.41	6.29	13.77	<.001	2.01

Note. *N*=71 for eating disorder patients. *N*=119 for general psychiatric outpatients. Degrees of freedom=188.

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Table A36. Descriptive Analyses for Inventory of Depression and Anxiety Symptoms in Patients

Scale	Mean	SD
General Depression	59.32	16.50
Dysphoria	30.40	9.29
Suicidality	11.07	5.41
Lassitude	16.42	5.37
Insomnia	16.43	6.59
Appetite Loss	8.78	4.03
Appetite Gain	7.69	3.08
Ill Temper	11.42	5.15
Social Anxiety	13.04	5.33
Panic	17.91	7.49
Traumatic Intrusions	9.73	4.81
Well-Being	19.24	7.64

Note. *N*=160.

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Table A37. Internal Consistency Reliabilities (Coefficient Alphas) and Average Interitem Correlations of Final Scales for Patients

		Combined Sample		Eating Disorder Patients		General Psychiatric Outpatients	
Provisional Scale	Items	α	AIC	α	AIC	α	AIC
Body Dissatisfaction	9	.90	.50	.85	.39	.82	.34
Binge Eating	9	.91	.53	.92	.56	.91	.53
Excessive Exercise	7	.95	.73	.97	.82	.91	.59
Muscle Building	5	.81	.46	.71	.33	.82	.48
Negative Attitudes	5	.92	.70	.95	.79	.90	.64
Purging	4	.83	.55	.84	.57	.79	.48
Restricting	8	.93	.62	.89	.50	.81	.35
Median Values		.92	.55	.89	.56	.82	.48

Note. *N*=190 for combined patient sample. *N*=71 for eating disorder patients. *N*=119 for general psychiatric outpatients. Negative Attitudes = Negative Attitudes toward Obesity.

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Table A38. Correlations for IEBQ Scales in Patients

	BD	BE	Exercise	MB	NA	Purging	Restricting
BD	1.00						
BE	0.19	1.00					
Exercise	0.23	-0.21	1.00				
MB	-0.11	0.07	0.21	1.00			
NA	0.17	0.06	0.17	0.25	1.00		
Purging	**0.38**	0.10	**0.31**	0.08	0.18	1.00	
Restricting	**0.38**	**-0.38**	**0.50**	-0.02	0.19	**0.37**	1.00

N=190. BD=Body Dissatisfaction, BE=Binge Eating, Exercise=Excessive Exercise, MB=Muscle Building, NA= Negative Attitudes toward Obesity. Correlations ≥ |.17| were significant at $p<.05$, correlations ≥ |.21| were significant at $p<.01$, and correlations ≥ |.25| were significant at $p<.001$. Correlations ≥ |.30| are in bold.

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Table A39. Correlations between IEBQ Scales and Eating Disorder Measures in Patients

	BD	BE	Exercise	MB	NA	Purging	Restricting
EDE-Q							
Restraint	**0.46**	-0.06	**0.38**	-0.04	0.24	**0.33**	**0.53**
Eating Concerns	**0.54**	0.21	**0.33**	-0.01	0.13	**0.39**	**0.51**
Shape Concerns	**0.79**	0.03	**0.39**	0.00	0.20	**0.37**	**0.53**
Weight Concerns	**0.69**	0.03	**0.36**	0.05	0.20	**0.35**	**0.60**
Total Score	**0.69**	0.06	**0.41**	0.00	0.22	**0.40**	**0.61**
EDE-QR							
Body Dissatisfaction	**0.73**	0.05	**0.37**	0.06	0.17	**0.43**	**0.58**
Restraint	**0.40**	0.02	**0.39**	-0.01	0.21	**0.35**	**0.36**
Eating/Body Weight Concerns	**0.44**	0.22	**0.34**	-0.02	0.05	**0.42**	**0.45**
EDI-3							
Drive for Thinness	**0.51**	0.01	0.26	-0.10	0.29	**0.31**	0.25
Bulimia	0.24	**0.79**	0.08	0.11	-0.10	0.29	0.03
Body Dissatisfaction	**0.76**	0.02	0.24	0.01	0.24	**0.37**	**0.34**

Note. BD=Body Dissatisfaction, BE=Binge Eating, Exercise=Excessive Exercise, MB=Muscle Building, NA= Negative Attitudes toward Obesity. EDE-Q= Eating Disorders Examination Questionnaire, EDI-3= Eating Disorders Inventory-3. *N*=190 participants completed the Iowa Eating Behaviors Questionnaire, *N*=88 participants completed the EDE-Q and EDE-QR, and *N*=68 participants completed the EDI-3. Correlations ≥ |.22| were significant at $p<.05$, correlations ≥ |.33| were significant at $p<.01$, and correlations ≥ |.39| were significant at $p<.001$. Correlations ≥ |.30| are in bold.

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Table A40. Correlations between IEBQ Scales and Eating Disorder Symptoms in Patients

	BD	BE	Exercise	MB	NA	Purging	Restricting
Body Mass Index	0.16	**0.36**	-0.20	0.05	0.05	-0.11	**-0.43**
Lifetime History of Eating Disorder Behaviors							
Self-induced Vomiting	0.21	0.09	0.07	-0.10	-0.05	0.18	**0.32**
Laxatives	**0.39**	0.14	0.13	-0.23	0.03	**0.50**	**0.35**
Binge Eating	0.14	**0.56**	0.07	0.07	0.09	0.19	-0.01
Fasting	**0.51**	0.10	0.23	0.17	0.18	0.26	**0.48**
Diuretics	0.23	0.16	0.02	-0.13	0.12	**0.48**	0.24
Diet Pills	0.21	0.27	0.01	0.08	0.15	**0.49**	0.06
Current Frequency of Eating Disorder Behaviors							
Self-Induced Vomiting	0.23	0.16	-0.13	0.00	0.02	0.11	0.14
Binge Eating	0.12	**0.70**	0.04	0.05	-0.05	0.18	-0.10
Laxatives	0.12	0.01	0.06	0.00	-0.02	**0.33**	0.16
Excessive Exercise	**0.39**	-0.12	**0.63**	0.02	0.28	0.24	**0.33**

Note. *N*=88. BD=Body Dissatisfaction, BE=Binge Eating, Exercise=Excessive Exercise, MB=Muscle Building, NA= Negative Attitudes toward Obesity. Current (i.e., past 28 days prior to treatment) frequency of eating disorder behaviors were obtained from the non-scored count items in the Eating Disorder Examination-Questionnaire. Correlations ≥ |.21| were significant at $p<.05$, correlations ≥ |.28| were significant at $p<.01$, and correlations ≥ |.40| were significant at $p<.001$. Correlations ≥ |.30| are in bold.

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Table A41. Correlations between IEBQ and IDAS Scales

	BD	BE	Exercise	MB	NA	Purging	Restricting
Depression	**0.50**	0.06	0.29	0.08	0.15	0.18	**0.50**
Dysphoria	**0.46**	0.12	0.27	0.11	0.11	0.12	**0.42**
Lassitude	**0.47**	**0.30**	0.06	0.07	0.19	0.20	0.15
Suicidality	0.24	0.09	0.22	0.10	0.12	0.24	0.26
Insomnia	0.24	0.01	0.17	0.02	0.03	0.02	**0.30**
Loss	0.28	**-0.32**	**0.30**	0.06	0.16	0.16	**0.71**
Gain	0.28	**0.52**	0.04	-0.10	-0.07	0.14	-0.08
Ill Temper	0.20	0.25	0.08	0.07	0.06	0.05	0.13
Wellbeing	**-0.42**	-0.03	-0.16	-0.04	-0.11	-0.21	**-0.36**
Soc. Anx.	**0.36**	0.11	0.20	0.17	0.05	0.10	0.27
Panic	**0.42**	0.08	0.29	0.13	0.12	0.22	**0.40**
Intrusions	0.24	**0.30**	-0.03	0.23	0.01	0.01	0.08

Note. *N*=160. Depression=General Depression, Loss= Appetite Loss, Gain= Appetite Gain, Soc. Anxiety=Social Anxiety, Intrusions=Traumatic Intrusions, BD=Body Dissatisfaction, BE=Binge Eating, Exercise=Excessive Exercise, MB=Muscle Building, NA= Negative Attitudes toward Obesity. Correlations ≥ |.16| are significant at $p<.05$, correlations ≥ |.22| were significant at $p<.01$, and correlations ≥ |.27| were significant at $p<.001$. Correlations ≥ |.30| are in bold.

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Table A42. Factor Loadings from Confirmatory Factor Analysis in Phase III Undergraduates at Time 1

Item	Factor Loading	*z*-value
Body Dissatisfaction		
14. I thought that my weight was perfect	-.67	-19.07
15. I did not like how my body looked	.86	48.85
16. I did not like how clothes fit the shape of my body	.86	47.48
17. I wished the shape of my body was different	.84	37.44
27. I was not satisfied with the size of my hips	.72	18.66
29. I thought my arms were too fat	.78	25.56
30. I thought my butt was too big	.66	12.75
31. Parts of my body seemed disproportionate	.75	22.53
33. I was self-conscious about the way my body looked	.81	32.10
Binge Eating		
1. I ate a very large amount of food in a short period of time (e.g., within 2 hours)	.51	9.68
2. I stuffed myself with food to the point of feeling sick	.63	13.06
3. I ate until I was uncomfortably full	.61	13.82
4. If someone offered me food, I felt that I could not resist eating it	.59	12.05
7. I ate when I was not hungry	.74	18.68
9. I ate because other people around me were eating, even though I was not hungry	.70	15.04
10. I ate as if I was on auto-pilot	.76	18.50
11. I snacked throughout the evening without realizing it	.76	19.41
13. I did not notice how much I ate until after I had finished eating	.74	20.15
Excessive Exercise		
76. Other people thought I exercised too much	.83	24.29
77. I exercised a lot more than most people my age	.83	30.70
78. I pushed myself extremely hard when I exercised	.86	40.71
79. I engaged in strenuous exercise at least five days per week	.88	41.99
80. I exercised to the point of exhaustion	.89	42.27

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Table A42. Continued

Item	Factor Loading	*z*-value
82. I planned my days around exercising	.79	23.56
83. I felt that I needed to exercise nearly every day	.81	31.08
Muscle Building		
26. I thought my muscles were too small	.48	8.17
63. I thought about taking steroids as a way to get more muscular	.77	12.21
68. I used muscle building supplements	.99	162.07
69. I considered taking a muscle building supplement	.48	8.17
71. I used protein supplements	.96	85.75
Negative Attitudes toward Obesity		
54. I was disgusted by the sight of obese people	.82	29.00
55. I felt that overweight people are lazy	.87	33.66
56. I thought that overweight people lack self-control	.86	32.62
57. I felt that overweight people are unattractive	.72	18.64
58. I was disgusted by the sight of an overweight person wearing tight clothes	.80	26.48
Purging		
70. I used diet pills	.87	10.36
72. I used diuretics in order to lose weight	.91	8.57
73. I considered taking diuretics to lose weight	.75	7.59
74. I used diet or cleansing teas to lose weight	.81	11.33
Restricting		
40. People would be surprised if they knew how little I ate	.71	15.85
41. People encouraged me to eat more	.61	12.67
42. I purposely ate less than those around me	.79	14.89
46. I enjoyed having an empty stomach	.69	13.28
51. People told me that I do not eat very much	.68	16.20
84. I skipped two meals in a row	.59	10.23
85. I got full more easily than most people	.77	25.98

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Table A42. Continued

Item	Factor Loading	*z*-value
86. I got full after eating what most people would consider a small amount of food	.87	33.85

Latent Endogenous Factors	Factor Loading on Body Dissatisfaction	z-value
Binge Eating	.49	3.22
Excessive Exercise	.14	2.19
Muscle Building	-.38	-6.88
Negative Attitudes toward Obesity	.11	1.81
Purging	.46	7.05
Restricting	.46	9.35

Note. N=262. All two-tailed z-values are significant at p<.05.

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Table A43. Correlations among Latent Endogenous Factors from Confirmatory Factor Analysis in Phase III Undergraduates at Time 1

	BE	EE	MB	NA	Purging	Restricting
BE	1.00					
EE	.10	1.00				
MB	.10	**.67**	1.00			
NA	.16	**.37**	**.32**	1.00		
Purging	.32	.21	.25	.14	1.00	
Restricting	-.04	.25	.16	.14	.20	1.00

Note. *N*=262. BD=Body Dissatisfaction, BE=Binge Eating, Exercise = Excessive Exercise, MB=Muscle Building, and NA= Negative Attitudes toward Obesity. Correlations ≥ |.30| are in bold. Correlations ≥ |.14| are significant at $p<.05$.

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Table A44. Factor Loadings from Confirmatory Factor Analysis in Phase III Undergraduates at Time 2

Item	Factor Loading	*z*-value
Body Dissatisfaction		
14. I thought that my weight was perfect	-.75	-26.86
15. I did not like how my body looked	.90	60.15
16. I did not like how clothes fit the shape of my body	.90	59.48
17. I wished the shape of my body was different	.84	46.23
27. I was not satisfied with the size of my hips	.70	18.71
29. I thought my arms were too fat	.79	27.38
30. I thought my butt was too big	.64	14.77
31. Parts of my body seemed disproportionate	.72	21.82
33. I was self-conscious about the way my body looked	.83	41.64
Binge Eating		
1. I ate a very large amount of food in a short period of time (e.g., within 2 hours)	.59	12.56
2. I stuffed myself with food to the point of feeling sick	.77	25.89
3. I ate until I was uncomfortably full	.76	22.20
4. If someone offered me food, I felt that I could not resist eating it	.69	17.97
7. I ate when I was not hungry	.74	23.37
9. I ate because other people around me were eating, even though I was not hungry	.75	21.93
10. I ate as if I was on auto-pilot	.78	22.77
11. I snacked throughout the evening without realizing it	.72	19.38
13. I did not notice how much I ate until after I had finished eating	.77	21.96
Excessive Exercise		
76. Other people thought I exercised too much	.75	18.19
77. I exercised a lot more than most people my age	.84	32.16
78. I pushed myself extremely hard when I exercised	.84	34.64
79. I engaged in strenuous exercise at least five days per week	.82	30.30
80. I exercised to the point of exhaustion	.86	40.42

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Table A44. Continued

Item		
82. I planned my days around exercising	.80	24.80
83. I felt that I needed to exercise nearly every day	.76	24.08
Muscle Building		
26. I thought my muscles were too small	.54	11.84
63. I thought about taking steroids as a way to get more muscular	.90	18.73
68. I used muscle building supplements	.99	99.74
69. I considered taking a muscle building supplement	.96	105.83
71. I used protein supplements	.94	64.73
Negative Attitudes toward Obesity		
54. I was disgusted by the sight of obese people	.86	40.88
55. I felt that overweight people are lazy	.93	70.89
56. I thought that overweight people lack self-control	.93	68.43
57. I felt that overweight people are unattractive	.79	31.99
58. I was disgusted by the sight of an overweight person wearing tight clothes	.86	44.02
Purging		
70. I used diet pills	.53	6.06
72. I used diuretics in order to lose weight	.93	12.13
73. I considered taking diuretics to lose weight	.98	15.81
74. I used diet or cleansing teas to lose weight	.47	4.71
Restricting		
40. People would be surprised if they knew how little I ate	.67	17.39
41. People encouraged me to eat more	.62	13.42
42. I purposely ate less than those around me	.83	19.33
46. I enjoyed having an empty stomach	.70	15.94
51. People told me that I do not eat very much	.74	19.51
84. I skipped two meals in a row	.58	11.02
85. I got full more easily than most people	.80	30.77

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Table A44. Continued

Item	Factor Loading	*z*-value
86. I got full after eating what most people would consider a small amount of food	.89	34.50
Latent Endogenous Factors	**Factor Loading on Body Dissatisfaction**	**z-value**
Binge Eating	.47	10.19
Excessive Exercise	.12	2.10
Muscle Building	-.26	-4.31
Negative Attitudes toward Obesity	.17	2.94
Purging	.61	5.93
Restricting	.42	9.27

Note. N=279. All two-tailed z-values are significant at p<.05.

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Table A45. Correlations among Latent Endogenous Factors from Confirmatory Factor Analysis in Phase III Undergraduates at Time 2

	BE	EE	MB	NA	Purging	Restricting
BE	1.00					
EE	.19	1.00				
MB	.19	**.63**	1.00			
NA	.12	**.33**	**.39**	1.00		
Purging	.28	**.34**	**-.73**	.12	1.00	
Restricting	.07	.26	.17	.03	**.32**	1.00

Note. *N*=279. BD=Body Dissatisfaction, BE=Binge Eating, Exercise = Excessive Exercise, MB=Muscle Building, and NA= Negative Attitudes toward Obesity. Correlations ≥ |.30| are in bold. Correlations ≥ |.17| are significant at $p<.05$.

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Table A46. Descriptive Analyses for Eating Pathology Measures in Phase III Undergraduates

	Time 1		Time 2	
Scale	Mean	SD	Mean	SD
Iowa Eating Behaviors Questionnaire				
Body Dissatisfaction	24.26	7.90	24.00	7.66
Binge Eating	20.01	5.48	19.27	5.56
Excessive Exercise	14.98	6.55	14.22	5.92
Muscle Building	8.53	4.38	8.09	4.01
Negative Attitudes toward Obesity	14.03	4.60	14.69	5.02
Purging	4.50	1.33	4.37	.96
Restricting	14.16	5.16	13.77	4.57
Body Shape Questionnaire	37.63	17.25	37.32	16.65
Dutch Eating Behavior Questionnaire				
Restrained Eating	23.48	8.72	22.81	8.66
External Eating	26.98	6.21	26.43	6.19
Emotional Eating	27.46	11.89	26.51	11.62
Eating Disorders Examination Questionnaire				
Restraint	1.17	1.27	1.00	1.11
Eating Concerns	.64	.93	.57	.92
Shape Concerns	2.12	1.49	1.98	1.44
Weight Concerns	1.77	1.57	1.66	1.41
Eating Disorders Examination Questionnaire-Revised				
Body Dissatisfaction	2.09	1.54	2.02	1.54
Restraint	1.64	1.69	1.43	1.58
Eating/Body Concerns	.63	.10	.62	1.04
Eating Disorders Inventory-3				
Drive for Thinness	7.61	7.04	6.95	6.93
Body Dissatisfaction	12.36	9.25	12.46	9.28
Bulimia	2.96	3.80	2.41	3.53
Male Body Attitudes Scale				
Muscularity	2.65	.88	2.60	.86
Low Body Fat	3.11	1.13	3.10	1.16
Height	2.68	1.41	2.78	1.37
Restraint Scale	12.12	5.87	12.40	5.58
Three Factor Eating Questionnaire				
Cognitive Restraint	7.84	5.06	7.58	4.96
Disinhibition	5.80	3.51	5.44	3.31
Hunger	5.91	3.25	5.98	3.42

Note. Valid *N*=262 at Time 1 and Valid *N*=279 at Time 2.

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Table A47. Internal Consistency Reliabilities (Coefficient Alphas) and Average Interitem Correlations of Final Scales for Phase III Undergraduates

		Time 1		Time 2	
Provisional Scale	Items	α	AIC	α	AIC
Body Dissatisfaction	9	.91	.53	.91	.52
Binge Eating	9	.85	.39	.87	.42
Excessive Exercise	7	.91	.59	.90	.56
Muscle Building	5	.86	.55	.87	.57
Negative Attitudes toward Obesity	5	.87	.57	.92	.70
Purging	4	.72	.39	.54	.22
Restricting	8	.81	.35	.79	.31
Median Values		.86	.53	.87	.52

Note. Valid *N*=262 at Time 1 and Valid *N*=279 at Time 2.

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Table A48. Correlations between Final IEBQ Scales and Eating Pathology at Time 1

	BD	BE	Exercise	MB	NA	Purging	Restricting
Body Shape Questionnaire	**0.80**	**0.48**	0.21	-0.25	0.16	**0.38**	**0.35**
Dutch Eating Behavior Questionnaire							
Restrained Eating	**0.58**	0.29	**0.35**	-0.12	0.12	**0.33**	**0.44**
External Eating	**0.31**	**0.61**	0.05	-0.05	0.20	0.20	0.10
Emotional Eating	**0.50**	**0.60**	0.07	-0.20	0.13	0.26	0.17
Eating Disorders Examination Questionnaire							
Restraint	**0.49**	0.22	**0.37**	0.02	0.11	**0.33**	**0.37**
Eating Concerns	**0.63**	**0.40**	0.25	-0.13	0.18	**0.34**	**0.43**
Shape Concerns	**0.81**	**0.41**	0.23	-0.19	0.17	0.29	**0.33**
Weight Concerns	**0.78**	**0.40**	0.20	-0.19	0.19	0.29	**0.34**
Eating Disorders Examination Questionnaire-Revised							
Body Dissatisfaction	**0.71**	**0.35**	0.09	-0.18	0.14	0.22	0.26
Restraint	**0.38**	0.17	**0.32**	0.04	0.13	0.27	0.20
Eating/Body Concerns	**0.50**	**0.39**	0.20	-0.09	0.19	**0.32**	**0.35**
Eating Disorders Inventory-3							
Drive for Thinness	**0.73**	**0.38**	**0.30**	-0.17	0.22	0.29	**0.39**
Body Dissatisfaction	**0.83**	**0.38**	0.06	-0.27	0.14	0.23	0.29
Bulimia	**0.57**	**0.61**	0.15	-0.11	0.18	**0.37**	0.24
Male Body Attitudes Scale							
Muscularity	0.24	0.14	0.28	**0.56**	0.26	0.00	0.10
Low Body Fat	**0.78**	**0.41**	0.20	-0.13	0.15	0.28	0.23
Height	0.15	0.02	0.21	**0.31**	0.12	0.05	0.13
Restraint Scale	**0.60**	**0.38**	0.28	-0.02	0.12	**0.33**	**0.39**
Three Factor Eating Questionnaire							
Cognitive Restraint	**0.42**	0.09	**0.36**	0.04	0.12	0.24	**0.37**
Disinhibition	**0.55**	**0.67**	0.08	-0.18	0.15	**0.32**	0.16
Hunger	**0.32**	**0.59**	0.14	0.00	0.16	0.24	-0.01

Note. *N*=262. BD=Body Dissatisfaction, BE=Binge Eating, Exercise=Excessive Exercise, MB=Muscle Building, NA= Negative Attitudes toward Obesity. Correlations ≥ |.12| are significant at $p<.05$, correlations ≥ |.16| were significant at $p<.01$, and correlations ≥ |.21| were significant at $p<.001$. Correlations ≥ |0.30| are in bold.

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Table A49. Correlations between Final IEBQ Scales and Eating Pathology at Time 2

	BD	BE	Exercise	MB	NA	Purging	Restricting
Body Shape Questionnaire	**0.85**	**0.44**	0.21	-0.17	0.17	**0.36**	**0.31**
Dutch Eating Behavior Questionnaire							
Restrained Eating	**0.62**	**0.37**	**0.32**	-0.05	0.14	**0.34**	**0.42**
External Eating	0.28	**0.59**	0.04	0.01	0.16	0.20	0.11
Emotional Eating	**0.46**	**0.51**	0.03	-0.16	0.05	**0.32**	0.20
Eating Disorders Examination Questionnaire							
Restraint	**0.54**	0.29	**0.43**	0.08	0.14	**0.30**	**0.44**
Eating Concerns	**0.58**	**0.50**	0.27	-0.02	0.17	0.29	**0.34**
Shape Concerns	**0.82**	**0.38**	0.22	-0.09	0.20	0.26	**0.30**
Weight Concerns	**0.80**	**0.40**	0.18	-0.16	0.17	0.26	**0.30**
Eating Disorders Examination Questionnaire-Revised							
Body Dissatisfaction	**0.79**	**0.36**	0.14	-0.15	0.21	0.26	0.27
Restraint	**0.48**	0.21	**0.41**	0.11	0.12	0.27	**0.34**
Eating/Body Concerns	**0.52**	**0.42**	0.29	0.03	0.19	0.28	**0.33**
Eating Disorders Inventory-3							
Drive for Thinness	**0.70**	**0.38**	**0.32**	-0.10	0.23	**0.34**	**0.40**
Body Dissatisfaction	**0.83**	**0.35**	0.09	-0.20	0.14	0.23	0.28
Bulimia	**0.51**	**0.59**	0.14	-0.09	0.14	0.28	0.26
Male Body Attitudes Scale							
Muscularity	**0.33**	0.18	**0.32**	**0.60**	**0.32**	0.06	0.18
Low Body Fat	**0.84**	**0.35**	0.16	-0.11	0.15	0.26	0.22
Height	0.18	0.04	0.18	0.29	0.06	0.04	0.20
Restraint Scale	**0.63**	**0.40**	0.29	-0.01	0.10	**0.31**	**0.40**
Three Factor Eating Questionnaire							
Cognitive Restraint	**0.48**	0.17	**0.40**	0.04	0.16	0.28	**0.38**
Disinhibition	**0.52**	**0.67**	0.11	-0.11	0.11	0.29	0.19
Hunger	**0.32**	**0.65**	0.19	0.07	0.11	0.20	0.08

Note. *N*=279. BD=Body Dissatisfaction, BE=Binge Eating, Exercise=Excessive Exercise, MB=Muscle Building, NA= Negative Attitudes toward Obesity. Correlations ≥ |.12| are significant at $p<.05$, correlations ≥ |.16| were significant at $p<.01$, and correlations ≥ |.20| were significant at $p<.001$. Correlations ≥ |0.30| are in bold.

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Table A50. Correlations between IEBQ Scores and Lifetime Histories of Eating Disorder Behaviors at Time 1

	BD	BE	Exercise	MB	NA	Purging	Restricting
Body Mass Index	0.19	0.00	0.09	0.10	0.01	0.17	-0.08
Laxatives	0.18	0.06	-0.02	-0.03	0.10	0.11	0.13
Diuretics	-0.01	0.01	-0.07	-0.05	0.01	0.18	0.06
Self-induced vomiting	0.23	0.20	0.18	0.03	0.20	**0.39**	0.21
Fasting	0.21	0.25	0.22	0.11	0.09	**0.35**	**0.39**
Binge Eating	0.02	-0.01	0.00	-0.03	0.02	-0.03	-0.03

Note. *N*=262. Lifetime histories of eating disorder behaviors were measured at Time 1 only. BD=Body Dissatisfaction, BE=Binge Eating, Exercise=Excessive Exercise, MB=Muscle Building, NA= Negative Attitudes toward Obesity. Correlations ≥ |.13| are significant at $p<.05$, correlations ≥ |.17| were significant at $p<.01$, and correlations ≥ |.20| were significant at $p<.001$. Correlations ≥ |0.30| are in bold.

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Table A51. Multitrait-Multioccasion Matrix of Retest Correlations in Phase III Undergraduates

	Time 1 scale						
Time 2 scale	BD	BE	Exercise	MB	NA	Purging	Restricting
BD	**0.73**	0.35	0.07	-0.20	0.05	0.30	0.32
BE	0.34	**0.70**	0.07	-0.02	0.13	0.28	0.13
Exercise	0.05	0.08	**0.72**	0.38	0.28	0.21	0.14
MB	-0.22	-0.11	0.38	**0.84**	0.26	-0.01	0.00
NA	-0.03	0.06	0.23	0.24	**0.70**	0.11	0.05
Purging	0.20	0.26	0.16	-0.03	0.11	**0.75**	0.12
Restricting	0.31	0.12	0.14	0.02	0.13	0.21	**0.74**

Note. *N*=227. BD=Body Dissatisfaction, BE=Binge Eating, Exercise=Excessive Exercise, MB=Muscle Building, NA= Negative Attitudes toward Obesity. Correlations ≥ |.14| are significant at $p<.05$, correlations ≥ |.21| were significant at $p<.01$, and correlations ≥ |.22| were significant at $p<.001$. Retest correlations are in bold along the diagonal. Discriminant correlations ≥ |0.30| are underlined.

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Table A52. Paired Sample t-tests and Cohen's *d* for Phase III Undergraduates

	Paired Differences		Paired Sample Test		
Scale Pair (T1-T2)	Mean	SD	*t*	*p*-value	Cohen's *d*
Iowa Eating Behaviors Inventory					
Body Dissatisfaction	-.018	5.70	-.05	.963	-.00
Binge Eating	.767	4.32	2.68	.008	.18
Excessive Exercise	.780	4.74	2.48	.014	.16
Muscle Building	.392	2.39	2.47	.014	.16
Negative Attitudes toward Obesity	.388	3.75	1.56	.121	.10
Purging	.083	.86	1.47	.144	.10
Restricting	.225	3.51	.97	.335	.06
Body Shape Questionnaire	-.152	11.60	-.20	.845	-.01
Dutch Eating Behavior Questionnaire					
Restrained Eating	.798	6.38	1.87	.063	.12
External Eating	.807	7.75	1.55	.122	.10
Emotional Eating	.408	4.91	1.24	.215	.08
Eating Disorders Examination Questionnaire					
Restraint	.163	1.03	2.37	.019	.16
Eating Concerns	.054	.67	1.19	.234	.08
Shape Concerns	.140	.99	2.11	.036	.14
Weight Concerns	.091	.92	1.48	.142	.10
Eating Disorders Examination Questionnaire-Revised					
Body Dissatisfaction	.073	.10	1.25	.213	.08
Restraint	.221	1.32	2.94	.004	.20
Eating/Body Concerns	.017	.83	.35	.725	.02
Eating Disorders Inventory-3					
Drive for Thinness	.659	4.83	2.05	.041	.14
Body Dissatisfaction	-.031	5.95	-.08	.938	-.01
Bulimia	.332	2.41	2.07	.039	.14
Male Body Attitudes Scale					
Muscularity	.036	.53	1.02	.308	.07
Low Body Fat	.010	.75	.19	.846	.01
Height	-.139	.96	-2.15	.033	-.14
Restraint Scale	-.156	3.50	-.66	.511	-.04
Three Factor Eating Questionnaire					
Cognitive Restraint	.156	4.16	.56	.575	.04
Disinhibition	.313	2.40	1.95	.053	.13
Hunger	-.123	2.52	-.73	.467	-.05

Note. N=227. Significance tests were two-tailed. Cohen's *d* was calculated as $t/\sqrt{(N)}$.

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Table A53. Retest Correlations for Established Eating Pathology Measures in Phase III Undergraduates

Scale	*r*
Body Shape Questionnaire	.76
Dutch Eating Behavior Questionnaire	
Restrained Eating	.72
External Eating	.67
Emotional Eating	.79
Eating Disorders Examination Questionnaire	
Restraint	.61
Eating Concern	.73
Shape Concern	.76
Weight Concern	.79
Total Score	.77
Eating Disorders Examination Questionnaire – Revised	
Body Dissatisfaction	.78
Restraint	.66
Eating/Body Concerns	.65
Eating Disorder Inventory-3	
Drive for Thinness	.76
Bulimia	.79
Body Dissatisfaction	.79
Male Body Attitudes Scale	
Muscularity	.80
Low Body Fat	.78
Height	.76
Restraint Scale	.81
Three Factor Eating Questionnaire	
Cognitive Restraint	.65
Disinhibition	.76
Hunger	.73

Note. N=227. Correlations are all significant at p<.001.

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APPENDIX B

HOMOGENEOUS ITEM COMPOSITES (HICs)

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HOMOGENEOUS ITEM COMPOSITES

HICS 1-6 represent various facets of binge eating as defined in the DSM-IV as uncontrollable eating of large amounts of food within a relatively short period of time.

1. Eating Large amount of Food in Discrete Period of Time
2. Subjective Feeling of Loss of Control Over Eating Episode
3. Eating large amounts of food when not physically hungry
4. Eating much more rapidly than normal
5. Eating alone because of being embarrassed by how much one is eating
6. Mindless eating

HICS 7-11 represent a pathological dissatisfaction with some aspect of one's weight, shape, or body composition. This group does not include dissatisfaction with facial features or other aspects of dissatisfaction related to body dysmorphic disorder.

7. Weight Dissatisfaction
8. General Body Shape Dissatisfaction
9. Desire for high muscularity
10. Desire for different proportions
11. Body/Weight Self-Consciousness

HIC 12 is designed to measure global perceived efforts to diet and limit food intake. HIC 13 is designed to measure concrete food intake behaviors.

12. Cognitive Food Restraint
13. Fasting/Dietary Restraint

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HICS 14-16 reflect DSM-IV criteria for anorexia nervosa, including a morbid fear of becoming fat or gaining weight and a refusal to maintain a minimally acceptable body weight for one's height. In addition, based on a review of pro-anorexia websites, items that reflect disgust with overweight or obese people (HIC 14) and a preference (both self and other) for extreme thinness (HIC 15) have been added.

14. Fear of Fatness
15. Disgust of Overweight/Intense Fear of Gaining Weight
16. Obsession with Slimness/Refusal to Maintain "Normal" Body Weight

HICS 17 and 18 reflect DSM-IV inappropriate compensatory behaviors and dietary supplement use that are designed to change one's body weight or body composition.

17. Purging Behavior/Supplement Use/Recurrent Inappropriate Compensatory Behavior
18. Excessive Exercise

HIC 19 is designed to measure satiety (i.e., an individual's ability to feel full/hungry) and is thought to be important in the development and maintenance of obesity.

19. Satiety

HIC 20 reflects obsessive food rituals that frequently result from extreme dietary restriction, as well as behaviors that are performed in an attempt to decrease anxiety about weight gain.

20. Food/Weight Rituals

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APPENDIX C

ITEM POOLS

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PHASE I ITEM POOL

1. I ate a very large amount of food in a short period of time (e.g., within 2 hours)
2. I stuffed myself with food to the point of feeling sick
3. People would have been surprised if they knew how much I ate in one sitting
4. I ate until I was uncomfortably full
5. I ate large amounts of food
6. I ate a lot more than people who are my same sex and height
7. I had a lot of trouble controlling what I ate
8. I felt that I could not control the amount of food I ate
9. Once I started eating, I had trouble stopping
10. If someone offered me food, I felt that I could not resist eating it
11. I could not stop snacking throughout the day
12. I was not able to resist eating second helpings at meals
13. I had trouble keeping away from certain foods
14. I ate when I was not hungry
15. I had a strong urge to eat after seeing a commercial about food
16. If food tasted good, I ate a lot more of it than I should have
17. I ate because other people around me were eating, even though I was not hungry
18. I felt I needed to finish everything on my plate
19. I ate a lot when there was nothing else to do
20. I ate much more rapidly than others
21. People told me that I ate really fast
22. I ate so quickly that I barely could taste my food

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23. When I ate with others, I was the first one done eating

24. I made sure to carefully chew each bite of food several times before swallowing

25. Eating felt like a race to me

26. I ate alone because I was embarrassed by how much I was eating

27. I was embarrassed by how much food I ate

28. I hid how much food I ate from others

29. I hid evidence of what I ate (e.g., candy wrappers)

30. I felt like people were judging me because of how much food I was eating

31. I preferred to eat large meals by myself

32. I ate alone so that others would not know how much I was eating

33. I ate without being aware of how much I was eating

34. I ate as if I was on auto-pilot

35. I found myself snacking without thinking about it

36. I snacked throughout the evening without realizing it

37. I ate an entire bag of chips or cookies without realizing it

38. I did not notice how much I ate until after I had finished eating

39. I ate when I was bored

40. I was not satisfied with my weight

41. I wished I could lose five or more pounds

42. I would have been happier if I lost some weight

43. I felt dissatisfied because I could not reach my target weight

44. I thought that my weight was perfect

45. I thought about my weight so much that it interfered with my life

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46. I did not like how my body looked

47. I felt uncomfortable in the clothes I was wearing

48. I thought my body shape was attractive

49. I did not like how clothes fit the shape of my body

50. I wished the shape of my body was different

51. I tried on different outfits, because I did not like how I looked

52. I wished my body was more muscular

53. I would have liked to have less body fat

54. I would have felt more confident if I had greater muscle mass

55. I wished my arms were more muscular

56. I wanted more defined abdominal muscles

57. I wanted a more muscular chest

58. I wished my body was more toned

59. I was not satisfied with the size of my hips

60. I wished I had a smaller waist

61. I did not like the size of my thighs

62. I wanted to be so thin that my thighs would not touch

63. I thought my arms were too fat

64. I thought my shoulders were too narrow

65. I thought my arms were too thin

66. I thought my butt was too big

67. I wished my stomach was flatter

68. Parts of my body seemed disproportionate

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69. I looked at my body in mirrors or windows

70. I was self-conscious about the way my body looked

71. I thought people would reject me because of my weight

72. I thought people were looking at me because of my weight

73. I avoided looking at my body

74. I avoided certain activities because people would see my body

75. I did not participate in certain activities because people would notice my weight

76. I tried to avoid foods with a high fat content

77. I tried to avoid eating between meals

78. I was on a diet

79. I tried to exclude "unhealthy" foods from my diet

80. I thought I should eat less food

81. I thought about food or calories

82. I tried to avoid foods with high calorie content

83. I skipped a meal

84. I counted the calories of foods I ate

85. I ate at a fast food restaurant

86. I ate less than people I was with

87. People told me that I do not eat very much

88. I snacked

89. I went for 8 or more *waking* hours without eating

90. I tried to eat as few calories as I could each day

91. I ate small portions at meals in order to control my weight

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92. I finished the food on my plate

93. I chose a low-calorie snack

94. I was very afraid of gaining weight

95. I was disgusted by the sight of obese people

96. I thought to myself that overweight people are unhappy

97. I felt that overweight people are lazy

98. I thought that obese people lack self-control

99. I felt that overweight people are unattractive

100. I felt like I would never stop gaining weight

101. I was disgusted by the sight of an overweight person wearing tight clothes

102. I would have done anything to keep myself from gaining weight

103. I thought gaining weight would ruin my life

104. I would rather have died than be fat

105. I thought gaining weight would make me very unhappy

106. I motivated myself by looking at pictures of very thin people

107. I wanted to be as thin as possible

108. I thought that being underweight is attractive

109. I was, or wanted to be, underweight

110. I was told that I am too thin

111. I enjoyed reading about weight loss tips

112. I felt that a person can never be too thin

113. I thought about making myself vomit in order to lose weight

114. I made myself vomit in order to lose weight

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115. I thought laxatives are a good way to lose weight

116. I used laxatives in order to lose weight

117. I thought about taking steroids as a way to get more muscular

118. I took weight gainers

119. I thought about taking weight gainers

120. I tried to eat at least 25 grams of protein per meal

121. I tried to eat as many calories as I could each day

122. I used muscle building supplements

123. I considered taking a muscle building supplement

124. I thought about using anti-estrogens to get more muscular

125. I used diet pills

126. I thought about taking a diet pill so that I could lose weight

127. I used protein supplements

128. I used diuretics in order to lose weight

129. I considered taking diuretics to lose weight

130. I took an enema to lose weight

131. I thought about taking an enema to lose weight

132. I followed a liquid diet (e.g., juice fast)

133. I used diet teas or cleansing teas to lose weight

134. I exercised even when I was sick

135. I exercised even though I was very tired

136. I exercised even when I had an injury

137. Other people thought I exercised too much

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138. I felt guilty when I missed a workout or exercise class

139. My exercise schedule interfered with my life

140. Sometimes I lost track of how long I was exercising

141. I exercised for more than 2 hours at a time

142. I got full more easily than most people

143. No matter how much I ate, I never seemed to get full

144. I got full after eating what most people would consider a small amount of food

145. I did not like having a full stomach

146. I had a hard time knowing when I was full

147. I felt satisfied from eating enough after a meal

148. I needed to eat my food in a specific order

149. I chewed each bite of my food a specific number of times

150. I stirred around the food on my plate to avoid eating it

151. I enjoyed cooking for others

152. I weighed myself repeatedly during the day

153. I needed to have the table set in a specific way or I could not eat

154. I did not like it when food touched my lips

155. I cut my food into uniform pieces

156. I stocked up on food even though I didn't plan to eat it

157. I enjoyed collecting and saving recipes

158. I enjoyed looking at pictures of food

159. I recorded the calories of foods I ate

160. I kept a list of foods I ate each day

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PHASE II ITEM POOL

1. I ate a very large amount of food in a short period of time (e.g., within 2 hours)
2. I stuffed myself with food to the point of feeling sick
3. I ate until I was uncomfortably full
4. If someone offered me food, I felt that I could not resist eating it
5. I could not stop snacking throughout the day
6. I was not able to resist eating second helpings at meals
7. I ate when I was not hungry
8. If food tasted good, I ate a lot more of it than I should have
9. I ate because other people around me were eating, even though I was not hungry
10. I ate as if I was on auto-pilot
11. I snacked throughout the evening without realizing it
12. I ate an entire bag of chips or cookies without realizing it
13. I did not notice how much I ate until after I had finished eating
14. I thought that my weight was perfect
15. I did not like how my body looked
16. I did not like how clothes fit the shape of my body
17. I wished the shape of my body was different
18. I tried on different outfits, because I did not like how I looked
19. I would have felt more confident if I had greater muscle mass
20. I wanted more defined muscles
21. I thought my calves were not muscular enough
22. I exercised to achieve maximal vascularity (i.e., larger veins)

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23. I exercised to achieve better muscle separation

24. I measured my muscles

25. I wanted to lift more weight

26. I thought my muscles were too small

27. I was not satisfied with the size of my hips

28. I did not like the size of my thighs

29. I thought my arms were too fat

30. I thought my butt was too big

31. Parts of my body seemed disproportionate

32. I looked at my body in mirrors or windows

33. I was self-conscious about the way my body looked

34. I tried to avoid foods with a high fat content

35. I tried to avoid eating between meals

36. I tried to exclude "unhealthy" foods from my diet

37. I tried to avoid foods with high calorie content

38. I counted the calories of foods I ate

39. I ate less than people I was with

40. People would be surprised if they knew how little I ate

41. People encouraged me to eat more

42. I purposely ate less than those around me

43. I avoided places where there would be tempting food

44. I chewed gum to avoid eating

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45. I drank water to feel full

46. I enjoyed having an empty stomach

47. I could not stand feeling full

48. I intentionally banned specific foods from my diet

49. I followed a strict daily calorie limit

50. I maintained my ideal weight

51. People told me that I do not eat very much

52. I ate small portions at meals in order to control my weight

53. I chose a low-calorie snack

54. I was disgusted by the sight of obese people

55. I felt that overweight people are lazy

56. I thought that obese people lack self-control

57. I felt that overweight people are unattractive

58. I was disgusted by the sight of an overweight person wearing tight clothes

59. I was told that I am too thin

60. I made myself vomit in order to lose weight

61. I thought laxatives are a good way to lose weight

62. I used laxatives in order to lose weight

63. I thought about taking steroids as a way to get more muscular

64. I took weight gainers

65. I thought about taking weight gainers

66. I tried to eat at least 25 grams of protein per meal

67. I tried to eat as many calories as I could each day

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68. I used muscle building supplements

69. I considered taking a muscle building supplement

70. I used diet pills

71. I used protein supplements

72. I used diuretics in order to lose weight

73. I considered taking diuretics to lose weight

74. I used diet teas or cleansing teas to lose weight

75. I exercised even though I was very tired

76. Other people thought I exercised too much

77. I exercised a lot more than most people my age

78. I pushed myself extremely hard when I exercised

79. I engaged in strenuous exercise at least five days per week

80. I exercised to the point of exhaustion

81. I exercised until I burned a specific amount of calories

82. I planned my days around exercising

83. I felt that I needed to exercise nearly every day

84. I skipped two meals in a row

85. I got full more easily than most people

86. I got full after eating what most people would consider a small amount of food

87. I recorded the calories of foods I ate

88. I kept a list of foods I ate each day

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FINAL ITEMS

1. I ate a very large amount of food in a short period of time (e.g., within 2 hours)
2. I stuffed myself with food to the point of feeling sick
3. I ate until I was uncomfortably full
4. If someone offered me food, I felt that I could not resist eating it
5. I ate when I was not hungry
6. I ate because other people around me were eating, even though I was not hungry
7. I ate as if I was on auto-pilot
8. I snacked throughout the evening without realizing it
9. I did not notice how much I ate until after I had finished eating
10. I thought that my weight was perfect
11. I did not like how my body looked
12. I did not like how clothes fit the shape of my body
13. I wished the shape of my body was different
14. I was not satisfied with the size of my hips
15. I did not like the size of my thighs
16. I thought my arms were too fat
17. I thought my butt was too big
18. Parts of my body seemed disproportionate
19. I was self-conscious about the way my body looked
20. People would be surprised if they knew how little I ate
21. People encouraged me to eat more
22. I purposely ate less than those around me

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23. I enjoyed having an empty stomach

24. People told me that I do not eat very much

25. I was disgusted by the sight of obese people

26. I felt that overweight people are lazy

27. I thought that obese people lack self-control

28. I felt that overweight people are unattractive

29. I was disgusted by the sight of an overweight person wearing tight clothes

30. I made myself vomit in order to lose weight*

31. I thought about taking steroids as a way to get more muscular

32. I used muscle building supplements

33. I considered taking a muscle building supplement

34. I used diet pills

35. I used protein supplements

36. I used diuretics in order to lose weight

37. I considered taking diuretics to lose weight

38. I used diet teas or cleansing teas to lose weight

39. Other people thought I exercised too much

40. I exercised a lot more than most people my age

41. I pushed myself extremely hard when I exercised

42. I engaged in strenuous exercise at least five days per week

43. I exercised to the point of exhaustion

44. I planned my days around exercising

45. I felt that I needed to exercise nearly every day

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46. I skipped two meals in a row

47. I got full more easily than most people

48. I got full after eating what most people would consider a small amount of food

*Item not included in scale scores.

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