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EATING BEHAVIORS

Spirituality among young women at risk for eating disorders☆

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Abstract

Objective: This study examined the spiritual and religious (S/R) beliefs and practices of college-age women at high-risk for eating disorders, and the relationship between body image distress, coping, and S/R.
Method: Two hundred fifty-five college-age women with elevated weight and shape concerns, assessed using the Weight/Shape Concerns Scale and the Eating Disorder Examination (EDE), completed surveys about their S/R beliefs and practices.
Results: Women with strong S/R beliefs and practices cope with body dissatisfaction differently than women without strong S/R beliefs. Participants with strong S/R were significantly more likely to pray, meditate, or read religious/spiritual texts to cope with body image distress. Participants without strong beliefs and practices were more likely to cope utilizing distraction. Women with strong beliefs who prayed found it effective.
Discussion: Study participants were heterogenenous in their S/R beliefs and practices. These beliefs and practices may be underutilized resources for coping with body image concerns.
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Increasing evidence suggests that spiritual and religious beliefs and practices have an important impact on both physical and mental health (Hill & Pargement, 2003; Kendler, Liu, Gardner, McCullough, Larson, & Prescott, 2003; Miller & Thoresen, 2003). Data suggest that religion and spirituality may be protective against physical and psychological illness as well as important tools for coping with life stressors (Hill & Pargement, 2003; Miller & Thoresen, 2003). More specifically, spirituality has been shown to increase resilience to depression in individuals suffering from terminal illnesses (Nelson, Rosenfeld, Breitbart, & Galietta, 2002); religiosity has been correlated with improved psychosocial adjustment in cancer patients (Rifkin, Doddi, Karagji, & Pollack, 1999). In addition, spiritual practices, such as mindfulness meditation, have been associated with stress reduction and improved coping among several populations, including chronic pain patients (Astin, 1997), individuals with panic disorder (Kabat-Zinn et al., 1992) and overworked medical students (Shapiro, Schwartz, & Bonner, 1998).

Data suggest that individuals with strong religious and spiritual beliefs and practices may call upon those beliefs and practices in order to cope with distress related to eating problems and body image concerns. Within the field of eating disorders research, mindfulness meditation has been tested with a small group of patients with binge eating disorder (BED) and demonstrated promising results (Kristeller & Hallett, 1999). Utilizing a single group extended baseline design, this study reported that meditation resulted in a reduced number and intensity of binge episodes, improved attitudes toward eating, and reduced co-morbid depression and anxiety (Kristeller & Hallett, 1999). Kristeller and Hallett specifically noted that meditation contributed to an improved ability to be more detached and non-critical toward the self. Dialectical behavior therapy, which includes a core mindfulness-based treatment component, has also demonstrated promising results for the treatment of BED and bulimia nervosa (BN) (Safer, Telch, & Agras, 2001; Telch, Agras, & Linehan, 2001). Improvements in spiritual well-being during treatment for eating disorders have been associated with improved attitudes toward eating, reduced body shape concerns, and improved social functioning in eating disorders patients (Smith, Hardman, Richards, & Fischer, 2003).

To date, no empirical studies have examined the role of spirituality in the lives of college-age women at high risk for eating disorders. Because this may have important implications for both eating disorders prevention and treatment, the present study sought to investigate this phenomenon. The primary aims of the present study were to (1) investigate the spiritual and religious (S/R) beliefs and practices of young women at high risk for eating disorders and (2) to examine the relationship between body image distress, coping, and S/R among these women.

1. Methods

1.1. Participants

Participants were 255 female students enrolled in an Internet-delivered eating disorder prevention study. Participants were recruited from two public and two private west coast universities. Inclusion criteria included having elevated weight/shape concerns as measured by the Killen Weight/Shape Concerns scale (Killen et al., 1994), being a female between the ages of 18 and 30 with the absence of a current eating disorder (ED) diagnosis and/or treatment, and having a body mass index (BMI) between 18–32. Exclusion criteria included severe co-morbid psychopathology, substance abuse/dependence, or active suicidal thought/plans.

1.2. Procedure

Participants gave informed consent and were administered baseline questionnaires and structured interviews as part of the eating disorders prevention program. The study was approved by human subjects committees at each of the participant institutions and by the human subjects committee at Stanford University.

1.3. Measures

1.3.1. Demographics

Students were asked to report their age, year in school, ethnicity, and their parents' highest level of education.

1.3.2. Diagnostic interview

Eating disorder diagnoses and assessment of eating disorder behaviors were made with the Eating Disorder Examination (EDE) (Fairburn & Cooper, 1993), expanded to include an assessment of binge-eating behavior. The EDE is a semi-structured, investigator-based interview that generates operational eating disorder diagnoses based on DSM-IV criteria. The EDE has demonstrated high internal consistency (Cooper et al., 1989), sensitivity to change (Fairburn & Cooper, 1993; Rosen et al., 1990), and interrater reliability (Fairburn & Beglin, 1994; Rosen et al., 1990; Wilson and Smith, 1989).

1.3.3. Height/body weight

Standing height was measured to the nearest millimeter using a portable direct reading stadiometer. Weight was measured to the nearest 0.1 kg using a digital stand-on scale with the students wearing light indoor clothing without shoes or coats.

1.3.4. Eating disorder attitudes

Eating disorder attitudes were assessed using the Eating Disorder Inventory-2 (EDI-2). The EDI-2 (Garner, 1990) is a 91-item questionnaire consisting of 11 subscales that assess specific cognitive and behavioral eating disorder dimensions. The subscales included in the present study include bulimia, drive for thinness, and body dissatisfaction. The original version of the EDI (Garner, Olmsted, & Polivy, 1983) demonstrated good internal consistency, convergent, and discriminant validity. The EDI has been widely used in eating disorders research and has appears to successfully discriminate between subjects with and without eating disorders (Garner et al., 1983).

1.3.5. Weight concerns

Weight concerns were measured using the Weight/Shape Concerns Scale (WCS) (Killen et al., 1994). The WCS is a five item questionnaire that assesses concern about weight and shape, fear of gaining weight, dieting frequency, importance of weight, and feelings of fatness. Scores range from 0 to 100, with higher scores representing greater weight and shape concerns. In a school-based study, the WCS predicted the onset of eating disorders with a sensitivity and specificity of .86 and .63, respectively. Good stability has been reported for this measure at 7-month and one-year intervals (test–retest $r = .71$ and .75, respectively) (Killen et al., 1994; Killen et al., 1996); two prospective studies have supported the predictive validity of this measure (Killen et al., 1994; Killen et al., 1996).

1.3.6. Mood

Mood was assessed using the Center for Epidemiologic Studies Depression scale (CES-D) (Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). This 20-item scale has been shown to have good convergent validity with other depression scales and good reliability (Weissman et al., 1977). A score greater than or equal to 16 is considered to indicate possible depression (Ensel, 1986). The CES-D has been found to have high internal consistency (alpha = .89) and adequate test–retest reliability (Weissman et al., 1977).

1.3.7. Coping strategies

Coping strategies were assessed with the Brief COPE (Carver, 1997). The Brief COPE consists of 14, 2-item scales, each representing an area of conceptual focus. This measure is designed to assess coping strategies participants typically use when facing stressful events. Items are rated on a 4-point scale and ask participants to rate the extent to which they use various coping strategies (from 'I usually don't do that at all' to 'I usually do this a lot'). All internal consistencies met or exceeded .50 (Carver, 1997). The religiosity subscale of this measure was utilized to assess the extent to which participants use religion to cope with stress.

1.3.8. Spiritual and religious beliefs

Spiritual and religious beliefs and practices were assessed using a scale which was developed for the present study. After a review of the literature related to the assessment of spirituality and religion, a 13-item self-report measure assessing the role of S/R beliefs and practices in coping with body image concerns was developed. Items not specific to body image concerns (e.g., religious affiliation, importance of S/R and perceived impact of S/R) were derived from several existing measures of spirituality and religiosity, including the Brief Multidimensional Measure of Religiousness/Spirituality (Fetzer Institute/National Institute of Aging Working Group, 1999), the Revised Age Universal Intrinsic–Extrinsic Scale (Malby, 1999), the Religious Beliefs and Behaviors Scale (Tonigan & Miller, 1992), the Systems of Belief Inventory (Holland et al., 1998), and the Spiritual Involvement and Beliefs Scale (Hatch, Burg, Naberhaus, & Hellmich, 1998). In addition, items specific to the role of spirituality and religion in coping with body dissatisfaction were included; these items were newly developed for this measure. This measure was developed because no existing measures assessed the role of spirituality and religion as they relate to coping with body image concerns.

Participants were asked to agree or disagree with statements related to their S/R beliefs and practices. Participants were then classified into two groups based on their ratings of the importance of spirituality and religion in their lives. Participants who endorsed over half of the following items were considered to have strong spiritual/religious beliefs.

1. Believe in God or other higher power
2. Religious/spiritual beliefs are important
3. Seek out people from religious/spiritual community when help or support is needed
4. Find strength or comfort in faith or religious/spiritual beliefs
5. Rely on higher power or religious/spiritual beliefs to make sense of situations and to decide what to do
6. Attend religious services because of the people who are there

7. Carry over religious beliefs into other dealings in life
8. Regular prayer
9. Regular meditation
10. Regular attendance at religious/spiritual services
11. Regular study of religious/spiritual material

The validity and reliability of the S/R measure were evaluated using Cronbach's alpha. This measure demonstrated excellent reliability (Cronbach's $\alpha = .93$) and convergent validity with the religion subscale of the COPE. Forty-seven percent ($n = 121$) of the students reported strong spiritual/religious beliefs. Participants who had strong spiritual/religious beliefs scored significantly higher on the COPE subscale, $\mu = 2.7$, SD = .89, than those without strong beliefs, $\mu = 1.3$, SD = .41; T (254) = 16.7, $p = .000$.

1.4. Data analysis

The role of S/R beliefs and practices in the lives of women at high risk for eating disorders and the relationship between body image distress, S/R, and coping were investigated using descriptive statistics and analysis of variance (ANOVA). Due to multiple comparisons, alpha was set at .01.

2. Results

2.1. Participants

Two hundred and fifty-five participants completed the spirituality questions. Their average age was 20.7 years (range 18–31) and the average BMI was 23.6 (range 18–31). Sixty percent identified themselves as Caucasian ($n = 153$), 19% ($n = 49$) Asian/Pacific Islander, 9% ($n = 23$) Multiethnic, 7% ($n = 19$) Hispanic, 2% ($n = 4$) African–American, 0.4% ($n = 1$) Native American, and 2% as Other ($n = 6$). Twenty-nine percent ($n = 68$) reported affiliation with a Protestant church, 24% ($n = 58$) with the Roman Catholic Church, 11% ($n = 26$) identified themselves as Jewish, 19% ($n = 45$) identified with non-Western religions, and 17% ($n = 40$) reported being agnostic/atheist.

Religious preference was the only demographic variable that related to the importance of S/R. Protestant and Catholic students (62% and 70% of each, respectively) had the highest percentages of students reporting strong beliefs, followed by students identifying with non-Western religions (49%) and Judaism (45%). Athiests/agnostics had significantly lower rates of strong belief (12%), F (4,232) = 15.7, $p = .000$. There were no significant relationships between strong S/R beliefs/practices and age, BMI, eating disorder psychopathology or depression.

Strategies utilized by participants to cope with body image concerns differed significantly based on the importance of S/R to them (see Table 1). Participants who reported strong S/R beliefs/practices were significantly more likely to read religious works (T(206) = 7.3, $p = .000$), pray (T(206) = 9.3, $p = .000$) and meditate (T(206) = 3.8 $p = .007$) than participants without strong S/R beliefs/practices. Participants with strong S/R beliefs/practices were significantly less likely to use distraction to cope with body image distress (T(206) = 2.7, $p = .007$) and reported prayer to

Table 1
Frequency and effectiveness of strategies used

	Frequency of use*			Effectiveness of strategy**		
	No strong beliefs	Strong beliefs		No strong beliefs	Strong beliefs	
Distract yourself	3.44(1.3)	3.0(1.2)	T(206)=2.7, $p=.007$	2.4(.9)	2.2(.8)	
Exercise	3.7(1.3)	4.1(1.2)	T(205)=2.1, $p=.036$	3.0(.8)	3.1(.9)	
Study	2.7(1.2)	2.9(1.2)		2.1(.9)	2.1(.8)	
Talk with a friend	3.1(1.3)	3.4(1.3)		2.4(.7)	2.6(.0)	
Talk with a significant other	2.7(1.6)	1.9(1.2)		2.7(1.1)	2.6(.9)	
Talk with parents/family	2.4(1.3)	2.6(1.3)		2.3(.9)	2.5(.9)	
Read something enjoyable or encouraging	2.7(1.1)	1.9(1.3)		2.3(.9)	2.4(.9)	
Read religious scriptures/spiritual text	1.1(.4)	2.0(1.3)	T(206)=7.3, $p=.000$	1.5(1.0)	2.4(1.0)	
Watch TV	2.6(1.2)	2.8(1.4)		2.0(.9)	2.0(.9)	
Pray	1.1(.3)	2.3(1.3)	T(206)=9.3, $p=.000$	1.0(0)	2.5(1.0)	T(43)=3.0, $p=.004$
Meditate	1.2(.7)	1.7(1.1)	T(206)=3.8, $p=.007$	2(1.2)	2.4(1.1)	
Do something fun	3.4(1.1)	3.6(1.1)		2.8(.8)	2.7(.8)	
Shop	2.7(1.4)	2.8(1.4)		2.2(.9)	2.2(.9)	
Surf the internet	3.2(1.2)	3.2(1.4)		2.0(.8)	2.1(.9)	
Focus on other things that you like about yourself	2.8(1.1)	1.8(1.4)		2.6(.8)	2.4(1.0)	

* Frequency ratings: 1=never, 2=rarely, 3=sometimes, 4=often, 5=usually, 6=always.
** Effectiveness ratings: 0=didn't use, 1=not at all effective, 2=somewhat effective, 3=moderately effective, 4=very effective.

be an effective strategy for dealing with dissatisfaction with weight and shape (T(43)=3.0, $p=.004$).

3. Discusssion

The purpose of the present study was to investigate the role of S/R beliefs and practices in the lives of young women experiencing body image distress and to examine the role of these beliefs and practices in coping with body dissatisfaction. Evidence from this study suggests that young women with strong S/R beliefs and practices cope with dissatisfaction with weight and shape differently than women who do not report strong S/R beliefs. Specifically, women with strong S/R beliefs and practices draw upon these resources when experiencing body image distress.

Although all of the individuals in the present study reported high weight and shape concerns, they were heterogeneous with respect to the importance of S/R in their lives. More than half of the participants (53%) reported that S/R beliefs and practices were not important to them. No significant relationships between the strength of S/R and age, BMI, eating disorder psychopathology, or depression were detected. Religious preference was the only demographic variable related to strength of S/R, with Protestant and Roman Catholic participants being more likely to report having strong spiritual and religious beliefs and practices than other participants. Nearly half of the participants affiliating with non-Western religions and Judaism reported having strong S/R beliefs and practices.

The most striking findings of the present study relate to the disparate strategies for coping with body image distress reported by the two groups. Participants who rated S/R as important were significantly more likely to call upon their S/R beliefs and practices to cope with negative feelings about their bodies than the other participants. Specifically, participants with strong S/R were significantly more likely to pray, meditate, or read religious/spiritual texts to cope with body image distress. Participants without strong S/R beliefs and practices were more likely to use distraction to cope with body dissatisfaction. The implications of these findings remain unclear. Future research should seek to replicate these findings and, if replicated, to investigate potential mechanisms of action.

With respect to the effectiveness of the coping strategies utilized by the participants when experiencing body image distress, participants with strong S/R beliefs and practices reported that prayer was significantly more effective for coping with their distress than other participants. Both groups reported that exercise was the most effective strategy for coping with body image distress. Compared to other coping strategies utilized by women with high weight and shape concerns, exercise may provide short-term but immediate and problem-specific relief from body dissatisfaction. Although exercise was reported to be more effective than other coping strategies (such as talking to friends, doing homework, watching television) it was reported to be only moderately so, with participants continuing to show evidence of chronic weight and shape concerns.

At present, the study of S/R as it relates to health outcomes remains in its nascent stages. More normative data regarding S/R are needed for young women both with and without elevated body image concerns. Nevertheless, the results of the present study are strengthened by excellent convergent validity between the S/R scale that was developed for the purpose of this study and the COPE religion subscale.

Although the present study suggests that S/R may not be integral to the lives of many college-age women experiencing body image distress, those women for whom S/R is important appear to find prayer somewhat effective for coping with body dissatisfaction. Spiritual and religious beliefs and practices may thus be an underutilized resource for young women experiencing body image distress. In particular, the use of S/R beliefs and practices could potentially moderate the outcome of eating disorders prevention and treatment efforts.

Future work should seek to elaborate the distinction between spiritual and religious practices in controlled settings. Collaboration with investigators from other disciplines may provide an opportunity to develop a better understanding of the potential roles of spirituality and religion in the prevention and treatment of eating and other health-related disorders and may be the crucial next step to enhancing the efficacy of these efforts.

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EATING BEHAVIORS

Worry and eating disorders: A psychopathological association

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Abstract

Worry is a mental process associated with anxiety disorders. The key feature of worry is the predominance of a negative-type and preoccupied thought about possible threatening future events.
Objective: Some studies have shown that worry may be a feature of eating disorders. This study aims to measure whether worry is significantly higher in eating disordered individuals than in a normal control group and whether worry is associated with the Eating Disorders Inventory.
Methods: Sixty-three individuals affected by an eating disorder (34 anorexics and 29 bulimics) completed the Penn State Worry Questionnaire, the Structured Clinical Interview for DSM, and the Eating Disorder Inventory. Thirty normal controls completed the Penn State Worry Questionnaire.
Results: Penn State Worry Questionnaire scores were significantly higher in eating disordered individuals than in controls. It was associated with all the symptoms of eating disorders and was correlated with all the EDI subscales, except for the subscale 'bulimia'. These findings suggest that worry is important for understanding the psychopathology of eating disorders.
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Keywords: Worry; Bulimia; Anorexia; Eating disorders

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Worry is a mental process widely studied in cognitive research as a main feature of anxiety (Borkovec, Ray, & Stöber, 1998) and it is the central feature of generalized anxiety disorder as defined by DSM-IV (APA, 1994). The key feature of worry is the predominance of negative thoughts, that means that worrying people think a lot about possible negative events they are afraid of (Borkovec, 1994). Both worriers and anxiety disordered people have much richer predictive networks of negative and even catastrophic events than nonworriers and nonanxious people (Vasey & Borkovec, 1992).

To our knowledge, there is not a large body of research devoted to the association between worry and eating disorders (ED). There are only four studies that investigated the relationship between worry and ED. Wadden, Brown, Foster, and Linowitz (1991) investigated different kinds of worry in nonclinical adolescents and found that girls showed higher worry levels about weight and food than boys. Kerkhof et al. (2000) administered the Penn State Worry Questionnaire to ED subjects and control people and found higher scores in the clinical sample. Scattolon and Nicky (1995) found that food consumption in a nonclinical sample of chronic dieters was triggered by social-evaluative/school-related worry. Sassaroli and Ruggiero (2005) found that in a stress situation worry is related to the Eating Disorders Inventory's subscales in nonclinical subjects. In addition, there are two studies regarding rumination in ED. The term 'rumination' indicates a variant of worry present in depression and in other mood disorders, and has been studied mostly by Nolen-Hoeksema (2000). Rumination is related to past negative events, while worry is a preoccupation with future negative events. According to Troop and Treasure (1997), the onset of bulimia is associated with rumination in response to life events. Hart and Chiovari (1998) have shown that dieters show significant more rumination about eating and food than nondieters.

All these studies suggest that worry is present and may play a role in ED. Also the DSM supports this viewpoint. In fact, in DSM-IV, the fear of fatness criterion of anorexia nervosa refers to that: 'even though underweight, the anorexic individual is intensely afraid of gaining weight or of becoming fat' and a criterion of bulimia nervosa in DSM-IV refers to that: 'The self-evaluation of bulimic subjects is excessively influenced by their body shape and weight'. These DSM definitions suggest that fear of fatness in anorexic individuals and body dissatisfaction in bulimic individuals may be worries about possible future negative events, such as gaining weight and becoming fat. Plausibly, the abovementioned DSM criteria of anorexia and bulimia nervosa suggest that ED subjects worry and think a lot about weight, fat, and body shape because they predict and fear a long chain of negative consequences related to such factors. These negative consequences would affect interpersonal problems, sense of self-efficacy, and fear of being blamed or disparaged by parents, peers, etc. In short, ED subjects may worry like anxiety disordered subjects.

The hypotheses of the study are that ED subjects worry more than control people and that worry is associated with ED symptoms. Given such hypothesis, the aim of the study is to evaluate and compare the amount of worry in an ED sample and in a control group, and to evaluate the correlation between worry and ED symptoms.

1. Methods

1.1. Participants

1.1.1. ED group

Sixty-three females affected by an ED (average age=23.06, S.D.=4.54) were recruited in two ED units: the ED unit of "San Paolo" Hospital, Milano, Italy (directed by Dr. Sara Bertelli) and the ED

unit of "San Gerardo" Hospital, Monza, Italy (directed by Dr. Luigi Zappa). Criteria for inclusion in the study were: DSM-IV diagnosis of one of the two abovementioned disorders and a minimum age of 17 years. Sixteen participants out of 63 were diagnosed with anorexia nervosa restricting type, 18 out of 63 were diagnosed with anorexia bingeing/purging type, and 29 out of 63 were diagnosed with bulimia.

1.1.2. Control group

Thirty females (average age=26.32 years, S.D.=4.27) were recruited among the population of students of the "Studi Cognitivi" Cognitive Psychotherapy School (Milano, San Benedetto del Tronto and Bolzano, Italy).

1.2. Measures

1.2.1. Measures of ED

The diagnoses of ED and the assessment of each symptom were implemented using the Structured Clinical Interview for DSM (SCID, Spitzer, Williams, Gibbon, & First, 1992; Italian version by Fava, Guaraldi, Mazzi, & Rigatelli, 1993).

The Eating Disorders Inventory (EDI) (Garner & Olmsted, 1984) is a 64-item, broad range, self-report questionnaire designed to assess the cognitive and behavioral dimensions of anorexia and bulimia nervosa. The EDI provides eight subscales scores indicating: (1) drive for thinness, (2) bulimia, (3) body dissatisfaction, (4) ineffectiveness, (5) perfectionism, (6) interpersonal distrust, (7) interoceptive awareness, and (8) maturity fears. In this study, Cronbach's α's of the EDI ranged from .84 to .79.

1.2.2. Measures of worry

Worry levels were assessed using the Penn State Worry Questionnaire (Meyer, Miller, Metzger, & Borkovec, 1990). PSWQ is a 16-item self-reported questionnaire. The total score of PSWQ is a reliable and widely accepted measure of the worry tendencies. The reliability, validity, and factor structure of PSWQ have been demonstrated in both clinical and nonclinical samples (Meyer et al., 1990). In this study, Cronbach's α's of the PSWQ were .84 in anorexics, .87 in bulimics, and .81 in normal controls.

1.3. Procedures

All participants were carefully informed about the procedures and aims of the study. Further, they were informed that all collected data would have been strictly confidential. All of them agreed to participate and signed an informed consent form. Parental permission was requested for subjects who were younger than 18 years old. Participants filled out the questionnaires in a undisturbed environment and they were given an appropriate amount of time to fill the forms.

The ED sample completed the SCID, the EDI, and the PSWQ, while the control group completed only the PSWQ.

Descriptive statistics were implemented to measure the average scores of PSWQ in ED sample and in the control group. *T*-Test was carried out to measure the significance of the difference of average PSWQ scores between the ED sample and the control group. A blockwise linear regression between the Penn

Table 1
Significant differences of the amount of worry between ED and controls

	N of valid cases	*M*	S.D.
PSWQ in anorexic subjects	34	46.06	28.78
PSWQ in bulimic subjects	29	45.79	26.61
PSWQ in controls	30	22.40	7.97

T-Test between anorexic subjects and controls: $t=4.536$, $p>.000$.
T-Test between bulimic subjects and controls: $t=4.541$, $p>.000$.

State Worry Questionnaire and the symptoms of ED was conducted to assess whether worry was associated with the presence of ED symptoms. Pearson's bivariate correlations were carried out to measure the correlation between PSWQ and EDI variables.

2. Results

Table 1 reports the average worry levels in anorexic, bulimic, and control individuals as measured by PSWQ. Worry levels were significantly higher (see Table 1 for *T*-Test values) in the two ED groups with respect to controls.

Table 2 reports the significant association between worry and presence of ED symptoms as measured by linear regression. Worry appears always associated with all the ED symptoms.

Table 3 reports Pearson's bivariate correlations between PSWQ and EDI variables. All the EDI subscales, except for 'bulimia', showed significant correlations with PSWQ.

Table 2
Blockwise linear regression between Penn State Worry Questionnaire and symptoms of ED

Symptoms of eating disorders	*N* of valid cases	R^2	β	F	Two-tailed sig.
Underweight (*anorexics and controls*)	64	.237	−.487	18.93	.000***
Psychological symptoms: body image disturbance, fear, or fatness and dependency of self-esteem on weight (*all subjects*)	93	.145	−.381	15.25	.000***
Loss of menstruation (*anorexics and controls*)	64	.237	−.487	18.93	.000***
Bingeing (*anorexics bingeing/purging type, bulimics, and controls*)	77	.150	−.388	13.25	.000***
Vomiting (*anorexics bingeing/purging type, bulimics, and controls*)	77	.154	−.392	13.61	.000***
Laxatives (*anorexics bingeing/purging type, bulimics, and controls*)	77	.131	−.363	11.35	.003**
Physical exercise (*all subjects*)	93	.062	−.249	5.93	.017*

* Correlation is significant at level .05 (2-code).
** Correlation is significant at level .01 (2-code).
*** Correlation is significant at level .001 (2-code).

3. Discussion

To our knowledge, this is one of the first studies that investigate the association between worry levels and eating disorders and the first one that has clearly shown the strength of such association. In fact, Sassaroli and Ruggiero (2005), Scattolon and Nicky (1995), and Wadden et al. (1991) studied the relation between worry and ED in nonclinical subjects. Actually, only Kerkhof et al. (2000) studied worry in ED subjects.

Basically, our study supports and extends the findings by Kerkhof et al.: worry is significantly higher in ED subjects than in a control group and is clearly associated with the ED symptomatology. This association was found for each of the symptoms of ED as measured by the SCID (see Table 2). On the other hand, the EDI (see Table 3) did not completely replicate these associations. In fact, worry is related to 'drive for thinness' and 'body dissatisfaction', but not to 'bulimia'. Therefore, the study suggests that pervasive worry is related to ED symptoms but the EDI suggests that this may be not totally true at least for some aspects of bulimic symptomatology. A possible explanation for the different results from SCID and EDI assessments of symptoms may be that the former is based on clinical judgment, whereas the latter is based on patient self-report. Could the patients themselves erroneously evaluate of even conceal their bulimic behaviors? Or could they pay more attention on weight and body image than on bingeing and purging?

Given the association between worry and ED, what is the role played by worry? Is worry a psychological factor underlying ED symptoms or, alternatively, is worry only a side effect of catastrophic cognitive beliefs that underlie the origin and the maintenance of ED? It may be that worry influences the etiology and the pathogenesis of ED by the same mechanism identified in generalized anxiety disorder by Vasey and Borkovec (1992)? Actually, there is a feature of worry that is crucial for understanding its role in psychopathology. This feature is that worry is predominantly verbal and abstract, as opposed to visual imagery and concrete thought (Borkovec & Inz, 1990). Verbal thought about emotional material elicits much less cardiovascular response then does visual imagery (Vrana, Cuthbert, & Lang, 1986). The verbal system is relatively isolated from emotions, giving the human mind a capability to inhibit spontaneous reactions and to plan complex responses. Subsequently, people tend to use verbalization as a strategy for gaining emotional self-control.

However, worrying people do not plan complex responses to overwhelming events, but tend to repeat to themselves that "things will get worse". In other words, worry is a fallacious strategy to solve

Table 3
Blockwise linear regression between Penn State Worry Questionnaire and Eating Disorders Inventory

EDI variables	*N* of valid cases	R^2	β	F	Two-tailed sig.
Drive for thinness (*all ED subjects*)	62	.065	.254	4.144	.046*
Bulimia (*anorexics bingeing/purging type and bulimics*)	47	.057	−.239	2.737	.105
Body dissatisfaction (*all ED subjects*)	62	.559	.748	76.13	.000***
Ineffectiveness (*all ED subjects*)	62	.990	.995	6250.05	.000***
Perfectionism (*all ED subjects*)	62	.405	.637	40.91	.000***
Interpersonal distrust (*all ED subjects*)	62	.774	.880	205.27	.000***
Interoceptive awareness (*all ED subjects*)	62	.265	.515	21.66	.000***
Maturity fear (*all ED subjects*)	62	.154	.392	10.91	.002**

* Correlation is significant at level .05 (2-code).
** Correlation is significant at level .01 (2-code).
*** Correlation is significant at level .001 (2-code).

problems and difficulties. In fact, in figuring out strategies to overcome negative events people need to use not only verbal and abstract thought but also they must use visual imagery (Schönpflug, 1989). However, visual imagery is difficult to manage, because it stimulates negative emotions and somatic anxiety. Thus, people affected by an intolerance of negative emotions, like anxiety disordered subjects, tend to use worry to suppress cardiovascular and somatic features of anxiety (Gray, 1982; Mathews, 1990; Smith, 1984). Thus, worry is similar to a sort of cognitive avoidance strategy. Given the association between worry and ED and the tendency of ED subjects to avoid negative emotions, it is plausible that this mechanism is also present in ED subjects.

Thus, in ED, a pervasive worry may stimulate people to restrict their attention on weight, food, and fat. Such elements may be the starting points of a typical web of worries, threatening predictions, and negative thoughts, regarding interpersonal relations, self-esteem, future, etc. In line with this idea, fear of fatness could be a typical negative and worrying thought. Becoming fat may lead people to have negative thoughts about the future. ED subjects would be terrified by these issues, and may think that worrying about eating, food, and fat is a good tactic to control eating and weight. In addition, Vasey and Borkovec (1992) suggest that worry may be also a sort of relief, a distraction from more emotionally laden topics. In the case of ED, worry about food may be a distraction from more terrifying preoccupations regarding self-esteem and interpersonal relations.

The study of worry may clarify other psychological dimensions of ED, like perfectionism and low self-esteem. The similarities between worry and these two psychopathological dimensions are supported by the correlation between the PSWQ and the EDI subscales ‘perfectionism’ and ‘ineffectiveness’ (Table 3). Worry may be a product of the interplay between a perfectionistic personality and the insurgence of low self-esteem in a stress situation (Sassaroli & Ruggiero, 2005). Perfectionistic subjects spend a lot of their time intensively worrying about their fear of failure and the worry levels tend to increase during a stressful situation (Borkovec et al., 1998).

The correlation between worry and the EDI subscales ‘interpersonal distrust’ and ‘maturity fears’ of EDI suggests that these two topics are also objects of worry (Table 3). Actually, from a clinical viewpoint, it is plausible that fearful thoughts regarding adulthood and feelings of distrust towards other people occupy the mind of ED subjects in the form of a repetitive worry. The association between the ‘interoceptive awareness’ (Table 3) subscale and worry suggests that also the feelings of confusion about emotions, hunger, and satiety experienced by ED subjects can be present in the form of worry, plausibly to manage and suppress more confusing, intrusive and painful emotional states.

In conclusion, this study confirms the association between pathological worry and ED. However, the study does not investigate what is the exact role played by worry in ED.

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EATING BEHAVIORS

Negative emotion and disordered eating among obese college students

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Abstract

The present study examined the relationship between negative emotions, body dissatisfaction, exercise, and disordered eating attitudes and behaviors among obese college students. It also examined whether there were gender differences in these variables. A total of 88 males and 102 females, who reported a BMI score above 30, completed a survey. Females reported higher levels of disordered eating, body dissatisfaction, and more frequent dieting than males and as predicted, males reported higher levels of exercise behaviors. Body dissatisfaction, anger discomfort, and self dissatisfaction all correlated with drive for thinness for both genders. Anger discomfort was the only variable to predict disordered eating for both genders. The results support numerous studies that have found that females are at greater risk of disordered eating than males, and also suggest that anger management may be an important component in treatment of disordered eating among obese young adults.
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Keywords: Obesity; Anger; Self dissatisfaction; Gender differences

Obesity has been linked to a number of health risks and rates have increased during the past decade (Devlin,Yanovski, & Wilson, 2000). While most obese people are psychologically well adjusted, binge

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eating disorder (BED) has been diagnosed in between 20%–30% of obese adults seeking treatment (Devlin, Walsh, Spitzer, & Hasin, 1992). Obese individuals diagnosed with BED also are more likely to suffer from other psychological problems including depression (Fassino, Leombruni, Piero, Abbate-Dage, & Rovera, 2003). Disordered eating behaviors commonly begin during childhood or early adolescence and are often associated with body dissatisfaction (Isnard et al., 2003). In a study among obese children and adolescents in treatment, Decaluwe, Braet, and Fairburn (2002) found that more than one third reported binge eating behavior, which was related to body shape concerns. Body dissatisfaction was also associated with disordered eating among obese women (Wardle, Waller, & Rapoort, 2001). Ackard, Neumark-Sztainer, Story, and Perry (2003) found that adolescents who overate were more likely to be dissatisfied with their bodies, employ dieting strategies, and be obese than non-bingers. Frequent dieting was related to overeating among both males and females. Children with high BMI levels were more likely to be dissatisfied with their bodies and report weight loss behaviors than normal weight children (McCabe & Ricciardelli, 2003). These findings suggest that body dissatisfaction, dieting, and binge eating are possible risk factors in obesity among a variety of age groups.

Numerous studies have found that men are more satisfied with their bodies than women (Demarest & Allen, 2000; Sondhaus, Kurtz, & Strube, 2001). This has also been supported among overweight people, as Cachelin, Striegel-Moore and Elder (1998) found that female dieters were more dissatisfied with their body than male dieters. Gender differences have also been found concerning body perception and risk of eating disorders. Lofton and Bungum (2001) found that female college students often falsely perceived themselves as overweight, while many male students falsely perceived themselves as underweight. Perception of being overweight was associated with disordered eating among females, however, excessive exercise was associated with the perception of being underweight among males (Tata, Fox, & Cooper, 2001). Thus, body dissatisfaction has been linked to excessive exercise among males and dieting among females, which supports previous studies that have found that women are at a higher risk for eating disorders than men (Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002; Tata, Fox, & Cooper, 2001).

Emotion has been found to be associated with disordered eating among obese individuals, especially those diagnosed with Binge Eating Disorder (BED; Pinaquy, Chabrol, Simon, Louvet, & Barbe, 2003). One study among obese women reported that meals eaten during emotional states were larger than meals during neutral states (Patel & Schlundt, 2001). Longitudinal data also support the relationship between emotion and weight, as hostility during young adulthood was associated with obesity in middle age (Siegel et al., 2003). The impact of gender on emotional eating has produced conflicting results. In a study examining gender differences in disordered eating, women were more likely to report eating in response to emotions such as anger or anxiety than males (Tanofsky, Wilfley, Spurrell, Welch, & Brownell, 1997). However, another study found that although anger and depression were associated with binge eating among obese males, women were more likely to report binging in response to dieting failures (Costanzo, Musante, Friedman, Kern, & Tomlinson, 1999).

Several theories have been suggested to explain the link between negative emotions and disordered eating. For example Mueller, Grunbaum, and Labarthe (2001) suggest a "biosocial" model to explain the relationship between negative emotions and body fat. The authors found that hostile individuals reported high levels of caloric consumption and interpersonal conflict, and low levels of exercise and social support, and suggest that these individuals may find more comfort in food than in other social or physical activities. According to feminist theory, disordered eating may be due to the feminine

socialization process that encourages women to suppress their anger, and overeating may be the displacement of anger onto the body (Zaitsoff, Geller, & Srikameswaran, 2002). The psychosomatic theory has been supported by Pinaquy et al. (2003), as they found a link between alexithymia and emotional eating among obese women with BED. The authors suggest that BED women have difficulty identifying and expressing their emotions, and possibly act on their feelings by overeating. Further support of the psychosomatic theory was observed as negative emotions were related to higher hunger levels, as well as an increased tendency to eat in order to cope with the emotions (Macht & Simons, 2000). Personality type may also be a factor in disordered eating as obese female patients with BED reported higher anger levels and more traits of Borderline personality than non-BED obese patients (Fassino et al., 2003). In a second study the authors found that BED patients had more impulsive temperaments, as well as a tendency to externally express anger, while anorectics tended to avoid emotional confrontation and internalize anger (Fassino, Daga, Piero, Leombruni, & Rovera, 2001). The above findings suggest that biological, personality and social factors may be important variables in the explanation of the impact of negative emotion on disordered eating.

One purpose of the present study is to examine whether there are gender differences in risk of eating disorders among a sample of obese college students. We predict that females would report higher levels of disordered eating, dieting, and body dissatisfaction than males, and males will report higher levels of exercise behavior. We will also examine the associations between negative emotions and disordered eating. We predict that anger discomfort and self loathing will be associated with symptoms of disordered eating for both genders. Finally we will examine the associations between BMI and body dissatisfaction and disordered eating.

1. Method

1.1. Participants

The participants included a total of 88 male and 102 female college students, who were selected from a larger sample of more than 1900 students, based on a BMI>=30, the established cutoff score for obesity. Students were attending college in Missouri, Hawaii, Guam, and California. The sample included the following ethnic groups: 28% Caucasian, 22% African American, 19% Pacific Islander, 16% Asian, 7% multiple ethnicity, and 8% other ethnicity. The mean age for males was 23.68 (SD=7.55) and females 26.34 (SD=9.18). All students volunteered to participate in the study and received extra credit for participating. The questionnaire took approximately 15 min to complete and the responses were anonymous.

1.2. Procedure

The following instruments were included in a questionnaire administered to the participants: *The Anger Discomfort Scale* (ANGDIS): This instrument measures the level of discomfort an individual feels toward his or her expression of anger (Sharkin & Gelso, 1991). The scale was found to correlate with levels of anger suppression and trait anxiety, and have satisfactory levels of reliability and validity. The three of the sub-scales of the Anger Discomfort Scale used in this study include: Intra-anger (e.g. “I am troubled at my anger”), Inter-anger (e.g. “I feel guilty about being angry at others”), and Emotional-anger

(e.g. "I am embarrassed when I get angry"). The mean score of the sum of the items of these three sub-scales were combined to form a single anger discomfort measure.

The *Self Loathing Sub-Scale* (SLSS): The SLSS is a four item sub-scale of the Exercise Orientation Questionnaire (Yates, Edman, Crago, Crowell, & Zimmerman, 1999). The EOQ consists of 6 factors including exercise identity, self control, weight loss, competition, exercise orientation and self loathing. The alpha value for EOQ was .92 and concurrent validity was established as EOQ scores correlate with measures of exercise intensity, regularity and investment. The SLSS measures self dissatisfaction as it relates to the body and exercise performance. This sub-scale has been found to be a valid indicator of those at risk for eating disorders, as SLSS scores were higher among individuals diagnosed with eating disorders and a clinically obese group than a control group (Yates, Edman, Crago, & Crowell, 2001) and athletes with symptoms of eating disorders reported higher SLSS scores than athletes reporting no symptoms (Yates, Edman, & Crowell, 2003).

Figure Drawings: This measure consisted of nine figure drawings ranging from a very slender figure (value=1) to a very large figure (value=9; Stunkard, Sorenson, & Schlusinger, 1983). Participants were asked to indicate the following: 1) which figure they resemble, and 2) which figure they would most prefer. Body dissatisfaction scores were computed based on the absolute value of the "resembled figure" score minus the "preferred figure" score. The discrepancy score of the figure drawings has been found to be a reliable and valid measure of body dissatisfaction among females, as well an appropriate measure of a "fatness–thinness" component of body dissatisfaction among males (Thompson & Altabe, 1991; Williams, Gleaves, Cepeda-Benito, Erath, & Cororve, 2001).

Eating Disorder Inventory-2 (EDI-2; Garner, 1991): In addition to the above measures, a subset of 55 males and 72 females also completed the Drive for Thinness (DT) and the Interoceptive Awareness (IA) sub-scales of the EDI-2. The DT sub-scale measures the preoccupation with weight and concerns with dieting. According to Garner, the Drive for Thinness scale (DT) measures the core symptoms of anorexia and bulimia pathology, and DT scores above 14 are considered in the pathological range. DT has been found to have high test–retest reliability, as well as satisfactory concurrent and construct validity (Garner, 1991). The IA sub-scale measures difficulty in identifying and expressing emotion and hunger, and is highly correlated with somatization, depression, and anxiety (Garner, 1991).

The following measures of exercise behaviors and attitudes were also included: 1) a measure of "exercise regularity" (1=rarely to 3=regularly), 2) a measure of "exercise investment" (1=couldn't care less to 10=totally invested), 3) a measure of "exercise intensity" (1=mild to 3=strenuous), and 4) an open ended question concerning the number of hours/ week of exercise. An additional question addressed frequency of dieting (1=never to 4=almost always). Participants also reported their ethnicity, height, weight, and gender.

2. Results

The first hypothesis, that predicted that females would report higher risk of disordered eating than males, was supported. Several *t*-tests were conducted and females reported higher levels of Drive for Thinness ($t(124)=3.72$; $p<.01$), Interoceptive Awareness ($t(122)=2.00$; $p<.05$), body dissatisfaction ($t(184)=4.65$; $p<.001$), self dissatisfaction ($t(187)=3.00$; $p<.01$) and dieting ($t(188)=3.09$; $p<.01$) than males (See Table 1). A total of 14% ($n=10$) of females and 1% ($n=1$) male reported DT scores above the cutoff score of ≥ 14. Ninety-eight percent of females preferred a smaller figure and 2% were

Table 1
Gender comparisons of mean scores for drive for thinness, interoceptive awareness, body dissatisfaction, self dissatisfaction, BMI, anger discomfort and exercise

Variable	Males	Females
	Mean (SD)	Mean (SD)
Drive for thinness	3.30 (3.93)	6.65 (5.70)**
Interoceptive awareness	2.30 (3.40)	3.79 (4.60)*
Self dissatisfaction	12.31 (3.86)	13.99 (3.79)**
Body dissatisfaction	1.55 (1.09)	2.29 (1.06)**
BMI	33.57 (3.99)	35.27 (4.50)
Anger discomfort	2.05 (.59)	2.07 (.63)
Dieting	1.79 (.75)	2.14 (.77)**
Exercise investment	6.17 (2.17)	4.80 (1.71)**
Exercise intensity	2.11 (.65)	1.66 (.57)**
Exercise regularity	2.29 (.71)	1.93 (.58)**
Hours exercise	6.31 (5.21)	3.85 (4.79)**

*$p<.05$; **$p<.01$.
SD=standard deviation.

satisfied with their present body shape. Eighty-one percent of males preferred a smaller figure, 14% were satisfied with their body, and 5% preferred a larger body.

The hypothesis that males would report higher levels of exercise than females was also supported. Male scores on all exercise variable were higher than females, with *t*-test values as follows: investment ($t(185)=4.83$; $p<.001$), intensity ($t(182)=5.10$; $p<.001$), regularity ($t(188)=3.86$; $p<.001$) and hours of exercise ($t(175)=5.10$; $p<.001$). Mean scores on these variables are reported in Table 1.

In order to examine which variables correlated with disordered eating, bivariate correlation analyses were conducted separately for each gender (See Table 2). Self dissatisfaction ($r=.47$), anger discomfort ($r=.48$). body dissatisfaction ($r=.32$) and dieting levels ($r=.38$) were positively related

Table 2
Correlation analyses of drive for thinness (DT) and interoceptive awareness (IA) with measures of BMI, self dissatisfaction, anger discomfort, body dissatisfaction, dieting and exercise variables by gender

	DT		IA	
	Males	Females	Males	Females
1. BMI	.26	.10	.29*	.09
2. Self dissatisfaction	.47**	.63**	.30*	.40**
3. Anger discomfort	.48**	.40**	.40**	.49**
4. Body dissatisfaction	.32*	.41**	.26	.32**
5. Dieting	.38**	.27*	.15	.22
6. Exercise investment	−.05	−.08	−.09	.01
7. Exercise intensity	−.35*	−.04	−.33	.01
8. Exercise regularity	.14	−.15	−.06	−.10
9. Hours exercised	−.06	−.22	−.11	.01

*$p<.05$; **$p<.01$.

Table 3
Summary of the regression analyses for the variables predicting drive for thinness and interoceptive awareness among males and females

Significant predictor variables	B	SE	Beta
Males			
Drive for thinness			
Anger discomfort	2.45	.83	.350
Dieting	1.59	.64	.301
Interoceptive awareness			
Anger discomfort	1.89	.84	.31
Females			
Drive for thinness			
Self dissatisfaction	.79	.180	.512
Anger discomfort	1.84	.922	.199
Interoceptive awareness			
Anger discomfort	1.89	.84	.31

to DT, while exercise intensity ($r=-.35$) was negatively correlated with DT among males. Among females, self dissatisfaction ($r=.63$), anger discomfort ($r=.40$), body dissatisfaction ($r=.41$) and dieting levels ($r=.27$) were associated with DT. Correlation values for IA were significant for self dissatisfaction ($r=.40$), anger discomfort ($r=.49$) , and body dissatisfaction ($r=.32$) among females. Among males, IA correlated with self dissatisfaction ($r=.30$), anger discomfort ($r=.40$), BMI ($r=.29$), and exercise intensity ($r=-33$). As shown above, these correlations, especially those of anger discomfort and self loathing with drive for thinness, are quite high for both genders.

Simultaneous multiple regression analyses were conducted to determine which variables, among BMI, body dissatisfaction, anger discomfort, dieting, and self dissatisfaction, best predicted DT and IA for each gender. As shown in Table 3, anger discomfort and dieting were significant predictor variables of DT and accounted for 46% of the variance among males. Self dissatisfaction and anger discomfort were significant predictors of DT among females and accounted for 47% of the variance. Anger discomfort was the only predictor of IA among males accounting for 28% of the variance and among females accounting for 36% of the variance.

3. Discussion

As predicted, obese females reported higher levels of disordered eating than males, as measured by the Drive for Thinness and Interoceptive Awareness scores. Women also reported higher body dissatisfaction, self dissatisfaction, and dieting frequency than men, even though there were no gender differences in BMI. More women scored within the pathological range of the DT scale than males, also supporting women's higher risk for eating disorders. Nearly all women preferred a smaller figure, while almost 20% of the men were either satisfied or preferred a larger figure, even though they were categorized as obese. These findings are consistent with past studies that have found females are at higher risk of eating disorders than males (Lewinsohn et al., 2002; Tata et al., 2001).

The present data support previous findings that males exercise more than females, as males reported higher scores on all four measures of exercise (Woods, Mutrie, Scott, & Simpson, 2002). Interestingly, there was a negative association between drive for thinness and exercise intensity among males. This suggests that males who exercise more intensely are less likely to desire a thinner body, supporting past studies that have found males often exercise to increase body size and gain muscle (McCabe & Ricciardelli, 2003; Tata et al., 2001). None of the exercise variables were associated with disordered eating among females.

It is important to note, however, that while males reported higher levels of exercise, females reported higher self dissatisfaction scores. Self dissatisfaction was measured by the SLSS, which is a sub-scale of the Exercise Orientation Scale. SLSS measures a sense of anger and frustration toward the self and body in relationship to exercise, as represented by items such as "I disliked my body before I began to exercise" and "I hate my body when it won't do what I want." A recent study found that SLSS was the only sub-scale of the Exercise Orientation Questionnaire in which both obese and eating disorder clinical groups scored higher than a control group of college students (Yates et al., 2001). The higher female SLSS scores suggest that obese women may have a more negative perception of their bodies in relationship to exercise than obese males. More research needs to be conducted to further explore the underlying construct of SLSS, as it was the best predictor of drive for thinness among women. It is possible that SLSS may be an indicator of perfectionism in relationship to the body's athletic performance, and perfectionism has been found to be associated with disordered eating (Pratt, Telch, Labouvie, Wilson, & Agras, 2001). Thus, while figure drawings measure body dissatisfaction, SLSS taps into internal constructs such as whether the body performs up to the self expectation.

While gender differences were found in the scores of many of the variables, there were gender similarities as to what factors were associated with disordered eating. Anger discomfort was the only variable to predict both IA and DT among both genders. The relationship between anger and disordered eating concurs with previous research that found eating behaviors among obese were highly influenced by emotions (Canetti, Bachar, & Berry, 2002). This relationship between anger discomfort and disordered eating, especially the strong correlation with IA, supports the psychosomatic theory of disordered eating (Fassino et al., 2001; Pinaquy et al., 2003). Although females reported higher levels of disordered eating than males, there were no gender differences in anger discomfort and equally strong correlations between anger and disordered eating among both genders. Thus, the impact of negative emotion on disordered eating may not be the result of the feminine socialization process as previously suggested (Zaitsoff et al., 2002). The present findings do support the suggestion of Fassino et al. (2003) that anger management should be a focus in treatment of obese patients with disordered eating, as therapy that encouraged the expression of negative emotions was found to reduce certain disordered eating symptoms among bulimic women (Agras, Walsh, Fairburn, Wilson, & Kraemer, 2000).

Body dissatisfaction and self dissatisfaction were associated with disordered eating among both genders. In contrast to other studies (Cachelin, Veisel, Barzegarnazari, & Striegel-Moore, 2000; Thomas, James, & Bachmann, 2002), there was no relationship between BMI and symptoms of eating disorders for either gender. These findings suggest that psychological variables that relate to anger and body perception may be more important risk factors of eating disorders than actual body size, at least among obese men and women. It is important to note that negative emotion, as measured by SLSS and anger discomfort, were significant predictors of drive for thinness among females while dieting was not. It is possible that dieting has become so normal among females, that it, in of itself, is not associated with greater ED risk.

There are many limitations to this study. The data are based on self report responses, and individuals may not always be honest or accurate in their responses. The sample consists of only college students, therefore, the results may not generalize to an older population. We also have no measure of socioeconomic status, and findings suggest that SES is related to obesity (Everson, Maty, Lynch, & Kaplan, 2002; Johnson, Cohen, Kasen, & Brook, 2002). While this study examined anger discomfort, additional research should be conducted that include measures of state or trait anger. Finally, the study is cross-sectional and cannot determine how anger discomfort impacts eating behaviors overtime.

The present findings suggest that obese females are at higher risk for eating disorders than males, as demonstrated by higher drive for thinness, interoceptive awareness, self dissatisfaction, body dissatisfaction, and dieting scores. However, there were gender similarities in the relationship of negative emotions and disordered eating as anger discomfort was the only variable to predict disordered eating for both genders. The findings also suggest that the negative emotion measures of anger and self dissatisfaction, in contrast to actual physical size, are important variables in explaining disordered eating among obese young adults. Finally, the results support previous findings that suggest that anger management may be an important component in treating disordered eating among obese young adults of both genders.

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EATING BEHAVIORS

Mediators of the association between abuse and disordered eating in undergraduate men

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Abstract

The vast majority of ED research has focused on women. However, recent studies have suggested that ED symptomatology in men may be underestimated. Additional investigations are needed to better understand EDs and their correlates among men. This study examined the relationships between childhood abuse experiences and disordered eating in male undergraduates. In addition, potential mediators and moderators of the association between abuse and disordered eating were evaluated. Results indicated that physical abuse and physical neglect were the only adverse childhood experiences associated with disordered eating. In addition, depression mediated the associations between these forms of abuse and ED symptomatology. However, neither anxiety nor alexithymia were significant mediators of the association between abuse and EDs. Social support moderated the association between physical neglect and depression, such that individuals with high social support were less depressed than those with low social support, regardless of their level of physical neglect. These results are somewhat different than those found in exclusively female samples, highlighting the importance of specifically examining EDs and their correlates among men.
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The vast majority of research on eating disorders (EDs) has focused on women. Although men are far less likely than women to be diagnosed with anorexia nervosa or bulimia nervosa, some researchers have suggested that the low rates of EDs among men are due, in part, to lack of knowledge about the existence of these disorders in males (Schneider & Agras, 1987; Siegel, Hardoff, Golden, & Shenker, 1995). Of note, a recent study found that, among males, rates of inpatient ED treatment increased significantly between 1984 and 1996 (Braun, Sunday, Huang, & Halmi, 1999), and epidemiological evidence suggests that rates of problematic eating behavior among men may be higher than previously thought (e.g., Hay, 1998; Woodside et al., 2001). Further, the severity and chronicity of ED symptomatology appears to be comparable across genders (Eliot & Baker, 2001). Given the significant medical and psychological consequences of EDs (Becker, Grinspoon, Klibanski, & Herzog, 1999; Garvin & Striegel-Moore, 2001; Kashubeck-West & Mintz, 2001), it is important to increase our understanding of factors that may play a role in the development and maintenance of these disorders in men.

Several factors associated with EDs in women have been identified in previous research. In particular, abuse has been found to be a non-specific risk factor for EDs among both women and men (Jacobi, de Zwaan, Kraemer, & Agras 2004; Kent, Waller, & Dagnan, 1999; Olivardia, Pope, Mangweth, & Hudson, 1995; Striegel-Moore, Dohm, Pike, Wilfley, & Fairburn, 2002). However, the direct relationship between abuse and EDs is somewhat weak (Kinzl, Mangweth, Traweger, & Biebl, 1997). Childhood sexual abuse (CSA) is the most commonly studied form of abuse, yet evidence suggests that childhood emotional (CEA) and physical (CPA) abuse are also important in the etiology of EDs (Kent et al.,1999; Kinzl et al., 1997; Olivardia et al., 1995; Striegel-Moore et al., 2002). However, the association of various types of abuse with EDs remains unclear.

Further, the importance of considering mediators of the association between abuse and EDs has been highlighted in studies (using exclusively female participants) conducted by Kent et al. (1999) and Mazzeo and Espelage (2002). Mazzeo and Espelage (2002) found that alexithymia and depression were significant mediators of the abuse and ED relationship. Additionally, Kent et al. (1999) found that the abuse and ED association was mediated by anxiety and dissociation.

This study extends Mazzeo and Espelage's (2002) research by examining the associations among depression, alexithymia, and abuse in men. We also investigated the potential role of anxiety as a mediator of the association between abuse and EDs. Finally, we evaluated the moderating effects of social support, a variable which appears to protect individuals from developing EDs in response to stressful life events (e.g., Crago, Shisslak, & Ruble, 2002; Perkins, Luster, & Jank, 2002; Stice, Presnell, & Spangler, 2002). This study thus follows the suggestion of Mussell, Binford, and Fulkerson (2000), who argued that advances in understanding of the etiology of EDs have been limited by the fact that hypothesized risk factors are often studied individually, rather than in more complex, multiple variable contexts.

1. Methods

1.1. Participants

Participants were 168 undergraduate male volunteers from Psychology classes at a large southeastern university. In addition to the measures described below, participants completed a demographic

questionnaire. They represented the following ethnic/racial groups: 54.2% Caucasian, 26.2% African-American, 10.7% Asian-American/Asian, and 3.6% Latino/Hispanic; 4.2% reported that they belonged to another ethnic or racial group, and 1.2% did not report their ethnicity. With respect to year in school, 63.8% were first-year students, 23.8% were second-year students, 8.8% were third-year students, 2.5% were fourth-year students, and 1.2% were in their fifth year or beyond. Participants' mean age was 19.7 (SD=3.3). Their mean height was 70.6 in. (SD=2.9); mean weight was 174.1 lb (SD=21.2) Participants' self-report of their height and weight was used to calculate body mass index (BMI=weight in kilograms/height in square meters). Results of a meta-analysis indicated that self-report is a valid method of assessing weight in nonclinical samples (Bowman & DeLucia, 1993). BMI ranged from 16.5 to 53.1; mean BMI was 24.5 (SD=4.8).

1.2. Measures

1.2.1. Childhood Trauma Questionnaire (CTQ)

Abuse history was measured by the CTQ (Bernstein et al., 1994), a 28-item, self-report measure that assesses a range of traumatic childhood experiences. The CTQ was designed to describe childhood trauma in an objective manner; therefore terms such as "abuse" are kept to a minimum (Bernstein et al., 1994). The measure's psychometric properties have been evaluated in diverse groups, including samples of nonclinical undergraduates (Bernstein & Fink, 1998).

The 28-item CTQ (Berstein et al., 1994) is composed of six subscales: Emotional Abuse, Physical Abuse, Sexual Abuse, Emotional Neglect, Physical Neglect, and Minimization/Denial. The Minimization/Denial subscale was designed to identify individuals with a tendency to respond in a socially desirable manner. In an undergraduate sample, internal consistency estimates (alpha) were .60 for Physical Neglect, .72 for Sexual Abuse, .78 for Physical Abuse, .89 for Emotional Abuse, and .92 for Emotional Neglect (Bernstein & Fink, 1998). In another sample, test–retest coefficients (obtained at a mean interval of 3.6 months) for the abuse subscales ranged from .79 (Physical Neglect) to .81 (Emotional Neglect and Sexual Abuse).

Previous investigations of the factorial validity of the CTQ using confirmatory factor analyses (Bernstein & Fink, 1998; Mazzeo & Espelage, 2002) have supported its five factor structure. The CTQ was significantly correlated with the Childhood Trauma Interview (Bernstein et al., 1994), providing evidence of the measure's convergent validity. In addition, in an undergraduate sample, scores on the abuse subscales were only modestly associated with a measure of social desirability (Bernstein & Fink, 1998). In the current study, internal consistency estimates (coefficient alpha) for the CTQ subscales were: .66 for Physical Neglect, .77 for Physical Abuse, .84 for Emotional Abuse, .86 for Emotional Neglect, and .96 for Sexual Abuse.

1.2.2. Toronto Alexithymia Scale (TAS-20)

Alexithymia was measured by the TAS-20 (Bagby, Parker, & Taylor, 1994; Bagby, Taylor, & Parker, 1994), a 20-item, self-report measure. Factor analyses have supported the measure's internal consistency, stability, and construct validity (Bagby, Parker et al., 1994; Bagby, Taylor et al., 1994). In addition, the TAS-20 exhibited discriminant validity (Bagby, Taylor, et al., 1994). Specifically, TAS-20 scores were negatively correlated with measures of psychological mindedness and openness to experience, and uncorrelated with agreeableness and conscientiousness. In the current study, coefficient alpha for the total 20-item scale was .81.

1.2.3. Center for Epidemiological Studies Depression Scale (CES-D)

The CES-D (Radloff, 1977) is a 20-item scale designed to measure depressive symptomatology in the general population. Higher scores indicate more severe depressive symptoms. Previous research has found that the CES-D yields internally consistent scores (e.g., Mazzeo & Espelage, 2002; Radloff, 1977). It has also been found to discriminate effectively between depressed and non-depressed individuals (e.g., Radloff, 1977). In addition, the CES-D was found to be a better predictor of depressive symptoms than the Beck Depression Inventory in a college sample (Santor, Zuroff, Ramsay, Cervantes, & Palacios, 1995). In the current study, the CES-D yielded internally consistent scores (alpha=.89).

1.2.4. State–Trait Anxiety Inventory (STAI)

The STAI is a self-report measure of state and trait anxiety. For the purposes of this study, only scores on the state subscale were analyzed. This measure yielded internally consistent scores in a sample of male college students (Cronbach's alpha=.91, Spielberger, Gorsuch, Lushene, Vagg, & Jacobs 1983). Additionally, concurrent, convergent, divergent, and construct validity of the STAI were demonstrated by its developers (Spielberger et al., 1983). In the current study, Cronbach's alpha was .92.

1.2.5. Perceived Social Support Scale

The PSS is a self-report measure which assesses social support from both friends (PSS-FR) and family (PSS-FA, Procidano & Heller, 1983). Both subscales yielded internally consistent scores in a sample of undergraduates (Procidano & Heller, 1983). Further, the test developers demonstrated construct validity for both subscales. Additionally, Lyons, Perrotta, and Hancher-Kvam (1988) found support for the construct and criterion-related validity of the measure in three samples. In the current study, Cronbach's alphas for the PSS-FR and PSS-FA were .85 and .90, respectively.

1.2.6. Bulimia Test—Revised (BULIT—R)

Disordered eating was assessed via the BULIT—R, a 28-item self-report measure of bulimic behaviors (Thelen, Farmer, Wonderlich, & Smith, 1991). The BULIT—R's developers (Thelen et al., 1991) have noted that this measure is a particularly useful and cost-effective means of investigating the frequency of bulimic behaviors in nonclinical populations, where the relative prevalence of the disorder is low. Thelen et al. (1991) found that the 2-month test–retest reliability of the measure was .95. Furthermore, a significant difference was found between scores of participants with bulimia and non-eating disordered participants (Thelen et al., 1991). Subsequent research has provided additional evidence of the reliability and validity of BULIT—R scores (e.g., Thelen, Mintz, & Vander Wal, 1996; Welch, Thompson, & Hall, 1993). In the current study, coefficient alpha for the BULIT—R was .90.

1.3. Procedure

Participants' consent was obtained via a form approved by the university's Office of Research Subjects Protection. They were told that the purpose of the study was to examine the associations between emotions and health behaviors. Measures were presented in a randomized sequence to control for order effects.

2. Results

2.1. Descriptive statistics

Means, standard deviations, and correlations of all measures used in this study are presented in Table 1.

Prior to testing the main hypotheses of the study, we examined the prevalence of childhood abuse in our sample. Although the CTQ is scored on a 5-point scale and these polytomous scores were used in all analyses, the number of participants endorsing at least one item on each CTQ subscale was calculated in order to evaluate the frequency of each abuse type. Emotional neglect was the most common type of childhood abuse experience; 79.2% of the sample endorsed at least one item on this subscale (79.2%). Emotional abuse was the second most frequently endorsed type, with 72.0% of respondents endorsing at least one of the experiences included on this subscale. Rates of physical abuse and neglect were also relatively high (67.9% and 59.5%, respectively). In contrast, only 7.1% of participants reported experiencing childhood sexual abuse; this rate is consistent with rates of sexual abuse reported among men in previous large-scale studies (Holmes & Slap, 1998). Participants' mean score on the Minimization/Denial subscale was .42 (SD = .82). This value is comparable to that obtained in the undergraduate sample utilized in the validation of the CTQ (Bernstein & Fink, 1998), and suggests that, in the current study, CTQ responses were not unduly influenced by social desirability.

2.2. Regression analyses

2.2.1. Abuse and disordered eating

The relative contributions of each abuse type to ED symptomatology were evaluated via simultaneous multiple regression. When all abuse types were entered, they accounted for significant variance in the BULIT—R ($R^2 = .15$, $p < .05$); however, only physical neglect contributed unique variance to the model ($\beta = .31$, $p < .05$).

Table 1
Means, standard deviations, and correlations for the total sample

Measure	1	2	3	4	5	6	7	8	9
1. STAI—state	–	.42**	.50**	.21**	.13	.18*	.18*	.08	.30**
2. TAS		–	.41**	.20*	.03	.14	.15*	.22**	.33**
3. CES-D			–	.25**	.34**	.29**	.28**	.30**	.42**
4. Emotional abuse				–	.59**	.29**	.67**	.43**	.16*
5. Physical abuse					–	.33**	.46**	.47**	.26**
6. Sexual abuse						–	.19*	.22**	.19*
7. Emotional neglect							–	.52**	.16*
8. Physical neglect								–	.35**
9. BULIT—R									–
Mean	35.10	47.51	15.86	7.98	7.25	5.44	9.18	7.10	45.34
SD	10.52	10.47	9.98	3.50	3.04	2.33	3.90	2.66	13.82

Note. STAI=State–Trait Anxiety Inventory; TAS-20=Toronto Alexithymia Scale-20; CES-D=Center for Epidemiological Studies Depression Scale; BULIT—R= Bulimia Test—Revised.

* $p < .05$.

** $p < .01$.

2.2.2. Does depression mediate the association between abuse and disordered eating in men?

Next we investigated whether the association between abuse and disordered eating was mediated by depression, using the method outlined by Baron and Kenny (1986), which specifies that four conditions must be present to establish mediation. Because of the large number of statistical tests conducted via this series of regressions, a conservative alpha level of .01 was used in all of the subsequent analyses assessing mediation to control for Type I error.

The associations between each type of abuse and depression were significant (all $ps < .01$, see Table 1), thereby meeting the first condition. However, only physical abuse and physical neglect were significantly associated with the BULIT—R (as can be seen in Table 1, $ps < .01$). Thus, only these abuse types met the second condition and were included in further testing.

Next, Baron and Kenny's third and fourth conditions were tested via simultaneous regressions in which abuse type (physical neglect and physical abuse) and CES-D scores were independent variables and the BULIT—R was the dependent variable. Results indicated that depression did mediate the association between physical abuse and BULIT—R. Specifically, the relationship between physical abuse and the BULIT—R, which was significant when depression was not included in the equation ($\beta = .26$, $t = 3.42$, $p < .01$), became nonsignificant when depression was included as a mediator ($\beta = .14$, $t = 1.82$, $p > .05$). Sobel's (1982) test was also conducted to examine the significance of this mediating effect, and results indicated that this mediator was robust (Sobel's test $= 3.35$, $p < .01$).

Similar results were obtained for the association between physical neglect and BULIT—R scores. Specifically, when depression was included in the final regression, the association between physical neglect and the BULIT—R decreased from $\beta = .35$ ($t = 4.72$, $p < .01$) to $\beta = .24$ ($t = 3.26$, $p < .01$). Although the relationship between physical neglect and the BULIT—R remained significant when the mediating role of depression was taken into account, Sobel's (1982) test indicated that the mediating effect was robust (Sobel's test $= 3.07$, $p < .01$).

2.2.3. Does alexithymia mediate the association between abuse and disordered eating in men?

Next we examined the role of alexithymia as a mediator of the association between abuse and EDs. As noted above, only physical abuse and physical neglect were associated strongly enough with BULIT—R scores to meet Baron and Kenny's (1986) criteria. However, the relationship between physical abuse and alexithymia was nonsignificant (see Table 1), thus, alexithymia did not mediate the association between physical abuse and disordered eating.

In contrast, physical neglect was significantly associated with alexithymia (see Table 1). However, alexithymia did not appear to mediate fully the association between physical neglect and disordered eating. Specifically, when alexithymia was included in the regression, the association between physical neglect and the BULIT—R decreased from $\beta = .35$ ($t = 4.72$, $p < .01$) to $\beta = .29$ ($t = 4.00$, $p < .01$). Sobel's (1982) test indicated that the mediating effect was nonsignificant (Sobel's test $= 2.31$, $p > .01$).

2.2.4. Does anxiety mediate the association between abuse and disordered eating in men?

As noted above, only physical abuse and physical neglect met Baron and Kenny's (1986) criteria for testing mediators of the association between abuse/neglect and eating disorders. However, neither physical abuse nor physical neglect were significantly associated with state anxiety ($ps > .01$); thus no further analyses of the mediating role of anxiety were conducted.

2.2.5. Does social support moderate the association between abuse and depression?

As the results reviewed above suggest, depression appears to be a relatively strong mediator of the association between childhood abuse experiences and disordered eating. Consequently, we were interested in investigating whether the influence of abuse on depression was moderated by social support received from friends and family. Following Aiken and West's (1991) recommendations, both the main effects and the interaction term were centered by creating deviation scores to reduce multicollinearity effects. The independent variables (the five CTQ subscales) and the moderator (social support) were centered prior to the analyses. In each hierarchical multiple regression, the main effects (i.e., abuse type, PSS-Friends and PSS-Family) were entered in the first step, and the interaction (i.e., product) terms were entered in a second step.

Results indicated that only the interaction of physical neglect and PSS-Friends was significant ($\beta = -.13$, $p < .05$). To interpret this interaction, regression lines were plotted for high, mean, and low values of PSS-Friends. Participants with low physical neglect scores were less distressed than those with high physical neglect scores, regardless of their level of social support from friends. However, participants with high physical neglect were less likely to be distressed if they also manifested high social support from friends. Participants who reported both high physical neglect and low social support from friends were the most distressed overall.

3. Discussion

These results add to the literature by assessing EDs and a range of associated psychological symptoms in men, as well as mediating and moderating relationships among these variables. Furthermore, these findings underscore the need for inclusion of men in studies of disordered eating. Although men and women suffering from EDs evidence similar symptomatology (e.g., Eliot & Baker, 2001), correlates of ED behaviors in men may differ. In the current study, only physical abuse and physical neglect were significantly associated with ED symptomatology. These results are consistent with the research of Kinzl et al. (1997), which found only CPA to be related to ED symptoms in a sample of men. However, current results differ from those found in exclusively female samples, such as that of Kent et al. (1999), which suggested that emotional abuse was particularly relevant to EDs in women. In addition, the current results highlight the importance of assessing a range of childhood abuse experiences. Previous studies have not evaluated the importance of childhood physical neglect, which emerged as the most significant correlate of ED behavior in this sample.

Furthermore, depression was the only significant mediator of the associations between physical abuse and ED symptoms and physical neglect and ED symptoms. This is consistent with Mazzeo and Espelage's (2002) study of women in which depression was a strong mediator of the effects of abuse on disordered eating. However, results of that investigation found that alexithymia also mediated the relationship, which was not demonstrated in the current study. Previous research, conducted in female samples, supports the role of anxiety as a mediator as well (e.g., Kent et al., 1999), but, again, our findings did not support this relationship. It is possible that, while anxiety, alexithymia, and depression contribute to the etiology of disordered eating in women, only depression is a salient factor in the development of EDs among men. However, the discrepancy between the current findings and the results of previous investigations may also be attributable to methodological differences. For example, Mazzeo and Espelage (2002) used structural equation modeling (SEM) to evaluate the mediating roles of

depression and alexithymia. Because of the smaller sample used in the current study, SEM was not an appropriate statistical strategy. Thus, additional research needs to be conducted to replicate and extend the current findings.

Our findings regarding the moderating role of social support were also consistent with extant literature. In our study, men with high peer social support manifested less depression than men with low levels of peer social support, regardless of the amount of childhood physical neglect reported. Interestingly, social support from family members did not provide an equivalent buffering effect. This result is consistent with that found in Stice et al.'s (2002) study of adolescent females, and suggests that peer support can be an important buffer across genders.

Several limitations of the current study must be noted. First, data are exclusively self-report, which can be limited by response biases and participants' inability to accurately remember their experiences and behaviors. However, scores on the Minimization/Denial subscale of the CTQ, a measure of social desirability, suggested that participants honestly reported their experiences. Secondly, the sample was comprised entirely of undergraduate students; therefore, results may not generalize well to older, more educationally diverse individuals. Further, future research should assess a broader spectrum of ED symptoms, particularly binge eating, as preliminary findings suggest that BED prevalence rates are comparable among men and women (e.g., Tanofsky, Wilfley, Spurrell, Welch, & Brownell, 1997). These results also need to be replicated in a sample of men with clinical EDs, as the overall prevalence of ED symptomatology was low in the current study. Finally, future research should further investigate EDs among men of diverse ethnic backgrounds.

In addition, although internal consistency for the physical neglect subscale of the CTQ was fairly low in this study, previous research suggests that this subscale has good test–retest reliability (Bernstein & Fink, 1998; Mazzeo & Espelage, 2002). In Mazzeo and Espelage's (2002) study, the physical neglect subscale demonstrated convergent validity with the emotional neglect subscale of the CTQ. As noted in the measures section, these researchers, as well as the test developers (Bernstein et al., 1994) demonstrated the CTQ's factorial validity via confirmatory factor analysis. Thus, this measure has been found to yield both stable and valid scores.

Finally, due to the cross sectional nature of the study, causation cannot be inferred, and the mediated and moderated relationships must be interpreted with caution. Hopefully, these results will stimulate future longitudinal research, which is needed to clarify causal risk factors that could be targeted in prevention programs (Kazdin, Kraemer, Kessler, Kupfer, & Offord, 1997; Kraemer et al., 1997).

This study also has several strengths, including a relatively large male sample. Moreover, research has suggested that ED onset occurs later in men than in women (Braun et al., 1999). Thus, investigation of EDs and their correlates in undergraduates may be especially apt. Additionally, a range of abuse types was assessed, using a standardized, validated measure.

In sum, our findings provide support for relationships among childhood physical abuse and neglect and ED symptomatology in men. Further, they suggest that this relationship is mediated by depression, and that social support can buffer the effects of abuse.

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EATING BEHAVIORS

Ethnic and gender differences in eating attitudes among black and white college students

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Abstract

This study examines ethnic and gender differences in eating attitudes and behaviors among college students. Participants were 225 Black and 199 White students sampled from a historically Black university. White participants were more dissatisfied with their bodies, engaged in more self-loathing, and dieted more than Blacks. Similarly, women were more dissatisfied with their bodies, engaged in more self-loathing, dieted more, and showed a greater drive for thinness than men. White women and Blacks of either gender exhibited similar predictors of drive for thinness with each group showing some combination of dieting and self-loathing. Intrapersonal anger predicted drive for thinness in White men, adding to a growing body of research suggesting a link between anger and eating disorders. Results support a substantial body of literature showing that Black and White college students differ on their views of body image and eating. Future research should explore the role of anger as a risk factor for eating disorders among White men.
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Keywords: Ethnicity; Gender eating attitudes; Eating behaviors

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1. Introduction

White women traditionally have been thought to be more prone to eating disorders than Black women. This conclusion has been largely based on research showing that, in comparison to White women, Black women report greater body mass (Chandler & Abood, 1997; DiGioacchino, Sargeant, & Topping, 2001; Pike, Dohm, Striegel-Moore, Wilfley, & Fairburn, 2001; Yates, Edman, & Aruguete, 2004), greater body satisfaction (Harris, Walters, & Waschull, 1991; Parker et al., 1995; Rucker & Cash, 1992), and less concern over dieting and body shape (Abrams, Allen, & Gray, 1993; Henriques, Calhoun, & Cann, 1996). However, several authors have recently challenged the assumption that Black women are protected from eating disturbances (Caldwell, Brownell, & Wilfley, 1997; O'Neill, 2003; Rand & Kuldau, 1992; Smolak & Striegel-Moore, 2001). Recently, researchers have compiled case reports of eating disorders in U.S. minority groups and have demonstrated that minorities with eating disturbances may show a different pattern of symptoms and risk factors than those documented for the White population on whom diagnostic standards have been based (Crago, Shisslak, & Estes, 1996; Smolak & Striegel-Moore, 2001). The present study explores the prevalence of eating disturbances and risk factors among Black and White college students.

Cross-cultural research has suggested the possibility that eating disturbances manifest differently among Black and White people. For example, ethnic differences are more likely to appear for restrictive diagnoses (i.e., anorexia nervosa) but become less likely for disorders of excessive consumption (e.g., binge eating). O'Neill (2003) meta-analyzed 18 studies (N=26,271) that sampled Black and White female student and community populations. She found that Black women have a slightly lower incidence of eating disturbances than White women. However, in comparing various measures, O'Neill (2003) found greater ethnic differences in symptoms involving eating restriction. By contrast, she found no significant ethnic differences in rates of bulimia or binge eating. Other studies have shown that although Black females were more satisfied with their bodies, they may also be more likely to purge after overeating than White females (leGrange, Stone, & Brownell, 1998; Story, French, Resnick, & Blum, 1995). These results indicate that the expression of eating disturbances varies between Whites and Blacks with Whites showing a greater tendency to restrict food intake.

If there are ethnic differences in the expression of eating disorders, one might predict that the associated risk factors would differ for Blacks and Whites. Research examining international cultural differences has shown that some patients with anorexia nervosa do not show the risk factor of drive for thinness, leading some to suggest that the fear of fat may be a culture-bound dimension of anorexia (Ramacciotti et al., 2002; Rieger, Topuyz, Swain, & Beumont, 2001). Smolak and Striegel-Moore (2001) suggest that the same cultural variation may exist between Blacks and Whites in the United States. Research on clinical samples indicates that Blacks and Whites show different risk profiles. For example, Black women with binge eating disorder are heavier and show less concern for body size and eating than White women with the disorder (Pike et al., 2001). In non-clinical populations, several studies have found that Blacks have lower rates of body dissatisfaction and weight concern (see Crago et al., 1996 for a review), risk factors typically associated with eating disorders. However, Abood and Chandler (1997) showed that dissatisfaction with one's weight and body shape predicted eating disordered symptoms in both Black and White college students. Similarly, Akan and Grilo (1995) reported that problematic eating attitudes in Black and White college students

could be predicted by low self-esteem and high public self-consciousness. Thus, mixed findings have characterized the research on risk patterns for eating disorders in Black and White participants. Clinicians and researchers (Arriaza & Mann, 2001; Smolak & Striegel-Moore, 2001; Striegel-Moore, Dohm, Pike, Wilfley, & Fairburn, 2002) have recently called for a clarification of the risk factors for various ethnic groups for the practical reasons of recognizing and treating eating disorders in minorities.

Few studies have explored risk factors for eating disturbances among Black and White men, perhaps due to the findings that men rarely report pathological eating attitudes and behaviors (Chandler, Abood, Lee, Cleveland, & Daly, 1994; Gray, Ford, & Kelley, 1987; Pyle et al., 1983). However, available research indicates that the differences between Black and White men may parallel those among Black and White women. For example, White men and boys are more likely to consider themselves overweight (DiGioacchino et al., 2001; Gray et al., 1987; Rand & Kuldau, 1990), and show less satisfaction with their bodies (Neumark-Sztainer et al., 2002; Smith, Thompson, Raczynski, & Hilner, 1999) than Black men and boys.

The present study examines the major predictors of eating disordered attitudes in Black and White college students from a small historically Black university. The hypotheses were as follows: (1) Blacks would show higher body mass indices (BMI) than Whites; (2) Whites would show greater eating disordered attitudes and behaviors (body dissatisfaction, self-loathing, dieting, and drive for thinness) than Blacks; (3) Women would show greater eating disordered attitudes and behaviors than men; and (4) Different risk factors would be significantly related to the tendency toward eating disturbances for Black men, White men, Black women, and White women.

2. Method

2.1. Participants

Participants ($N=475$, 37% male and 63% female; mean age 22, S.D.$=6.03$) were students from a midwestern historically Black university. Students self-reported their ethnic categories. Ethnicities of participants were categorized as follows: 225 Black, 199 White, 35 Multiethnic, and 22 other. Due to small group sizes, we excluded from analyses participants in the latter two groups. The resulting sample consisted of 424 participants.

The university was ethnically integrated after 1954 and there are currently roughly equal numbers of Black and White students. Institutional research on the university population has indicated that mean family income of students ranges from $25,000 to $35,000 per year. Multivariate analysis using dependent variables of family income, personal income, and perceived class has indicated no significant differences between Black and White students.

BMI in our sample ranged from 15.70 to 51.23 ($M=24.74$, S.D.$=5.35$). Fifty-seven percent of the sample were classified as normal weight, 34.1% were classified as overweight or obese, while only 9.4% were classified as underweight. Even though the majority of the sample was of normal weight, only 33.7% were satisfied with their weight. About half of participants indicated a desire to lose weight (49%), although several indicated a desire to gain weight (15.4%). Of those desiring weight gain, 62% were men. Nine participants (2.1%; 7 White women and 2 Black women) showed eating disturbances in the pathological range (Drive for thinness score ≥ 14).

2.2. Procedure

Questionnaires were administered to students during class time over two semesters. We assured students that their participation was voluntary and asked them to submit their responses anonymously. The questionnaire took approximately 15 min to complete and included the following scales: (1) a demographic survey assessed gender, age, weight, height, ethnicity, dieting, and exercise behaviors. Body Mass Index (BMI) was calculated by dividing weight in kilograms by height in meters squared. A BMI below 18.5 indicates unusual thinness. A BMI between 18.6 and 24.9 is considered normal. A BMI over 25 indicates overweight or obese status. (2) Drive for thinness was a sub-scale of the Eating Disorders Inventory (EDI; Garner, Olmstead, & Polivy, 1983). This 7-item factor of the original 64-item scale measured concerns with thinness, weight loss, diet, and food intake. Garner (1991) has suggested that a score of 14 on this scale could be used to indicate high risk of an eating disorder, since predictive validity has been established for clinical diagnoses. (3) Self-loathing sub-scale (SLSS) consisted of 1 factor (4 items) from the 27-item Exercise Orientation Questionnaire (EOQ; Yates, Edman, Crago, & Crowell, 2001). This sub-scale assessed self-dissatisfaction and has been correlated with eating disorder assessment scales and self-reported eating disordered symptoms. (4) Body dissatisfaction was assessed using Figure Drawings (Furnham & Alibhai, 1983) consisting of 9 male and 9 female figure schematics that range from underweight (value=1) to overweight (value=9). Participants were asked which of the figures they resemble and which they would most prefer to resemble. A body dissatisfaction score was determined by computing the difference between the "resembled" and the "preferred" figure scores. (5) The Anger Discomfort Scale (Sharkin & Gelso, 1991) was a 15-item inventory measuring how uncomfortable participants were with their own anger. The originators of the scale performed a factor analysis that showed four factors, the most robust of which was "intrapersonal discomfort" (5 items) that describes discomfort with private feelings of anger. We changed the questionnaire packet in between data collection periods (semesters) in order to add an indicator of eating pathology (the Drive for thinness measure). Therefore, we reported a smaller sample size and fewer degrees of freedom for this measure ($N=269$).

3. Results

Before testing our hypotheses, we assessed whether our groups differed in age. We found a significant effect of ethnicity for age in which Black participants were younger ($M=20.65$, S.D.=3.34) than White participants ($M=22.65$, S.D.=7.92), $F(1,418)=7.30$, $p<0.01$. There was no significant age difference between men and women. In order to control for the effects of age on ethnicity, all subsequent analyses included age as a covariate. Group differences were analyzed using 2-way Gender (male, female) × Ethnicity (White, Black) ANCOVAs.

Hypothesis one predicted that Blacks would show higher BMIs than Whites. We did not find a significant effect of ethnicity for this measure. Although we did not anticipate a gender difference, we did find a significant main effect for gender on BMI scores, $F(1,387)=7.03$, $p<0.01$, in which men showed higher body mass than women (see Table 1). Men ($M=4.49$, S.D.=1.26) also chose figure drawings to indicate that they perceived themselves as being heavier than women ($M=4.02$, S.D.=1.44), $F(1,415)=14.77$, $p<0.001$.

Table 1
Ethnic and gender differences in self-reported eating attitudes and behaviors

		Black		White		F	Male		Female		F
Dependent variable	Range	M	S.D.	M	S.D.		M	S.D.	M	SD	
Body dissatisfaction	($^{-}8$–$^{+}8$)	0.26	1.17	0.85	1.16	19.97***	0.10	1.23	0.80	1.10	33.09***
Self-loathing	(4–20)	10.57	3.99	11.83	3.83	5.63*	10.62	3.58	11.50	4.15	4.87*
Dieting	(1–4)	1.54	0.73	1.91	0.93	13.72***	1.51	0.77	1.85	0.87	15.10***
Drive for thinness	(0–21)	2.60	3.24	4.09	5.26	3.15^{ns}	1.87	2.63	4.12	4.91	12.02**
Body Mass Index	N/A	25.04	5.36	24.25	5.08	0.64^{ns}	25.54	4.84	24.11	5.41	7.03**

F values reflect results of 2 (Gender) × 2 (Ethnicity) ANCOVAs. No significant interactions were found.
^{ns}, not significant.
* $p<0.05$.
** $p<0.01$.
*** $p<0.001$.

The second hypothesis predicted that Whites would report greater eating disordered attitudes and behaviors than Blacks. In support of this hypothesis, we found main effects of ethnicity in Body dissatisfaction, $F(1,411)=19.97$, $p<0.001$, Self-loathing, $F(1,414)=5.63$, $p<0.05$, and Dieting, $F(1,420)=13.72$, $p<0.001$. Whites were more likely to be dissatisfied with their bodies, engaged in more self-loathing, and dieted more than Blacks (see Table 1). In addition, Whites ($M=3.43$, S.D. = 1.04) tended to choose smaller body figures than Blacks ($M=3.87$, S.D. = 0.99) when asked what they would like to look like, $F(1,410)=12.63$, $p<0.001$.

Hypothesis three predicted that women would report greater eating disordered attitudes and behaviors than men. Supporting this prediction, women were more likely than men to report Body dissatisfaction $F(1,411)=33.09$, $p<0.001$, Drive for thinness, $F(1,210)=12.02$, $p<0.01$, Dieting $F(1,420)=15.10$, $p<0.001$, and Self-loathing, $F(1,414)=4.87$, $p<0.05$ (see Table 1). However, men ($M=2.46$, S.D. = 0.70) were more likely than women ($M=2.13$, S.D. = 0.70) to exercise $F(1,420)=21.09$, $p<0.001$.

The final hypothesis stated that for our four groups of participants (Gender by Ethnicity) different predictors would be significantly related to Drive for thinness. For the four simultaneous regression analyses, Body dissatisfaction, Self-loathing, BMI, Intrapersonal Anger, Dieting, and Exercise were entered as predictors of Drive for thinness. For Black women, Self-loathing was the only significant predictor, $\beta=0.42$, $t(49)=3.22$, $p<0.01$. For White women, Self-loathing ($\beta=0.53$, $t(57)=4.66$, $p<0.001$) and Dieting ($\beta=0.42$, $t(57)=3.96$, $p<0.001$) were significant predictors. For Black men, Dieting was the only significant predictor, $\beta=0.56$, $t(35)=3.85$, $p<0.001$. For White men, Intrapersonal Anger was the only significant predictor of Drive for thinness, $\beta=0.40$, $t(19)=2.30$, $p<0.05$.

4. Discussion

Consistent with a large body of research, we found that White participants were more dissatisfied with their bodies, engaged in more self-loathing, and dieted more than Blacks. Whites also chose smaller body figures than Blacks when asked what they would like to look like. Contrary to previous research (Abrams et al., 1993; Granner, Abood, & Black, 2001), we found no ethnic differences in our measure of disordered attitudes (Drive for thinness) and the number of scores in the pathological range on this measure was very low (2.1%). Previous studies have shown higher rates of pathology in college student

populations (6–25%; Chandler et al., 1994; Nielson, 2000; O'Dea & Abraham, 2002) suggesting that our sample may have been atypical in this respect. Nonetheless, ethnic differences on other variables further support the notion that Black and White college students differ on their views of body image and weight concern (DiGioacchino et al., 2001; Miller & Pumariega, 2001; Yates et al., 2004).

Our findings on gender differences mirror those found in other studies (Braun, Sunday, Huang, & Halmi, 1999; Cohane & Pope, 2001). Women were more likely to show body dissatisfaction, self-loathing, drive for thinness, and dieting than men. These results are interesting in light of the finding that men had significantly higher BMIs than women. It appears that either men are less susceptible to societal pressures to be thin or that there exists a reporting bias in which men are less likely to admit vulnerability to such pressures (Yates et al., 2004).

The unique contribution of this study to the literature concerns the risk factors for unhealthy eating attitudes in four groups: White women, White men, Black women, and Black men. White women and Blacks of either gender showed similar predictors of eating disturbances; each group showed some combination of dieting and self-loathing. White men stood alone in that intrapersonal anger predicted eating disturbances. Similar predictors of drive for thinness in White women and Blacks of either gender support the suggestion that eating disturbances have parallel antecedents in Black and White Americans. The similarities between Blacks and Whites in our study may be typical of non-clinical samples. Other studies of college student samples have reported similar risk factors among Blacks and Whites (Abood & Chandler, 1997; Akan & Grilo, 1995). By contrast, in clinical samples, risk factors appear to vary considerably by ethnicity (Robinson & Andersen, 1985; Striegel-Moore et al., 2002). These results suggest that the search for ethnicity-specific risk factors should attempt to concentrate on clinical populations of Black and White people.

The finding that White men showed anger as a predictor of eating disturbance is noteworthy. Most of the research on emotion and eating has examined the relationship between depression and eating disorders (O'Brien & Vincent, 2003). Like depression, anger has been linked to disturbed eating. Anger has been positively related to bulimia and oral control in college women (Worobey, 1999). Moreover, both men and women report higher levels of hunger and eating while experiencing anger than while experiencing positive emotions (Macht, 1999; Tanofsky, Wilfley, Purrell, & Welch, 1997). Among obese men (but not women), the experience of anger has been linked to binge eating (Costanzo, Musante, Freidman, Kern, & Tomlinson, 1999). The role of anger in men's eating patterns should be further explored given evidence that young men's eating disturbances are often untreated (O'Dea & Abraham, 2002). Identifying anger as a predictor of eating problems in White men may help to clarify risk factors for disturbed eating in this group.

There are several limitations to this study. One limitation concerns the use of self-report measures. It may be the case that participants do not report accurately or that a particular group of participants may experience more pressure to answer questions in a socially desirable manner. A related problem concerns demand characteristics. Some authors have argued that minority groups may be particularly likely to answer surveys in the way that they perceive the researcher to expect (Smolak & Striegel-Moore, 2001). Erroneous ethnic differences may be the result of such action. It is difficult to tell the extent to which social desirability or demand characteristics affected the responses of participants in this study. Another limitation is that the ethnic differences we found may be confounded by differences in socioeconomic status, a variable we did not measure in this study (Caldwell et al., 1997). However, we can reasonably assume that our samples of Black and White students were roughly equal in socioeconomic status given previous institutional research on the same population. Nonetheless, further research should include

measures of socioeconomic status and social desirability so that it is possible to statistically control for these variables.

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EATING BEHAVIORS

Gender differences regarding psychopathological, family and social characteristics in adolescents with abnormal eating behavior

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Abstract

Objective: (1) To identify gender differences regarding psychopathological, family and social characteristics in adolescents with abnormal eating behavior; (2) to study risk factors for this abnormal eating in boys and girls.
Method: Adolescents participating in this community-based longitudinal study completed, at the age of 13 (t_1) and 15 years (t_2), a semi-structured interview and the validated Spanish versions of several self-reported questionnaires measuring eating and general psychopathology. A control group of 150 pupils and 159 adolescents with abnormal eating behavior were selected.
Results: Girls with abnormal eating showed significantly more psychiatric morbidity and boys more social difficulties. Body dissatisfaction and psychiatric morbidity predicted abnormal eating at t_2 only in girls.
Discussion: The findings contribute to the debate on gender differences in abnormal eating behavior etiology.
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The study of gender differences can add useful information to the question of eating disorder (ED) aetiology. If it is found that men with ED do not differ significantly from women, this would support the biologist point of view more. If, on the contrary, men with ED present some specific psychological and socio-cultural risk factors, then the socio-cultural vision of the etiology of ED would gain support (Carlat, Camargo, & Herzog, 1997). However, until some years ago, the complex role of these differences in ED received limited attention in the research.

Most studies on ED in males have examined individual cases or small samples mainly in clinical populations (Carlat et al., 1997; Kinzl, Mangweth, Traweger, & Biebl, 1997). Research data show a

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similar phenomenology of anorexia and bulimia nervosa in males and females as for the psychopathological, prognostic and clinical characteristics, except for men usually presenting more hyperactivity (Crisp & Burns, 1983; Davis, Kennedy, Ravelsky, & Dione, 1994) and lower body image distortion (Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002; Robb & Dadson, 2002; Schneider & Agras, 1987). With regard to the diagnostic distribution, the proportion of eating disorders not otherwise specified (EDNOS) is higher in men than in women, suggesting that atypical eating disorders may be a particular problem in males (Carlat et al., 1997). Other authors refer mainly to the premorbid factors as later onset in men (Sharp, Clark, Dunan, Blakwood, & Shapiro, 1994) and more frequency of previous obesity and treatment delay as well as findings of a greater comorbidity, mainly with substances abuse in bulimic males as compared to the females (Carlat et al., 1997).

Studies in non-clinical samples have been focused mostly on gender differences in perceptions of body size, weight concerns, weight control practices and physical activity (Adams et al., 2000; Augestad, 2000; Lewinsohn et al., 2002). Nelson, Hughes, Katz, and Searight (1999) found that, whereas female college students with abnormal eating attitudes and behaviors were characterized by lack of acceptance of their body and poor personal self-esteem, current psychological distress discriminated male problem eaters most strongly. Other authors (Keel, Klump, Leon, & Fulkerson, 1998) reported that patterns displayed by females with disordered eating were closely replicated with a male sample. Therefore, the topic continues controversial. Recently, in a substantial population-based non-clinical sample study, the compensatory behaviors typically associated with eating disorders but no physical exercise have been found strongly associated with female gender (Anderson & Bulik, 2004). In this mentioned study, women tend to report higher drive for thinness scores than males and tend to place a greater importance on weight and shape in how they feel about themselves.

There are some questions that remain to be addressed, as when gender differences in ED symptoms emerge or how these differences change according to the age. More prospective community studies in adolescent population of both sexes, which would analyze not only gender differences concerning eating disorder psychopathology, but other numerous variables related with the altered eating attitudes would also be necessary.

The purpose of the present longitudinal community study was threefold: (1) to identify gender differences regarding psychopathological, family and social variables among adolescents with abnormal eating behaviors and to find out if 2 years later these differences continued; (2) to see if these gender differences were specific of the adolescents with abnormal eating behavior or, on the contrary, they were also found within the general population; (3) to identify risk factors for abnormal eating behavior in female and male adolescents, controlling the effect of initial altered eating behavior. We hypothesized that there might be higher levels of psychiatric morbidity in women and also different predictive factors for abnormal eating behaviors, for instance body dissatisfaction, than in males.

1. Method

1.1. Participants and procedure

The current paper is part of a prospective study performed in a community population of adolescents in which all the schools of a rural and urban area of the county of Ciudad Real (Spain) were contacted.

Details about the procedure have been published elsewhere (Beato-Fernández, Rodríguez-Cano, Belmonte-Llario, & Martinez-Delgado, 2004). The first assessment (t_1) was completed by 1766 students (887 females and 878 males). To evaluate numerous demographic, psychosocial and family variables, participants were administered a semi-structured questionnaire and the Spanish versions of the following questionnaires: (1) the validated 28-item Spanish version of the General Health Questionnaire (GHQ) (Goldberg & Hillier, 1979; Lobo, Pérez Echevarría, & Artal, 1986), used for screening psychiatric morbidity, with the optimal cut-off point of 6/7; (2) the Rosenberg Self-Esteem Scale (Baños & Guillen, 2000; Rosenberg, 1965), which measures self-esteem defined as the respect and acceptation feeling towards oneself; (3) the Family APGAR, a self-reporting questionnaire for the assessment of the family functioning (Bellon, Delgado, Luna del Castillo, & Lardelli, 1996; Smilkstein, 1979).

For the assessment of abnormal eating behavior the validated Spanish version of The Eating Attitudes Test, the EAT-40 (Castro, Toro, & Salamero, 1991; Garner & Garfinkel, 1979), for the screening of anorexic symptoms predominantly was used, with the cut-off point of 30 and The Bulimic Investigatory Test Edinburgh (BITE) (Henderson & Freeman, 1987; Cervera et al., 1995). Scores equal to or over 10 indicate an unusual pattern, perhaps a compulsive eater. Furthermore, the validated Spanish version of The Body Shape Questionnaire (BSQ) (Cooper, Taylor, Cooper, & Fairburn, 1987; Raich, Deus, Muñoz, Pérez, & Requena, 1991), establishing the cut-off point at 105, was employed to measure the degree of the subjects' dissatisfaction with their physical appearance. According to the BMI, four categories were established (Garrow & Webster, 1985): low weight ($BMI < 20$), normal weight ($20 \geq BMI < 25$), high weight ($25 \geq BMI < 30$) and obesity ($BMI \geq 30$). Two years later (t_2), the same assessment was carried out. Among the 1076 (576 females and 500 males) subjects assessed for the second time, 159 subjects (119 females and 40 males) were considered at risk of developing an eating disorder. A control group of 150 pupils was randomly selected from the remaining sample (112 females and 38 males).

1.2. Statistical analysis

Standard chi-square and *t*-test were conducted to identify clinical, psychopathological, family and social characteristics according to gender, first within the adolescents with disordered eating and second, within the non-risk group to see if certain gender differences were specific of the adolescents at risk. The Bonferroni correction was applied by adjusting the *p*-value when it was opportune (α level $p < 0.01$). Forward stepwise logistic regression analysis was carried out to determine the association between the mentioned characteristics, assessed at t_1 and disordered eating behaviors at t_2 (EAT+ and/or BITE+) in female and male adolescents. The effect of the rest of the variables and disordered eating behaviors at t_1 was controlled. Separate logistic regression analysis was performed for boys and girls. Statistical package SPSS V.10 for Windows was used (Norusis, 1999).

2. Results

One hundred and fifteen pupils (85 females and 30 males) were EAT+ and/or BITE+ at t_1 at the age of 13. That supposes 14.75% of females and 6% of the male adolescents. Two years later (t_2), the number of adolescents at risk was 80 females (13.88%) and 15 males (3%). Socio-demographic characteristics showed by the controls did not differ significantly from those of the risk group.

2.1. Gender differences in psychopathological, family and social characteristics among adolescents with abnormal eating behavior

No statistically significant gender differences regarding BMI or weight status were found at t_1 and t_2 (mean BMI at t_1: boys=22.02, S.D. 3.07; girls=21.12, S.D. 2.99; t_2: boys=21.96, S.D. 3.56; girls=21.42, S.D. 3.86). As expected, girls at the age of 15 reported with a significantly higher frequency than boys that they had been on a diet in the last 6 months (48.8% compared to 6.7%; $\chi^2=9.17$, $df=1$, $p=0.002$) and also that they avoided going to social acts because of the diet (25% compared to 0%; $\chi^2=9.36$, $df=3$, $p=0.025$). There were no statistically significant differences in the frequency of doing physical exercise to lose weight.

Considering eating psychopathology, at t_1, there was a significantly higher percentage of girls EAT+ (78.6% of the girls compared to 41.4% of the boys; $\chi^2=13.974$, $df=1$, $p=0.000$) and BSQ+ (76.2% girls compared to 20.7% boys; $\chi^2=28.170$, $df=1$, $p=0.000$). However, there were no significant differences concerning either the BITE symptom subscale (68.2 girls and 63.3% boys) or the BITE severity subscale (21.4% girls and 12.8% boys; cut-off point of 5). Two years later, there were no significant gender differences regarding the EAT+ neither the BITE+ although the percentage of subjects BSQ+ varied (40% girls, 0 boys; $\chi^2=9.048$, $df=1$, $p=0.001$).

Data related to comorbidity and altered behaviors associated to ED are shown in Table 1. A significantly higher proportion of girls were GHQ+. In contrast, boys presented significantly higher frequency of stealing behaviors. When adolescents at risk were 15, differences regarding self-esteem (RSE) and the proportion of subjects GHQ+ became even more significant.

With regard to family and social variables, the following ones did not show statistically significant gender differences: loss of somebody loved, the father's or siblings' illness, family violence, high grade of demands on the parts of the mother and the father, school results, relationship with the teacher and family dysfunction, measured by means of the APGAR questionnaire. History of obesity was significantly more frequent in the boys' mother (13.3%) than in the girls' mother (2.5%) (< 0.05). On the contrary, history of the mother's mental disorder was reported by 17.5% of the boys and only 6.7% of the girls ($p<0.05$). Significantly higher rates of males (30%) than females (11.8%) communicated that

Table 1
Frequency of the presence of some psychopathological variables in adolescents with abnormal eating behavior at the ages of 13 and 15

	13 years old (n=115)		15 years old (n=95)	
	Boys (n=30)	Girls (n=85)	Boys (n=15)	Girls (n=80)
Suicide thoughts	9 (31%)	38 (44.7%)	6 (40%)	41 (51.3%)
Suicide attempts	3 (10.4%)	12 (14.4%)	1 (6.7%)	18 (22.5%)
Self-injuries	8 (26.7%)	22 (26.5%)	3 (20%)	24 (30%)
Stealing	16 (53.3%)*	28 (33.7%)	10 (66.7%)*	29 (36.7%)
GHQ+	10 (33.3%)	46 (54%)*	3 (20%)	49 (61.3%)**
Mean GHQ subscale of depression	1.23, S.D. 1.9	2.25, S.D. 2.23*	1.20, S.D. 1.69	2.43, S.D. 2.31**
RSE	27.88, S.D. 5.1*	25.28, S.D. 5.8	28.6, S.D. 4.7**	24.47, S.D. 5.15

GHQ=General Health Questionnaire, RSE: Rosenberg Self-Esteem Questionnaire. χ^2 test.
* $p<0.05$.
** $p<0.01$.

they enjoyed themselves alone ($p<0.05$). Males reported more frequently bad relationships with their mates (28.8%, 7.5% of the girls).

2.2. Gender differences in the non-risk adolescents

Within the non-risk group (N=150; 38 males, 112 females), a significantly higher proportion of girls presented low weight (69.2% compared to 41.2%). However, and similarly to the risk group, there were significant gender differences in the mean scores on the BSQ (females 55.13, S.D. 22.95; males 40.16, S.D. 8.97) but not on the EAT and BITE.

As compared to the girls at risk, the girls of the control group did not present higher psychopathology, measured by means of the GHQ, than the boys, although the females had lower mean scores in the questionnaire assessing self-esteem (RSE mean scores at 15 years: females=29.60, S.D. 5.02; males=31.84, S.D. 3.94; $p=0.01$). Neither there were significant gender differences regarding drug consumption, suicide thoughts, suicide attempts and self-injuries. Only differences regarding stealing behavior (females 20.9%, males 42.1%; $p=0.01$) were found.

With regard to the family and social variables, in the control group, there were no significant differences, excluding school marks (bad marks females=36%, bad marks males=59.5%; $p=0.01$).

2.3. Risk factors for abnormal eating behavior in girls and boys

Among girls, scores on the GHQ above the cut-off point (OR=3.439; 95% CI 1.432, 8.256) and scores on the BSQ (OR=1.02; 95% CI 1.010–1.029) were both predictive for disordered eating behaviors at t_2. Among boys, only a weak negative association between family APGAR and disordered eating at t_2 ($\beta=-0.446$; OR=0.640; 95% CI 0.455, 0.904) was found.

3. Discussion

To our knowledge, this is the first Spanish community survey, which examines specific gender differences among adolescents with abnormal eating behaviors using a longitudinal design. Although it is generally acknowledged that the males with ED usually present more hyperactivity (Davis et al., 1994), in this study, the girls and boys with altered eating behavior did not differ in the frequency of physical exercise to lose weight. This might have two explanations: (1) the males may report another reasons to carry out physical exercise (Furnham, Badmin, & Sneade, 2002), which were not explored in the present study; (2) the increase in the physical activity of the males could take place once the disorder is developed.

Consistently with earlier reports, adolescent girls generally showed lower self-esteem and more body dissatisfaction than boys. However, one interesting finding of the current work was that, quite on the contrary of adolescents with disordered eating, girls without abnormal eating behavior did not differ from boys regarding psychiatric morbidity, suicide thoughts or attempts. These results are in contrast with other research showing that females have higher rates of depression than males during adolescence (Kearney-Cooke, 1999). In the light of the present findings, most psychiatric morbidity among females would not be a generalized fact but rather a characteristic specific to the risk group and permitting for the development of an eating disorder. Other authors communicated no substantial differences between

males and females in what regards psychological factors associated to disordered eating patterns (Keel et al., 1998). In our study, not only the above mentioned differences were found, but also psychiatric morbidity, together with body dissatisfaction, were established as one of the variables predictive for altered eating behaviors in females but not in males.

Males at risk of suffering an ED reported to have more difficulties in the relationships with their fellows, tending to enjoy themselves alone. This finding is in accordance with other research in which, perhaps as a function of interpersonal isolation, males with chronic bulimic symptoms reported more interpersonal distrust, even compared to females with elevated symptom levels (Joiner, Katz, & Heatherton, 2000).

With regard to family relationships, diverse studies revealed contradictory results (Felker & Stivers, 1994; Nelson et al., 1999; Strober, Freeman, Lampert, Diamond, & Kaye, 2001). We found that family functioning was protective for disordered eating in boys. Nevertheless, this association was very weak.

In summary, the present findings suggest that girls with abnormal eating behaviors at the age of 13 present higher levels of general psychiatric morbidity, measured with the GHQ and boys more difficulties with social relationships. Those differences, which were not found in the control group, became even more significant at the age of 15. Furthermore, unlike for males, in the case of females, scores on the GHQ above the cut-off point and body dissatisfaction both contributed to the prediction of abnormal eating patterns 2 years later. Generalizations from this study should be made cautiously given several limitations. First, important variables such as personality, sexual or physical abuse and sexual orientation were not explored. It would have been of interest to include them, because, as reported by Neumark-Sztainer, Story, Hannan, Beurhing, and Resnick (2000), boys with history of sexual abuse present higher risk of ED than girls. In our study, the issues related to this topic had to be eliminated in the assessment because some heads of the centers did not find them appropriate. Secondly, self-report screening questionnaires rather than diagnosable eating disorders were studied, due to the relatively low prevalence of the disorder in males. It would be useful to survey a larger number of males to see if the present results could be replicated.

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Assessing the functional nature of binge eating in the eating disorders☆

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Abstract

This study explored the functional nature of binge eating through the development of a new self-report instrument called the Binge Eating Adjective Checklist. Participants were 405 adult females who presented to a specialized eating disorders clinic. A subset of participants with bulimia nervosa also completed additional psychometrics and treatment. Those participants who reported greater reductions in negative affective and somatic states during a binge episode were also more distressed on measures of perfectionism, self-esteem, ineffectiveness, and interceptive awareness. They were also less likely to achieve abstinence from bingeing and vomiting over the course of treatment. Thus, the instrument appears to offer a methodology for studying the phenomenology of binge eating and the prediction of therapeutic outcome in bulimia nervosa.
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Keywords: Eating disorders; Binge eating; Functional

The phenomenology of binge eating has been the subject of considerable study. A number of researchers have investigated the psychological and physical experiences that individuals report before and after they binge eat. Among those studied include people with bulimia nervosa, binge eating disorder, and nonclinical binge eaters. Research methodologies have included prospective, event- and time-based self-monitoring procedures, retrospective interviews and questionnaires (see Deaver,

☆ Data originally collected at the Eating Disorder Program, Toronto General Hospital, Toronto, Ontario, Canada.

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Miltenberger, Smyth, Meidinger, & Crosby, 2003). A consistent picture emerging from these studies is that people typically report the intensification of dysphoric mood states just before the onset of an episode of binge eating. Furthermore, the dysphoria is specific to binge eating compared to other occasions of food consumption such as snacks or meals, as well as times when the individual is not eating. Perhaps most intriguing is the observation that the dysphoria represents a rapidly deteriorating mood state from baseline mood over a period of 1–3 h leading up to the binge episode (Davis, Freeman, & Solyom, 1985).

From these observations have stemmed a number of theoretical formulations to account for why people binge eat. Central to these speculations is the notion that binge eating serves some functional property for the person via alleviation of the dysphoric mood states (Ainsworth, Waller, & Kennedy, 2002; McManus & Waller, 1995; Polivy & Herman, 1993). For instance, the escape model (Heatherton & Baumeister, 1991) contends that people who binge are prone to experiences of aversive self-awareness caused by a perceived failure to meet high personal standards. The individual escapes the resulting dysphoria by binge eating which temporarily narrows the focus of attention away from the aversive awareness and towards the immediate stimulus environment; in this case, to the act of eating.

At present, it is difficult to study the mood changes over the course of a binge episode. When self-monitoring is employed, several studies have found that, contrary to the functional hypothesis, the pre-binge dysphoria is actually maintained or even exacerbated when assessed in the few hours following the binge episode (Davis et al., 1985; Lynch, Everingham, Dubitzky, Hartman, & Kasser, 2000; Wegner et al., 2002). It could be these studies failed to uncover the hypothesized mood modulating effect of the binge because they sampled mood too remote from the epicenter of the binge itself; that is, after rather than during the binge. Unfortunately, the use of self-monitoring as a methodology to study mood changes during a binge is beset with problems. The intrusive nature of the task demands that participants suspend their behavior in the middle of the act of binge eating in order to record their mood, a task that might prove difficult for many. Time-based methods of cueing participants to self-monitor are not likely to capture many instances in which the person is actually engaging in a binge episode owing to the relative infrequency of the event itself. Event-based methods of cueing participants to self-monitor just prior to the binge and again only a few minutes later right in middle of the binge itself may suffer from reactivity to the procedure, or to appear at least contrived to the participant.

The present study explored the value of a retrospective questionnaire called the Binge Eating Adjective Checklist (BEAC) in studying the topography and stability of mood and somatic states over the course of binge eating. While certain limitations like overestimation are recognized of methods that require participants to recollect affect (Schrader, Davis, Stefanovic, & Christie, 1990), the potential value of a simple instrument that could easily be administered has motivated exploration of this paradigm. In keeping with the functional notion of binge eating, it was predicted that people would report alleviation in negative mood and somatic states during the binge itself relative to their phenomenological experience in the moments prior to a binge. A further purpose of this study was to explore potential psychological correlates of individual differences with respect to the functionality of binge eating. That is, are people who find binge eating to be particularly functional also characterized by a unique psychological profile? A direct prediction from the escape model (Heatherton & Baumeister, 1991, p. 89) would be that such individuals have unusually high standards (e.g., perfectionism) and low self-esteem. A final exploratory purpose of the study was to ascertain the predictive validity of the BEAC with regard to the response of people with bulimia nervosa to treatment.

1. Method

1.1. Participants

The participants were 405 adult females seen in consultation at the Toronto General Hospital eating disorder program. Two hundred and sixty-six participants were seen in the years 1991–1994, and 50% met *DSM-IIIR* (American Psychiatric Association, 1987) criteria for bulimia nervosa; 24% anorexia nervosa of the binge eating subtype; and 26% eating disorder not otherwise specified with binge eating present. Diagnosis was rendered by clinic psychologists and psychiatrists. The final 139 participants met *DSM-IIIR* criteria for bulimia nervosa and were enrolled in one of two comparative treatment trials (Davis, McVey, Heinmaa, Rockert, & Kennedy, 1999; Goldbloom et al., 1997). Participants gave their informed signed consent.

1.2. Measures

1.2.1. Binge eating adjective checklist

The BEAC was modeled on the Multiple Affect Adjective Checklist (Zuckerman & Lubin, 1965). Adjectives for the BEAC were derived from the content analysis of interviews with 21 adult females who met DSM-III criteria for bulimia (Davis et al., 1985). They were found to use 103 different adjectives in response to the sections of the Personal Data Questionnaire (Orleans & Barnett, 1984) that addressed the psychological and physical experiences before, during, and after episodes of binge eating. These 103 adjectives were listed alphabetically on paper in three columns and presented twice to participants. Instructions for the first presentation (BEAC-before) were as follows: "On this sheet you will find words which describe different kinds of moods and feelings. Mark an X in the boxes beside the words which describe how you typically feel right before you binge; just before you begin to binge eat. Some of the words may seem alike, but we want you to check all the words that typically describe your feelings right before you binge. Work rapidly." Instructions for the second presentation (BEAC-during) were as follows: "This time we want you to mark an X in the boxes beside the words which describe how you typically feel right in the middle of a binge; after you have begun to binge but before you stop binge eating. Work rapidly." Participants were also given the *DSM* definition of a binge as follows: (1) eating, in a discrete period of time (e.g., within any 2-h period), an amount of food that is definitely larger than what most people would eat during a similar period of time and under similar circumstances; and (2) experiencing a sense of lack of control over eating during the episode (e.g., feeling that one cannot stop eating or control what or how much one is eating)."

1.2.2. Other measures

The concurrent validity of the BEAC was investigated through the administration of a battery of psychometric measures that quantify severity of psychopathology both specific and nonspecific to eating disorders. Indices of specific psychopathology included three scales of the Eating Disorder Inventory (EDI) (Garner & Olmsted, 1984); Drive for Thinness, Bulimia, and Body Dissatisfaction. The Eating Disorder Examination (EDE) (Fairburn & Cooper, 1993) was used to determine duration of illness and frequency of episodes of binge eating and vomiting at pretreatment and follow-up. Indices of nonspecific psychopathology included the Beck Depression Inventory (BDI) (Beck & Steer, 1987), Rosenberg Self-

esteem Scale (RSES) (Rosenberg, 1965), and five EDI scales of Ineffectiveness, Perfectionism, Interpersonal Distrust, Interoceptive Awareness, and Maturity Fears. Higher scores on the measures reflect greater psychopathology except for the RSES where the reverse is the case.

1.3. Procedure

For the first 266 participants, only the BEAC was administered at the end of the consultation interview by a psychologist or psychiatrist. The remaining 139 participants completed the BEAC and the other measures before the commencement of treatment. Forty-three of these participants completed the BEAC on two separate occasions 1–3 weeks apart before the commencement of treatment in order to establish test–retest reliability. For 89 treatment completers from the initial cohort of 139, 4-month posttreatment symptom frequencies for binging and vomiting were established on follow-up interview using the EDE.

2. Results

For the 405 participants, each of the 103 adjectives was dichotomously coded as 0 = not checked and 1 = checked. Thirty-four BEAC-before adjectives were checked by more than 50% of participants; anxious (81%), craving food (79%), no will power (76%), out of control (74%), depressed (72%), lonely (72%), frustrated (71%), helpless (67%), bored (66%), unhappy (65%), cannot cope (63%), fat (62%), down (60%), isolated (60%), guilty (59%), ugly (58%), desperate (57%), hungry (57%), upset (56%), self-disgust (56%), failure (56%), tense (56%), unmotivated (55%), unproductive (54%), angry (54%), disappointed (54%), worthless (53%), uptight (53%), awful (53%), self-hate (53%), worried (52%), panicky (51%), confused (51%), and irritable (51%). Ten BEAC-during adjectives were checked by more than 50% of participants; out of control (77%), no will power (70%), guilty (61%), self-disgust (58%), bloated (58%), helpless (56%), disgusted (56%), fat (55%), anxious (52%), and shame (51%).

BEAC-before adjectives were factor analyzed using principal components analysis with orthogonal (Varimax) rotation to enhance interpretability of the rotated factor solution. Seven factors were selected for rotation. This decision was based partly on an examination of the eigenvalues (scree criterion), and partly on the meaningfulness of the factors resulting from the seven-factor solution. Those adjectives loading $> \pm 0.3$ on a factor were assigned to the factor upon which they loaded highest. The seven factor labels with corresponding eigenvalues are as follows: Negative Affect = 20.34 (31 adjectives), Self-criticism = 5.81 (25 adjectives), Apathy = 3.51 (17 adjectives), Positive Affect = 2.98 (10 adjectives), Arousal = 2.72 (11 adjectives), Fatigue = 2.39 (5 adjectives), and Hunger = 2.20 (4 adjectives). The first three factors typify negative psychological experiences, the fourth is indicative of positive psychological experiences, while the last three factors involve negative somatic experiences.

Adjectives within each of the seven factors were subjected to separate Kuder-Richardson (*K-R 20*) analysis of internal consistency for both BEAC-before and BEAC-during responses. Seven adjectives did not meet the criterion of minimum item-total correlation = 0.3 and were dropped from further analysis (anxious, compelled, distracted, healthy, remorseful, thirsty, vibrant). Three of the resulting scales demonstrated adequate internal consistency (*K-R 20* > 0.8), while the other four scales failed to reach this level, with values ranging from 0.69 to 0.77 (see Table 1). However, these four scales had considerably

Table 1
BEAC scale composition, Kuder-Richardson (K-R 20) and test–retest reliability, and direction of change on individual adjectives

Scales	K-R 20		Test–retest *r*		Adjectives (percent endorsement before/during binge) episodes
	Before	During	Before	During	
Negative Affect, 31 adjectives	0.93	0.94	0.78	0.83	angry (54/41)$^{\downarrow}$, bitchy (41/21)$^{\downarrow}$, blue (43/22)$^{\downarrow}$, bored (66/14)$^{\downarrow}$, cannot cope (63/35)$^{\downarrow}$, confused (51/43), depressed (72/41)$^{\downarrow}$, disappointed (54/48), discontented (46/22)$^{\downarrow}$, down (60/27)$^{\downarrow}$, frustrated (71/49)$^{\downarrow}$, grouchy (34/18)$^{\downarrow}$, helpless (67/56)$^{\downarrow}$, hurt (44/19)$^{\downarrow}$, irritable (51/31)$^{\downarrow}$, isolated (60/41)$^{\downarrow}$, lonely (72/39)$^{\downarrow}$, lousy (46/38), mad (40/29)$^{\downarrow}$, moody (44/23)$^{\downarrow}$, self-pity (40/30)$^{\downarrow}$, tense (56/30)$^{\downarrow}$, ticked off (37/27)$^{\downarrow}$, unhappy (65/43)$^{\downarrow}$, unloved (47/26)$^{\downarrow}$, unmotivated (55/30)$^{\downarrow}$, unproductive (54/35)$^{\downarrow}$, upset (56/38)$^{\downarrow}$, uptight (53/30)$^{\downarrow}$, worried (52/40)$^{\downarrow}$, worthless (53/43)$^{\downarrow}$
Self-criticism, 25 adjectives	0.93	0.94	0.78	0.84	awful (53/46), bloated (33/58)$^{\uparrow}$, desperate (57/43)$^{\downarrow}$, disgusted (44/56)$^{\uparrow}$, failure (56/45)$^{\downarrow}$, fat (62/55), fearful (43/41), frightened (38/37), gross (43/44), guilty (59/61), horrible (45/41), huge 43/47), no will power (76/70), obese (31/37), out of control (74/77), rotten (43/37), self-disgust 56/58), self-hate (53/44), shame (49/51), sick (26/41)$^{\uparrow}$, stupid (36/36), terrible (39/34), ugly (58/47)$^{\downarrow}$, uncomfortable (40/49), unreal (26/26)
Positive Affect, 15 adjectives	0.83	0.86	0.83	0.88	contented (5/23)$^{\uparrow}$, emotional relief (27/42)$^{\uparrow}$, enjoyment (18/34)$^{\uparrow}$, euphoric (8/13), fine (6/9), good (9/15), happy (9/13), loved (4/6), mental relief (18/32)$^{\uparrow}$, pacified (9/22)$^{\uparrow}$, physical relief (14/23)$^{\uparrow}$, relaxed (7/14)$^{\uparrow}$, released (11/32)$^{\uparrow}$, satisfied (6/20)$^{\uparrow}$, serene (2/5)
Arousal, 8 adjectives	0.76	0.74	0.77	0.58	dizzy (14/12), faint (11/8), hyper (34/23)$^{\downarrow}$, incoherent (14/15), jittery (30/19)$^{\downarrow}$, lightheaded (18/17), panicky (51/35)$^{\downarrow}$, shaky (33/23)$^{\downarrow}$
Apathy, 9 adjectives	0.73	0.77	0.86	0.77	apathetic (19/16), blank (32/32), dazed (37/24)$^{\downarrow}$, depleted (21/11)$^{\downarrow}$, immobilized (11/17), indifferent (25/24), numb (29/37), resigned (24/25), spacey (22/25)
Fatigue, 4 adjectives	0.71	0.69	0.63	0.86	drained (43/24)$^{\downarrow}$, exhausted (29/21), sleepy (17/20), tired (36/26)
Hunger, 4 adjectives	0.69	0.67	0.79	0.55	craving food (79/41)$^{\downarrow}$, hungry (57/22)$^{\downarrow}$, ravenous (35/17)$^{\downarrow}$, starving (44/14)$^{\downarrow}$
Composite, 7 scales	0.95	0.96	0.81	0.86	linear combination of 7 scales = Negative Affect + Self-criticism − Positive Affect + Arousal + Apathy + Fatigue + Hunger

BEAC = Binge Eating Adjective Checklist.
$^{\downarrow}$Significant decrease during binge episodes. Bonferroni corrected per-comparison error rate of $p < 0.0005$.
$^{\uparrow}$ Significant increase during binge episodes. Bonferroni corrected per-comparison error rate of $p < 0.0005$.

fewer items (4, 4, 8, and 9) than the scales with *K-R 20* above 0.8 (15, 25, and 31). It is well known that dichotomous scales with few items rarely achieve high levels of internal consistency (Nunnally, 1978). A Composite scale was calculated by subtracting the Positive Affect scale from the additive combination of the remaining six scales. The internal consistency of the Composite scale (*K-R 20* = 0.95–0.96) and its

test–retest reliability (rs = 0.81–0.86) are very good. Test–retest reliability coefficients for the seven individual scales are presented in Table 1.

Change scores (BEAC-before–BEAC-during) for the retained 96 adjectives were analyzed according to McNemar's nonparametric test for two related dichotomous variables. A Bonferroni correction was applied to maintain the per-comparison error rate at $\alpha/96 = 0.0005$. Forty-two adjectives evidenced a significant decrease during binge episodes with a range of 10% (depleted) to 52% (bored), χ^2s ($df = 1$) > 16.69, ps < 0.0005. Twelve adjectives increased significantly during binge episodes with a range of 7% (relaxed) to 25% (bloated), χ^2s ($df = 1$) > 13.33, ps < 0.0005. The adjectives and their direction of change are displayed in Table 1.

2.1. Defining subgroups using the BEAC RC index

In order to explore the concurrent and predictive validity of the BEAC, participants were classified according to their magnitude of change scores on the instrument. An index of reliable change (RC) was calculated on the Composite difference score (BEAC-before–BEAC-during) in accordance with the formula described by Jacobson, Follette, & Revenstorf (1984). Participants' change scores were divided by the standard error of change scores estimated from the Composite scale's test–retest reliability. When RC exceeds 1.96, it is unlikely ($p < 0.05$) that the magnitude of change could be attributable to an unreliable measuring instrument. The RC index is the single-subject design counterpart to the t-test of correlated means that is customarily employed to determine whether a group has changed to a statistically significant degree. The index was calculated to be 20 or greater on the Composite change score. For the entire sample of $N = 405$ participants, 23% met or exceeded the index of reliable change while 77% did not meet the criteria. These groups were labeled as RC and No-RC, respectively.

Analysis of change scores for the entire sample on the Composite and seven scales according to a paired-sample multivariate Hotelling's test proved significant, Wilks' Lambda = 0.373, $F(7, 398) = 95.7$, $p < 0.001$, indicating that participants reported less psychological and physical distress during compared to before a binge. Univariate t-tests were conducted for each scale with a Bonferroni per-comparison error rate adjusted to $\alpha/8 = 0.0063$. Participants reported a significant decrease on Negative Affect, Arousal, Fatigue, Hunger, and Composite. A significant increase on Positive Affect was also evident. There was no significant change on Self-criticism or Apathy (see Table 2).

Table 2
Percent of BEAC scale adjectives checked before and during binge episodes by all participants ($N = 405$)

Scale	Before		During		Change score		$t(404)$	p
	M	(S.D.)	M	(S.D.)	M	(S.D.)		
Negative Affect	53.7	(27.6)	33.4	(28.2)	20.3	(27.2)	15.04	<0.001
Self-criticism	48.0	(28.9)	47.7	(31.3)	0.3	(29.4)	0.19	0.850
Positive Affect	11.7	(17.2)	22.3	(23.3)	−10.5	(23.2)	−9.14	<0.001
Arousal	25.9	(25.4)	19.4	(23.2)	6.4	(24.3)	5.31	<0.001
Apathy	23.4	(23.6)	25.2	(25.1)	−1.8	(20.7)	−1.73	0.084
Fatigue	31.7	(33.3)	23.3	(30.3)	8.4	(36.2)	4.66	<0.001
Hunger	54.3	(33.9)	23.4	(29.1)	30.9	(35.2)	17.70	<0.001
Composite	35.9	(18.5)	25.6	(20.5)	10.3	(18.8)	11.02	<0.001

BEAC = Binge Eating Adjective Checklist. Percentages reflect the number of scale items checked divided by total possible items per scale multiplied by 100.

Similarly conducted paired-sample multivariate Hotelling's tests also proved significant for the No-RC group, Wilks'Lambda=0.427, $F(7, 306)=58.77$, $p<0.001$; and for the RC group, Wilks' Lambda=0.087, $F(7, 85)=127.51$, $p<0.001$. Regarding the No-RC group, a statistically significant yet small reduction was observed on Negative Affect with a comparable increase on Self-criticism. The greatest reduction (29.1%) reported by the No-RC group was on Hunger. For the RC group, a comparable reduction (37.2%) was reported on Hunger. As would be expected by the very nature of the RC index, RC participants compared to No-RC participants reported statistically significant and greater magnitudes of change on Negative Affect (58.2% vs. 9.2%), Self-criticism (37% vs. −10.5%), Positive Affect (−30.3% vs. −4.7%), Arousal (22% vs. 1.8%), Fatigue (28.8% vs. 2.4%), and composite (38.1% vs. 2.1%). Thus, it would appear that binging is functional for both groups by way of significant reductions on Hunger. For the RC group, additional functional value of the binge accrues through dramatic changes in affective states (Negative Affect, Self-criticism, Positive Affect) and in somatic states (Arousal, Fatigue).

2.2. Concurrent validity of the BEAC RC index

The 139 participants who completed the battery of psychometric measures were divided into those who met or exceeded the BEAC RC index (RC group, $n=37$ [27%]) and those who did not (No-RC group, $n=102$, [73%]). The RC group was viewed as individuals for whom binging had the greatest functional significance. Possible group differences were investigated using separate two-sample multivariate Hotelling's tests on measures of specific and nonspecific psychopathology. Episodes of binging and vomiting were first subjected to a log transformation because of extreme skewness in their respective raw score distributions. The test of nonspecific psychopathology measures yielded a significant group effect, Wilks' Lambda=0.806, $F(7, 131)=4.51$, $p<0.001$, indicating that the RC group was more psychologically maladjusted compared to the no-RC group. Univariate t-tests with a Bonferroni correction of $\alpha/7=0.0071$ revealed that the RC group reported lower scores on RSES, and higher scores on EDI scales of Ineffectiveness, Perfectionism, and Interoceptive Awareness (see Table 3). The multivariate test of specific psychopathology measures failed to reveal a significant group effect in the overall pattern of severity in eating disorder symptomatology, Wilks' lambda=0.929, $F(6, 132)=1.69$, $p=0.129$. However, on univariate testing, the RC group did evidence a longer duration of illness compared to the no-RC group, $t(137)=2.66$, $p<0.009$. Thus, individuals who report large reductions in psychological and physical distress over the course of binge eating are distinguished by personality features and not by eating disorder features apart from duration of illness.

2.3. Predictive validity of the BEAC RC index

The 89 participants who completed treatment were categorized according to frequency of eating symptoms at 4-month follow-up on the EDE interview: those who reported zero episodes of binging and vomiting (asymptomatic, $n=27$ [30%]), and those who reported one or more episodes (symptomatic, $n=62$ [70%]). For the RC group ($n=24$), only 2 (8%) were asymptomatic. For the No-RC group ($n=65$), 25 (39%) were asymptomatic. Those who showed large changes on the BEAC (RC group) were significantly less likely to be asymptomatic following treatment than those who showed smaller changes on the BEAC (no-RC group), $\chi^2(1, N=89)=7.53$, $p<0.006$. The ability of the RC index to predict

Table 3
Differences between BEAC RC and No-RC groups on psychopathology and therapeutic outcome

Measure	RC group ($n=37$)		No-RC group ($n=102$)		$t(137)$	p
	M	(S.D.)	M	(S.D.)		
Nonspecific psychopathology						
Rosenberg Self-esteem Scale	21.7	(4.7)	24.9	(5.7)	−3.06	0.003
Beck Depression Inventory	23.5	(10.0)	19.1	(11.3)	2.11	0.037
EDI Ineffectiveness	14.4	(6.5)	9.2	(7.0)	3.91	<0.001
EDI Perfectionism	11.3	(3.8)	7.9	(4.9)	3.86	<0.001
EDI Interpersonal Distrust	6.8	(4.4)	5.1	(4.5)	1.99	0.049
EDI Interoceptive Awareness	14.8	(6.8)	10.7	(7.0)	3.02	0.003
EDI Maturity Fears	4.1	(4.8)	3.3	(3.8)	0.96	0.339
Specific psychopathology						
Duration of illness (years)	9.3	(6.1)	6.4	(5.5)	2.66	0.009
EDI Drive for Thinness	15.8	(4.5)	15.4	(4.7)	0.43	0.667
EDI Bulimia	13.5	(4.7)	12.3	(4.6)	1.32	0.189
EDI Body Dissatisfaction	19.0	(7.1)	18.0	(7.5)	0.71	0.481
EDE episodes of binging	30.8	(31.5)	27.6	(22.0)	0.84	0.405
EDE episodes of vomiting	53.0	(88.4)	36.3	(39.6)	0.36	0.722
Therapeutic outcome						
Asymptomatic at follow-up	8%		39%		7.53[a]	0.006

BEAC=Binge Eating Adjective Checklist; RC=Reliable Change; EDI=Eating Disorder Inventory; EDE=Eating Disorder Examination; episodes of binging and vomiting=*f* over 28 days at pretreatment; asymptomatic at follow-up=zero episodes of binging and vomiting over 28 days at 4-month posttreatment follow-up.
[a] χ^2 test with 24 RC and 65 No-RC participants.

therapeutic outcome was examined using odds ratio. Those who showed smaller changes on the BEAC (No-RC group) were 6.88 times as likely to be asymptomatic as those who showed larger changes on the BEAC (RC group). The 95% confidence interval for the odds ratio was 1.49 and 31.79. Thus, individuals who report large reductions in psychological and physical distress over the course of binge eating appear very resistant to treatment.

3. Discussion

The BEAC appears to offer a methodology for studying the phenomenology of binge eating. Participants nominated a plethora of adjectives to describe their experience in the moments leading up to a binge episode. At the level of individual items, at least two-thirds of participants reported feeling anxious, depressed, frustrated, helpless, lonely, bored, no will power, out of control, and craving food. The pattern of nomination was not haphazard as the factor structure of the BEAC yielded seven scales that were both internally and temporally consistent; Negative Affect, Self-criticism, Positive Affect, Arousal, Apathy, Fatigue, and Hunger. Thus, individuals with eating disorders are able to retrospectively and reliably identify affective and somatic experiences associated with binge eating.

The origins of these pre-binge experiences remain to be elucidated. In the present study, the Composite scale represents the linear combination of the seven factorially derived scales, and it is the

best reflection of the magnitude of dysphoria experienced by participants prior to binge eating. It correlated significantly ($p<0.002$) with a number of indices of psychopathology; depression (BDI; $r=0.40$), low self-esteem (EDI Ineffectiveness; $r=0.47$ and RSES; $r=-0.33$), perfectionism (EDI Perfectionism; $r=0.24$), and interceptive awareness (EDI Interceptive Awareness; $r=0.41$). While this study lacks baseline data by which to compare the magnitude of distress just prior to binge eating, it does indeed appear substantial.

As predicted, people reported amelioration in these negative psychological and physical states during the act of binge eating. The largest reduction was observed on the Hunger scale which is not at all surprising given the nature of the biological act of eating (Blundell & Hill, 1993). Both RC and no-RC groups reported large and comparable reductions in Hunger during the binge itself. The majority of these participants reported craving food (79%) and hunger (57%) prior to binge eating. This is consistent with the observation that people with bulimia nervosa are calorically deprived in the hours leading up to a binge episode (Davis, Freeman, & Garner, 1988). It suggests that hunger is one common motivating factor that serves as a discriminative stimulus for binge eating. The observation also supports the therapeutic strategy in cognitive-behavioral therapy to reduce the biological press to binge through reduction of restrained eating among individuals with eating disorders.

The RC group was arithmetically defined as individuals who reported statistically reliable reductions in negative affective and somatic states over the course of binge eating. Roughly one-quarter of the entire sample met this criterion. Such individuals reported large reductions in Hunger as well as Negative Affect, Self-criticism, Arousal, Fatigue, and substantial increases in Positive Affect over the course of binge eating. Such individuals epitomize the functional hypothesis in which binge eating is seen as an appetitive behavior that serves to diminish aversive self-awareness. It is of interest that personality features rather than severity of eating disturbances distinguished between those individuals for whom binge eating placates aversive self-awareness and those who do not. Indeed, the RC group evidenced significantly greater perfectionism and diminished self-esteem, two personality features implicated by Heatherton and Baumeister (1991) as the psychological catalyst for enhancing aversive self-awareness, leading ultimately to the act of binge eating to temporarily escape from such awareness. This group also reported higher EDI Interoceptive Awareness scores which suggests they are prone to difficulties in the accurate detection of emotions and visceral states of hunger and satiety (Garner & Olmsted, 1984). Such difficulties could further enhance aversive self-awareness.

Perhaps the most intriguing observation of the present study is that individuals who reported greatest reductions in psychological and physical distress over the course of binge eating were less able to completely relinquish their eating symptoms over the course of treatment. From a functional analytic perspective, it is logical that a symptom that serves a psychological function would be more resistant to extinction. Indeed, these individuals also reported a longer duration of illness, implying that the mood modulating function of binge eating in a minority of such individuals serves to perpetuate the eating symptom over time in spite of therapeutic efforts for symptom reduction. Therapeutic implications for this observation are that reduction in dietary restraint should be a therapeutic focus for the typical individual whose eating disturbance includes binge eating, while additional therapeutic efforts to promote adaptive mood modulation would be required for a minority of individuals. The use of the Binge Eating Adjective Checklist described herein may facilitate detection of such individuals, and the early institution of appropriate therapeutic strategies to deal with both therapeutic foci as warranted.

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EATING BEHAVIORS

Parental rearing behaviours and eating disorders: The moderating role of core beliefs

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Abstract

Objective: Core beliefs have been shown to mediate between eating psychopathology and dysfunctional parent–daughter interactions. However, the possible moderating role of core beliefs has been neglected. This study aimed to explore the hypothesis that core beliefs serve as moderator variables in the relationship between recalled parental rearing behaviours and eating psychopathology.
Method: Sixty-six women with a current eating disorder completed self-report measures of parental rearing behaviours, core beliefs, and eating psychopathology.
Results: Three core beliefs were found to moderate the relationship between paternal rejection and aspects of eating psychopathology. The predictive validity of paternal rejection on aspects of eating symptomatology was found to decrease as dysfunctional core beliefs increased.
Discussion: When levels of social isolation, vulnerability to harm, and self-sacrifice core beliefs were high, recalled parental relationships were no longer relevant to current eating psychopathology. The findings provide further evidence that core beliefs are important factors in eating disorder psychopathology and may be clinically useful in identifying targets for treatment.
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Keywords: Core beliefs; Moderation; Parental rearing behaviours

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1. Introduction

Parent–child relationships and abnormal rearing practices are accepted as important factors within a multifactorial model of eating disorder aetiology (e.g., Calam, Waller, Slade, & Newton, 1990; Dare, Le Grange, Eisler, & Rutheford, 1994; Strober & Humphrey, 1987; Ward, Ramsey, Turnbull, Benedettini, & Treasure, 2000). Eating disorder research in both clinical and non-clinical groups has found that women report negative interactions and relationships with their parents (Calam et al., 1990; Palmer, Oppenheimer, & Marshall, 1988; Walters & Kendler, 1995). Evidence also suggests that fathers and mothers of eating disordered women show quite distinct interpersonal styles: mothers tend to be described as overprotective, controlling, and intrusive, and fathers as distant, withdrawn, and passive (Sights & Richards, 1984; Strober & Humphrey, 1987).

Studies of eating disorder aetiology have been criticised for assuming a 'single pathway' model of the process from abnormal attachment and disordered eating (O'Kearney, 1996). Such models assume that disrupted attachments alone provide sufficient explanation for the development of eating disorders and, in doing so, neglect to consider the possible "causal, moderating, and mediating factors", which may occur both concurrently and subsequently to negative childhood experiences (O'Kearney, 1996, p. 124). Several investigations of mediating variables in the relationship between parent–child interactions and eating disorders have been reported. Villejo, Humphrey, and Kirschenbaum (1997) found that activation of internalised images of dysfunctional family relationships triggered emotional distress, which was associated with increased feelings of hunger and hostility in eating disordered women. In addition, maladaptive eating and dieting expectancies mediated the influence of family teasing about weight, and the modelling of negative maternal eating behaviour, on bulimic symptomatology (MacBrayer, Smith, McCarthy, Demos, & Simmons, 2001).

While studies have examined variables which mediate the relationship between parent–child interactions and disturbed eating behaviours, little research has investigated variables that might moderate this relationship.[1] In testing whether internalized shame mediated or moderated the relationships between family dysfunction and bulimic psychopathology, Murray, Waller, and Legg (2000) found that the effect of perceived paternal control was moderated by the individual's level of shame-proneness. However, this relationship was accounted for by individual's internalized shame scores and the overall relationship between family dysfunction and bulimic psychopathology was mediated by internalized shame. Such results indicate a complex relationship between family dysfunction and eating disorders, and strengthen the impetus for further examination of the variables and processes, which might underpin this relationship.

Underlying maladaptive core beliefs have been repeatedly shown to be important in the aetiology of eating disorders (e.g., Leung, Thomas, & Waller, 2000; Waller, Dickson, & Ohanian, 2002; Waller, Ohanian, Meyer, & Osman, 2000). Maladaptive core beliefs represent the deepest level of cognition, that develop as a result of dysfunctional interactions with significant others in the first few years of childhood (Young, 1990). Leung et al. (2000) have provided evidence that maladaptive core beliefs in eating disordered women might be explained by perceptions of parental bonding. Recent work with nonclinical samples has found that defectiveness/shame and dependence/incompetence core beliefs mediated the

[1] Baron and Kenny (1986) highlight the difference between third variables, which act as mediators and those that act as moderators. While mediators explain how an effect occurs, moderator variables affect the direction or strength of the relationship between a predictor and outcome.

relationship between parental bonding (maternal and paternal care and maternal overprotection) and eating disorder symptoms (Turner, Rose, & Cooper, 2005) and mistrust/abuse beliefs mediated the relationship between paternal overprotection and the severity of bulimic behaviours (Meyer & Gillings, 2004).

Despite evidence suggesting that core beliefs are important to eating disorder psychopathology and that they act as specific mediators in the relationship between aspects of recalled parenting and disordered behaviour, no investigations have assessed the possible moderating role of core beliefs in the family dysfunction-eating disorder relationship. In addition to finding a strong link between unhealthy parental bonding behaviours and dysfunctional core beliefs in eating disorders, Leung et al. (2000) also found that high levels of perceived paternal care had an adverse effect on bulimic individuals, such that they felt more socially undesirable and vulnerable to harm. Thus, it seems that negative parental rearing behaviours may not always lead to greater eating psychopathology through the development of higher levels of core beliefs, and that core beliefs may have a multiple, complex roles to play in the relationship between family dysfunction and disordered eating. The aim of the present study was to examine the possible moderating role of core beliefs in the relationship between parental rearing behaviours and eating psychopathology. It was hypothesised that more negative perceived parental rearing behaviours would be associated with more severe eating psychopathology and that this relationship would be moderated by the levels of individual core beliefs.

2. Methods

2.1. Participants

Members of the Eating Disorder Association (EDA) who had voluntarily registered to take part in research were mailed a questionnaire pack for the study. The EDA is a national charity, which provides information and support for individuals with eating disorders and their families. As most of the previous research regarding core beliefs had used female subjects (e.g., Leung, Waller, & Thomas, 1999; Waller et al., 2000), inclusion criteria were females with a current eating disorder. Sixty-six questionnaires were returned (response rate = 55%). These women had a mean age of 32.52 years (S.D. = 9.69, range = 16–59) and a BMI of 18.86 (S.D. = 3.91, range = 12–35).

2.2. Measures and procedure

Participants completed three self-report measures: the Eating Disorder Inventory (EDI; Garner, Olmsted, & Polivy, 1983); the Young Schema Questionnaire-Short Form (YSQ-SF; Young, 1998) and the short form of the Egna Minnen Betraffande Uppfostran (EMBU: 'My Memories of Upbringing'; Arrindell et al., 1999).

2.2.1. The Eating Disorder Inventory

The EDI is a 64-item questionnaire designed to assess psychological characteristics and symptoms relevant for anorexia and bulimia nervosa. The EDI consists of eight subscales, which can be split into two clinically relevant aspects, eating attitudes, and ego dysfunction characteristics. As the present study was concerned mainly with the symptomatic aspects of disordered eating, only the eating attitudes subscales (drive for thinness, bulimia, and body dissatisfaction) were used. Respondents rate how each

item applies to them, ranging from "always" to "never" and higher scores represent greater level eating related psychopathology. The EDI has been the measure of choice in the investigation of eating psychopathology. It has been shown to produce positive correlations with clinician ratings, patterns of convergent, and discriminant validity with other psychometric measures (Garner & Olmsted, 1984), and to have good predictive validity (Norring, 1990).

2.2.2. Young Schema Questionnaire-Short Form

The YSQ-S is a 75-item self-report questionnaire measuring levels of 15 core beliefs. A higher mean score for each subscale (range = 1–6) indicates a more dysfunctional belief. The 15 schemas are: abandonment (close relationships will end imminently), dependence/incompetence (one can not cope without others), defectiveness/shame (one is internally flawed and unlovable), emotional deprivation (one's emotional needs will never be met), emotional inhibition (emotions must be inhibited), enmeshment (emotional over-involvement with others), entitlement (one can act without consideration for others), failure to achieve (one is incapable of performing well), insufficient self-control/self discipline (one cannot control impulses or feelings), mistrust/abuse (one will be hurt or used by others), subjugation (one must submit to the desires of others), social isolation (one is different and isolated from others), self-sacrifice (one should satisfy others' needs), unrelenting standards (one should strive for high standards), and vulnerability to harm and illness (one has no control over the threat of disaster). The YSQ-S has shown Good reliability and validity and equivalent psychometric properties to the long form (Waller, Meyer, & Ohanian, 2001).

2.2.3. EMBU-Short Form

Parental rearing behaviours were assessed using the EMBU. The measure was designed to assess adult's perceptions of their parents' rearing behaviour and contains three subscales (rejection, emotional warmth, and protection), which can be scored separately for each parent. Rejection represents elements of punitive, shaming, and indifferent behaviour, favouring of siblings over the subject, and verbal or physical hostility by the parent. Emotional warmth entails physical and verbal signs of parental love, affection, and acceptance. Finally, protection refers to overprotective behaviour and contains items relating to attempts made by the parents to control their child's behaviour, over-concern about their safety, and intrusive over involved behaviour. High scores on the rejection and protection subscales and low scores on the Emotional Warmth scale indicate more negative recalled parental rearing behaviours. The questionnaire has been translated into other languages and validated in many countries (e.g., Arrindell et al., 1986, 1988; Huang, Someya, Takahashi, Reist, & Tang, 1996; Ross, Campbell, & Clayer, 1982). The present study utilised the short (23-item), English version of the questionnaire (s-EMBU; Arrindell et al., 1999), this version has been found to be functionally equivalent to the longer form, showing good internal reliability and construct validity (Arrindell et al., 1999).

2.3. Data analysis

Kolmogorov–Smirnov Z tests indicated that the data was normally distributed and therefore parametric analyses were used throughout. A series of correlational analyses (Pearson's) were conducted to determine the bivariate association between the s-EMBU and EDI subscales. A Bonferroni correction was conducted to reduce the risk of type I error and yielded a revised α of .003 (Grove & Andreasen, 1982). The moderating role of core beliefs was tested by examining the main effects and interaction

effects of parental rearing behaviours and core beliefs in predicting the EDI subscales. Moderation is indicated when a causal relationship between two variables changes as a function of a third variable. The moderator effect is shown if the product term of the independent variable and hypothesised moderator is significant when their main effects are controlled (Baron & Kenny, 1986). The effects of the independent variable for different levels of the moderator were tested by simple slope analysis (Aiken & West, 1991).

3. Results

3.1. Descriptive statistics

The women's mean scores on the EDI eating scales were as follows: drive for thinness = 14.38 (S.D. = 5.82), bulimia = 6.03 (S.D. = 5.76), and body dissatisfaction = 19.67 (S.D. = 7.54). These scores were similar to the norms for clinical eating disorder populations (Garner, 1991). Finally, the women's mean scores on the parental rearing subscales were: maternal rejection = 13.84 (S.D. = 5.48), maternal emotional warmth = 13.32 (S.D. = 5.19), maternal protection = 23.84 (S.D. = 6.99), paternal rejection = 14.45 (S.D. = 6.02), paternal emotional warmth = 12.27 (5.19), and paternal protection = 23.05 (S.D. = 6.93).

The women's mean YSQ-S scores were: emotional deprivation = 4.17 (S.D. = 1.35), abandonment = 4.00 (S.D. = 1.44), mistrust/abuse = 3.73 (S.D. = 1.37), social isolation = 4.38 (S.D. = 1.44), defectiveness/shame = 4.41 (S.D. = 1.39), failure to achieve = 3.85 (S.D. = 1.49), dependence/incompetence = 3.00 (S.D. = 1.11), vulnerability to harm = 3.37 (S.D. = 1.41), enmeshment = 2.60 (S.D. = 1.58), subjugation = 3.90 (S.D. = 1.30), self-sacrifice = 3.86 (S.D. = 1.23), emotional inhibition = 3.59 (S.D. = 1.49), unrelenting standards = 4.81 (S.D. = 1.12), entitlement = 2.51 (S.D. = 0.92), and insufficient self-control = 2.81 (S.D. = 1.19). These results were comparable with those found in other clinical eating disorder samples (e.g., Leung et al., 1999; Waller et al., 2000).

3.2. Association of parental rearing behaviours with eating symptomatology

The associations between the EMBU and EDI subscales were assessed using Pearson's r correlational analyses. At the revised α level only two paternal rearing behaviours were associated with eating scores (Table 1). Drive for thinness was significantly associated with paternal rejection and paternal protection. Paternal rejection was also positively associated with bulimia and body dissatisfaction.

Table 1
Correlations among measures of eating symptomatology and parental rearing behaviours

	Drive for thinness	Bulimia	Body dissatisfaction
Maternal rejection	.266	.023	.319
Maternal emotional warmth	−.065	−.116	−.223
Maternal protection	.300	−.079	.258
Paternal rejection	.334*	.339*	.320*
Paternal emotional warmth	−.023	−.142	−.217
Paternal protection	.348*	.072	.241

* $P < .003$.

3.3. The moderating role of core beliefs

Simultaneous regression analyses were used to assess whether core beliefs moderated the relationships between paternal rejection and protection and eating psychopathology. The interactions between paternal rejection and social isolation, and paternal rejection and vulnerability to harm were significant predictors of drive for thinness ($\beta = -1.11$, $p < .05$; $\beta = -1.46$, $p < .001$, respectively). In addition, the interaction between paternal rejection and self-sacrifice predicted body dissatisfaction ($\beta = -1.10$, $p < .05$). Core beliefs did not moderate the effect of paternal protection on drive for thinness or the effect of paternal rejection on bulimia.

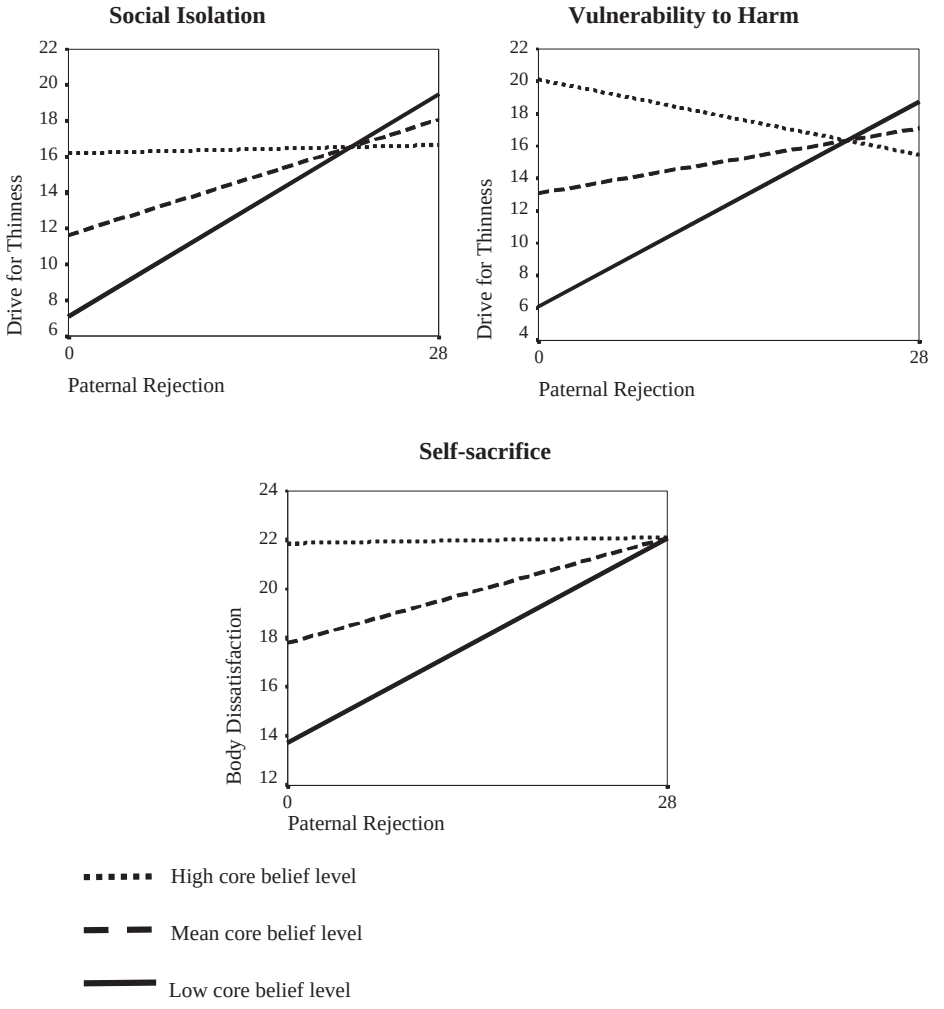

Fig. 1. Simple regression slopes for moderation analysis. The top two graphs show regression of paternal rejection on drive for thinness for three levels of social isolation and vulnerability to harm beliefs, the bottom graph shows the regression of paternal rejection on body dissatisfaction for three levels of self-sacrifice beliefs. The low core belief level represents 1 S.D. below the mean, moderate core belief levels represents the mean value of the core belief and the high level represents 1 S.D. above the mean.

The significant interactions were investigated further using simple slope analyses. Slopes for the regressions of paternal rejection on eating symptomatology were computed at three levels of the moderator: the mean score (moderate), one standard deviation below (low), and one standard deviation above the mean (high). Fig. 1 shows the resulting plots. For the paternal rejection × social isolation interaction, when social isolation was low or moderate, paternal rejection positively predicted drive for thinness ($\beta = .51$, $p < .01$; $\beta = .27$, $p < .05$, respectively). However, when social isolation beliefs were high, paternal rejection was no longer predictive of drive for thinness ($\beta = .02$, NS).

Similar patterns were observed for the other two models. For the paternal rejection × vulnerability to harm interaction the slope analysis showed that, when the core belief was low, paternal rejection was predictive of drive for thinness ($\beta = .53$, $p < .001$), but this relationship did not exist at higher levels of the core belief (moderate: $\beta = .17$, NS; high: $\beta = -.19$, NS, respectively). Finally, the paternal rejection × self-sacrifice interaction showed that, at low and mean levels of the core belief, paternal rejection was positively predictive of body dissatisfaction ($\beta = .69$, $p < .01$; $\beta = .35$, $p < .05$, respectively); however, when levels of self-sacrifice beliefs were high, paternal protection was not predictive of body dissatisfaction ($\beta = .02$, NS).

4. Discussion

The aim of this exploratory study was to investigate the role of core beliefs as moderators in the relationship between parental rearing behaviours and eating psychopathology. Only more negative paternal rearing behaviours (rejection and protection) were found to be related to disordered eating attitudes and behaviours. These data show that three core beliefs in particular (social isolation, vulnerability to harm, and self-sacrifice), moderated the predictive influence of paternal rejection on eating psychopathology. Both social isolation and vulnerability to harm beliefs were found to moderate the relationship between paternal rejection and drive for thinness, while self-sacrifice beliefs moderated the effect of paternal rejection on body dissatisfaction. Closer examination of these moderator effects revealed that the predictive validity of paternal rejection on aspects of eating symptomatology decreased as the level of the core belief increased. When levels of these unhealthy core beliefs were high, recalled parental relationships were no longer relevant to eating psychopathology.

The finding that paternal rejection was predictive of drive for thinness, bulimia, and body dissatisfaction concurs with evidence that paternal rejection is of particular relevance to eating disorder aetiology (e.g., Castro, Toro, & Cruz, 2000; Dominy, Johnson, & Koch, 2000; Stuart, Laraia, Ballenger, & Lydiard, 1990). Previous research has shown that bulimic women reported more paternal rejection than did control women (Stuart et al., 1990). In addition, women with binge eating disorder perceive their fathers as more rejecting than do obese and non-obese women and also perceive their fathers as significantly more rejecting than their mothers (Dominy et al., 2000). Furthermore, Castro et al. (2000) found that, while perceptions of rejection and overprotection did not differ between adolescents with anorexia and adolescents from the general population, a low perception of paternal rejection in anorexia was the highest predictor of a good treatment response.

The effect of paternal rejection on eating psychopathology was moderated by three core beliefs in particular: social isolation, vulnerability to harm, and self-sacrifice. It seems that paternal rejection predicts drive for thinness, except when the individual holds very high level of beliefs that they are isolated from the rest of the world, or fear that an unpreventable catastrophe will strike at any time.

Similarly, paternal rejection predicted body dissatisfaction except when the individual held intense, dysfunctional beliefs about needing to meet other people's needs. However, the findings suggest that, when these beliefs are very high, perceptions of rejection by the father are no longer reliably related to disturbed eating behaviour. There are several possible explanations for such findings. Firstly, eating disordered women with high levels of these core beliefs may not recall their father's behaviour as rejecting and their drive for thinness and body dissatisfaction may be predicted by other factors. Core beliefs have been found to be related to psychopathology comorbid to eating disorders such as personality characteristics (Meyer, Leung, Feary, & Mann, 2001) and depression (Waller et al., 2001). Thus, other variables related to high levels of dysfunctional core beliefs may be predictive of disordered eating, beyond the scope of recalled parental rearing behaviours. Finally, feeling very isolated, in imminent danger or that the needs of others are more important than one's own may affect an individual's report their experiences of parental rearing behaviours. When levels of dysfunctional core beliefs are very high, the individuals employ coping mechanisms such avoidance or overcompensation (Young, 1994) to deal with the extreme negative affect associated with the activation of the dysfunctional core beliefs and, in doing so, may become unable to accurately report the parental rearing experiences at the origin of the beliefs. These explanations are at best speculative, and further investigation of the specific relationships between core beliefs, eating psychopathology, and family interactions are needed to further elucidate the complex role of core beliefs in the causal relationship between parent–child interactions and eating disorders.

The use of a self-report, retrospective measure of parental rearing is a limitation of the present study. However, it has been suggested that, when personality characteristics or pathology are the object of interest, the subject's perception of their parents behaviour is more relevant than their parent's actual behaviour (e.g., Parker, 1984; Perris et al., 1986). Furthermore, previous work with eating disorder samples has shown significant results with self-report measures (e.g., Calam et al., 1990; Palmer et al., 1988; Rhodes & Kroger, 1992). Nevertheless, these data should be treated with caution since the women were a self-selected group and had self reported their current eating disorder status but clinical verification of this status was not available. Therefore, replication of these findings is required in order that they be shown to generalise to formally diagnosed, clinical groups.

Despite limitations, the present study has both theoretical and clinical implications. It demonstrates that the perception of paternal rejection is of particular relevance to aspects of eating psychopathology and complies with suggestions that an increased emphasis on the assessment of father–daughter relationships in connection to eating disorders is required (e.g., Dominy et al., 2000). These findings are also clinically useful in identifying targets for treatment. Previous work has shown that, after a cognitive-behavioural treatment program, only paternal rejection was predictive of short term outcome (Castro et al., 2000) and these data suggest that therapy for eating disorders would benefit from a greater emphasis on this aspect of father–daughter interaction. Individuals who report low to moderate levels of core beliefs are likely to benefit from family therapy or therapy that focuses on exploring the perceived father–daughter relationship. However, individuals with high levels of social isolation, vulnerability to harm, and self-sacrifice beliefs may be more likely to benefit from therapy that targets these specific maladaptive beliefs and their associated coping styles. There is growing agreement that, in order to enhance models of eating disorder aetiology, there is a need to move away from examining the simple relationships between family dysfunction and eating psychopathology (e.g., Murray et al., 2000; O'Kearney, 1996). The present study provides further insight into the different impacts that perceived parental behaviours have on the cognitive content of eating disordered women and therefore helps to

inform the development of a more a dynamic, multidimensional view of the underlying mechanisms involved in eating disorders.

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EATING BEHAVIORS

Consistency of food intake over four eating sessions in the laboratory

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Abstract

Objective: The aim of this study was to test the consistency (repeatability) of laboratory measures of food intake, including eating microstructure (cumulative food intake curves), in non-obese humans across four eating sessions, each separated by 1 week. A secondary aim was to test the effect of dietary restraint on the food intake of female participants.
Methods: Mixed model analyses were used to compare average food intake across sessions, and intraclass correlation coefficients (ICC) were employed to compare within subject variability to total variance. High and low restraint females and low restraint males consumed four lunches in a Universal Eating Monitor (UEM) laboratory. The lunches consisted of one type of sandwich (chicken salad sandwich squares) or three types of sandwiches (chicken salad, ham, and turkey sandwich squares) presented in counterbalanced order.
Results: Measures of food intake were stable for men and women, regardless of sandwich variety. In females, level of dietary restraint (high vs. low) did not significantly affect food intake.
Discussion: The results indicate that eating behavior in the laboratory is sufficiently stable over time to justify evaluation of interventions designed to alter food intake using within subject designs.
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Keywords: Food intake; Eating monitor; Reliability; Consistency; Repeatability; Food intake curves

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Consumption of food is necessary for survival; yet, excessive food intake contributes to a positive energy balance, weight gain, and obesity. The deleterious effects of obesity on health are well documented (Field, Barnoya, & Colditz, 2002), and sound methodology is necessary to understand the causal mechanisms of eating behavior (Hill, Rogers, & Blundell, 1995) and to test the efficacy of interventions to reduce food intake and body weight. One strategy for testing the latter is to administer the intervention in the laboratory and observe its effects on eating behavior. Frequently, a within subjects or repeated measures design is used and participants serve as their own control. These designs assume that: 1) eating behavior in the laboratory is stable across testing sessions, 2) individual characteristics have minimal impact on eating behavior and, if they do, they are controlled experimentally or statistically, and 3) different types of meals have minimal impact on eating behavior, a necessary assumption to generalize the results of the study to other foods. Research examining these assumptions is reviewed below.

Consumption of liquid ad libitum meals in the laboratory has been found to stabilize after four to five testing sessions (Jordan, Wieland, Zebley, Stellar, & Stunkard, 1966). Participants drank a liquid meal from a tube protruding from a wall, behind which the reservoir containing the liquid was hidden. This paradigm eliminated the influence of visual cues on intake, but it did not reflect the typical foods or eating environments of free-living humans. Using solid food in a series of test meals, Barkeling, Rossner, and Sjoberg (1995), concluded that food intake was stable over 5 days. Based on significant test–retest correlations, they also concluded that the "relative rate of consumption" (eating rate during the 1st half of the meal minus that of the 2nd half, divided by total intake), which is one aspect of the microstructure of eating, was stable across sessions for normal weight males. Analysis of variance indicated that relative rate of consumption did not differ across five eating sessions for the entire sample.

Personal characteristics that might influence food intake include gender (males eat more than females) (Bray, 1998), dietary restraint (the intent to restrict food intake), and disinhibition (the tendency to overeat) (Herman & Mack, 1975). After assessing food intake with doubly labeled water, Tuschl, Platte, Laessle, Stichler, and Pirke (1990) concluded that restrained women eat less than unrestrained women do, but laboratory studies of food intake have failed to support this conclusion. Smith et al. (1998) measured the food intake of women in a laboratory and did not find a significant association between dietary restraint, measured by the Eating Inventory (Stunkard & Messick, 1988), and food intake. Alternatively, they found that disinhibition was positively associated with food intake regardless of level of dietary restraint, and disinhibition has been found to be positively associated with body weight (Williamson et al., 1995). Earlier studies did not control disinhibition, which might have contributed to the conclusion that dietary restraint influenced eating behavior. In this study, we planned to study eating behavior in non-obese individuals whose level of dietary restraint, not disinhibition, varied; therefore, we did not recruit individuals who reported high levels of disinhibition.

The type of meal also influences food intake. Food intake increases with greater variety of foods and dissimilarity among the foods impacts the amount of food eaten, i.e., more food is eaten as the dissimilarity among foods increases (Rolls, 1985).

The primary aim of this study was to test the consistency of food intake (amount of food eaten and microstructure) over four sessions in the laboratory using mixed models and intraclass correlation coefficients (ICCs). Cumulative food intake curves, which reflect eating rate across time, were fit with the quadratic model, and the consistency of the linear and quadratic coefficients was examined (see Methods section). The effects of sandwich variety (one type vs. three types of sandwiches), gender, and, for females, dietary restraint were also evaluated.

1. Methods

1.1. Participants

Adult male and female participants ($N=36$) were recruited from staff at the Pennington Biomedical Research Center (PBRC) and undergraduate psychology courses at a local university. Inclusion criteria were: 1) age 18 to 60 years, 2) nonsmoker, 3) body mass index (BMI; kg/m^2) between 18.5 and 26.0, 4) absence of medication use to control body weight, 5) absence of current or past eating disorder, and 6) scoring high (> 12) or low (< 7) on the dietary restraint scale and low (< 7) on the disinhibition scale of the Eating Inventory (Stunkard & Messick, 1988). Females who scored low on disinhibition and high or low on restraint were recruited for the study. An attempt to recruit high restraint/low disinhibition males was not successful; therefore, males were recruited who scored low on restraint/low on disinhibition. All participants scored low on disinhibition; therefore, the groups will be referenced as the low and high restraint groups. Participants received $40.00 for their participation in the study.

1.2. Assessment methods

1.2.1. Eating inventory

The Eating Inventory is a 51-item self-report inventory that measures dietary restraint (intent to restrict dietary intake), disinhibition (tendency to episodically overeat), and perceived hunger (Stunkard & Messick, 1988). The Eating Inventory is frequently used in food intake studies and has established reliability and validity.

1.2.2. Height and body weight

Self reported height and weight were used to calculate body mass index (BMI) for three low restraint females. All other participants' height and weight were measured at the PBRC by research staff.

1.2.3. Universal Eating Monitor (UEM)

The study was conducted at the PBRC's Eating Laboratory in three individual rooms with UEMs, which were constructed following Kissileff, Klingsberg, and Van Itallie (1980). The UEM consists of a scale, hidden in a table, that is connected to a computer that periodically records the weight of a plate of food that rests on the scale. The scale is concealed with a tablecloth and the participant's eating behavior is unobtrusively recorded. The eating session is videotaped to identify and remove artifacts from the data that occur when a participant moves the plate of food. Cumulative food intake (vertical axis) is estimated as a quadratic function of time (horizontal axis). These curves were estimated as a quadratic function; therefore, linear and quadratic coefficients were produced. The linear coefficient reflects motivational forces of eating behavior, and the quadratic coefficient reflects the curvature of the curve and inhibitory forces of eating behavior (Guss & Kissileff, 2000).

1.2.4. Sandwich variety

Two types of test meals were used by providing one type of sandwich (chicken salad) or three types of sandwiches (chicken salad, ham, and turkey) presented in counterbalanced order. The sandwiches were similar in energy density and macronutrient composition based on analysis with the MENu database

Table 1
Nutrient information of the chicken salad, ham, and turkey sandwiches

	Kcal per sandwich	Grams per sandwich	Energy density (kcal per g)	Percent kcal from protein	Percent kcal from carbohydrate	Percent kcal from fat
Chicken salad	276.0	56.8	4.9	27.7	41.7	29.2
Ham	239.8	49.4	4.9	27.0	42.7	28.4
Turkey	292.2	61.5	4.8	29.8	42.2	27.4

The sandwiches were designed to be similar in energy density and macronutrient composition. Abbreviations: Kcal=kilocalorie.

(MENu, 2000) (See Table 1). Participants were provided with a plate containing more sandwich squares than one could typically eat in one sitting (either 15 chicken salad sandwich squares or 5 of each variety).

1.3. Procedure

Participants provided informed consent for participation in the study. An Institutional Review Board approved the study. Participants ate four lunches, each separated by 1 week. The order of the single- and three-variety sandwich meals was counterbalanced. One-half of the participants ate the single-variety meal at visits 1 and 3, and the three-variety meal at visits 2 and 4. The other half of the participants ate the single-variety meal at visits 2 and 4, and the three-variety meal at visits 1 and 3. The meals included a pitcher of water and a drinking glass and were served between 11:00 A.M. and 12:30 P.M. Participants completed each test lunch at the same time of day and were instructed not to eat or drink anything but water from 10:00 P.M. the night before each test lunch.

1.4. Data analytic plan

Mixed model analysis of variances (ANOVAs) were conducted to test if session (day of testing), sandwich variety, gender, and dietary restraint (for females) affected food intake (grams eaten). A similar mixed ANOVA was performed on parameters of the quadratic curve, modeling each person's coefficient as a function of meal variety, restraint, and session as the repeated factor. Intraclass correlation coefficients (ICCs) were calculated for between and total variance estimates from these models to assess the repeatability of food intake across sessions. To test if an ICC differed significantly from zero (alpha=.05), the p-value of the Wald Test for the between subject variance component was utilized. An additional mixed effects model was created to evaluate repeatability for each restraint group for females.

2. Results

2.1. Description of the study sample

The sample was predominantly white/non-Hispanic ($n=32$; 88.9%) (see Table 2). High and low restraint females differed significantly on dietary restraint, $F(1, 24)=153.13$, $p<.0001$, but not disinhibition, $F(1, 24)=0.09$, $p=.77$, or BMI, $F(1, 24)=2.70$, $p=.11$. Low restraint males and females did not differ on restraint, disinhibition, or BMI (all p values >.50).

Table 2
Demographic characteristics of the study sample

Restraint	Total sample ($N=36$)	Females			Males
		All females ($n=26$)	High restraint ($n=13$)	Low restraint ($n=13$)	Low restraint ($n=10$)
Age	22.42 (6.33)	23.15 (7.24)	24.62 (9.33)	21.69 (4.17)	20.50 (2.17)
BMI	22.05 (2.15)	22.11 (2.17)	22.79 (2.09)	21.43[a] (2.12)	21.90 (2.19)
Restraint	7.47 (5.66)	9.00 (5.91)	14.38 (2.43)	3.62 (1.98)	3.50 (1.90)
Disinhibition	3.94 (1.82)	3.96 (1.93)	4.08 (2.10)	3.85 (1.82)	3.90 (1.60)

Group means are represented in this table with standard deviations (S.D.) in parentheses. Low and high restraint females differed significantly on restraint, but not disinhibition or BMI. Low restraint males and low restraint females did not differ significantly on BMI, restraint, or disinhibition.

[a] Self reported height and weight were used to calculate body mass index (BMI) for three low restraint females.

2.2. Consistency of food intake

The food intake (grams) of females did not differ by meal session ($p=.31$), and the sandwich variety by session ($p=.13$), session by restraint ($p=.40$), variety by restraint ($p=.09$), and sandwich variety by session by restraint ($p=.72$) interactions were not significant. Food intake of males did not differ across sessions, $F(3, 21)=1.48$, $p=.25$, and the sandwich variety by session interaction was non-significant $F(3, 21)=0.21$, $p=.89$. Food intake data are summarized in Table 3. ICCs indicated satisfactory consistency or repeatability of the amount of food eaten during the four meals for males and high and low restraint females (see Table 3).

2.2.1. Sandwich variety

The food intake of females and males did not differ by sandwich variety (p's>.17). The food intake means for meals consisting of either one- or three-varieties of sandwiches (collapsed across gender,

Table 3
Intraclass correlation coefficients (ICCs) for total food intake and the linear and quadratic coefficients, and the mean number of grams of food (S.D. in parentheses) eaten by participants

	Females			Males
	All females ($n=26$)	High restraint ($n=13$)	Low restraint ($n=13$)	Low restraint ($n=10$)
ICCs				
Total Food Intake	.69*	.69*	.69*	.80[a]
Linear Coefficient	.68*	.65*	.70*	.87[b]
Quadratic Coefficient	.20	.16	.42	.64
Mean grams eaten across 4 sessions	198.9 (104.1)	175.6 (82.4)	222.2 (118.3)	393.3 (152.5)
Session 1		151.8 (82.0)	212.7 (98.0)	351.9 (122.0)
Session 2		180.5 (66.3)	234.8 (97.8)	406.0 (153.9)
Session 3		190.5 (94.2)	205.1 (119.8)	402.7 (156.0)
Session 4		178.7 (90.8)	239.0 (164.8)	404.5 (184.6)

[a] $p=.05$.

[b] $p=.06$.

* ICC significantly greater than zero ($p<.05$).

session, and restraint) did not differ (single-sandwich = 246 g, S.D. = 146; three-types of sandwiches = 259 g, S.D. = 150).

ICCs for low restraint participants, collapsed across gender, were calculated for the amount of food eaten with the same meal (either single-sandwich or three-types of sandwiches) and different meals (single-food *and* three-food). The ICCs for single-sandwich meals (ICC = .78) and different types of sandwiches (ICC = .74) did not differ significantly ($p = .23$).

2.2.2. Dietary restraint

Food intake did not differ as a function of restraint, $F(1, 24) = 1.64$, $p = .21$. Table 3 depicts average food intake and ICC estimates for high and low restraint females.

2.2.3. Gender

Low restraint males ate significantly more food than low restraint females, $F(1, 33) = 11.07$, $p < .01$. The sandwich variety and session main effects were not significant (p's > .13). The sandwich variety by gender, sandwich variety by session, session by gender, and sandwich variety by session by gender interactions were not significant (p's > .25). Males and females had similar ICCs for the amount of food eaten (see Table 3).

2.3. Eating microstructure: cumulative food intake curves

The average linear coefficient for females did not change with restraint ($p = .91$), but showed a significant interaction of session and sandwich variety ($p < .05$). This interaction was due to the rate of intake for the single-type of sandwich meal being approximately 14 g/min faster than that of the three-sandwich meal in the fourth session. The clinical meaningfulness of this finding is questionable; 14 g of food is equivalent to one bite of food. None of the other quadratic model coefficients showed any differences across session, sandwich variety, and restraint. The ICCs for the linear coefficient were significantly different from zero for all participants, indicating consistency, but the ICCs for the quadratic coefficient were not significantly different from zero (see Table 3).

3. Discussion

Food intake over four sessions in the laboratory was consistent among males and females. Both ICCs and ANOVAs were used to test the consistency of food intake. Food intake was consistent across sessions for high and low restraint females, and sandwich variety did not affect the consistency of food intake. ICCs for men and women were similar, and men ate more food than women. The results suggest that eating behavior in the laboratory is sufficiently stable across sessions to use within subjects designs to test the effects of food products and pharmacological or behavioral interventions designed to alter eating behavior and body weight.

The results of this study indicate that sandwich variety and, for women, dietary restraint did not affect food intake. Previous research has found that food variety and intake are positively associated; more food is eaten as the dissimilarity among foods increases (Rolls, 1985). In the present study, the dissimilarity among the three types of sandwiches was limited, which might explain why food intake was not associated with sandwich variety. Controlling for disinhibition, dietary restraint did not

significantly affect the amount of food eaten by women. This finding is inconsistent with the conclusion that restrained women eat less than unrestrained women (Tuschl et al., 1990; Westenhoefer, Pudel, & Maus, 1990), but it supports the results of Smith et al. (1998) who did not find an association between restraint and food intake. Disinhibition, on the other hand, has been associated with food intake (Smith et al., 1998) and body weight (Williamson et al., 1995), regardless of level of dietary restraint.

The linear coefficient of cumulative food intake curves was consistent across sessions for all participants, but the quadratic coefficient was not. The methods used to calculate intraclass correlation coefficients prohibit statistical tests to determine if the correlations for these two ratios differed significantly for high and low restraint females, but the magnitude of the differences is noteworthy (see Table 3). Based on the results of this study, it is more practical to test interventions that affect the motivational (linear coefficient), but not the inhibitory (quadratic coefficient) aspects of eating behavior using within subject designs. Nevertheless, the quadratic coefficients are very small (e.g., − 0.00014), and the shape of the curves from session to session might not be dramatically impacted by small alterations in this coefficient.

The results of this study should be interpreted in the context of its limitations. First, the study sample consisted of predominantly non-obese, college-age, men and women. Second, the number of men in the sample was limited ($n = 10$). Third, menstrual cycle phase has been found to influence food intake (Buffenstein, Poppitt, McDevitt, & Prentice, 1995), but it was not controlled in this study. It is possible that menstrual cycle phase could have increased the variability of the eating behavior of females during this study, though this variability would likely be random since the four test lunches occurred 1 week apart.

In conclusion, this study provides strong evidence for the consistency of eating behavior in the laboratory. Gender, sandwich variety, and dietary restraint did not influence the consistency of food intake, and only gender affected the amount of food consumed. This study provides support for the use of laboratory-based within subjects designs to test the efficacy of interventions designed to modify food intake and body weight.

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EATING BEHAVIORS

The Minnesota Eating Behavior Survey: A brief measure of disordered eating attitudes and behaviors

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Abstract

This article describes details of the development and psychometric characteristics of a brief self-report inventory for assessing attitudes and behaviors symptomatic of eating disorders that is currently in use in a longitudinal study of over 700 families with 11-year-old or 17-year-old twin girls. The Minnesota Eating Behavior Survey (MEBS), formerly the Minnesota Eating Disorder Inventory, is a 30-item measure developed for use with children as young as 10 years as well as adults. An examination of the MEBS's psychometric properties in a large, community sample of girls, women, and men demonstrated good factor congruence, internal consistency reliability, three-year stability, as well as evidence of concurrent and criterion validity. This questionnaire has promise as a screening and assessment measure for eating disturbance in cross-sectional and longitudinal research involving individuals of a wide range of ages.
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1. Introduction

Many people in Western cultures–especially adolescent girls and young women–experience eating pathology, although relatively few of these individuals have anorexia nervosa or bulimia nervosa.

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Approximately 0.5% of females report a lifetime history of anorexia nervosa, and 1% to 3% of women have a lifetime history of bulimia nervosa. Prevalence of both disorders in males is about one-tenth that of females (American Psychiatric Association, 2000). Eating pathology is believed to occur on a continuum of severity; accordingly, approximately twice as many individuals have been shown to experience subthreshold or atypical eating disorders (EDs) (Fairburn & Walsh, 2002; Shisslak, Crago, & Estes, 1995). Furthermore, severity of eating pathology tends to vary over time. For example, a subset of subclinical cases will eventually develop diagnosable eating disorders, and some with full-fledged EDs will move to subclinical severity (Keel, Mitchell, Miller, Davis, & Crow, 1999). To assess a spectrum of eating pathology and be able to track over time changes in attitudes and behaviors symptomatic of eating disorders, researchers require focused measures that assess eating pathology on a continuum of severity, and that may be used as readily with children as with adults. A need is especially clear for suitable self-report measures tapping a range of these symptoms in community samples, in whom a minority will meet criteria for an eating disorder but many more will experience subthreshold symptoms. It is more cost-effective to screen large samples, such as those participating in community-based studies, using self-report as opposed to interview measures (Garner, 2002).

A number of self-report measures of eating pathology exist. One of the most frequently used self-report measures of eating pathology is the Eating Disorder Inventory (EDI, Garner, Olmsted, & Polivy, 1983a; Garner, Olmsted, & Polivy, 1983b). This 64-item, theoretically derived measure was devised to assess attitudinal, behavioral, and personality characteristics that had been observed among individuals with eating disorders (Garner et al., 1983b). It includes eight subscales, three of which (Bulimia, Drive for Thinness, Body Dissatisfaction) consist of items assessing behaviors and attitudes directly related to eating and weight, and one (Interoceptive Awareness) of which contains two items related to eating behaviors. The remaining four subscales (Ineffectiveness, Perfectionism, Interpersonal Distrust, and Maturity Fears) focus on psychological constructs hypothesized to be relevant to the aetiology of eating disorders. Items are written at the fifth-grade reading level (Williamson, Anderson, Jackman, & Jackson, 1995).

The EDI was developed using a criterion group of female patients with anorexia nervosa (both restrictive and bulimic subtypes) with a mean age of approximately 22 years, and a comparison sample of female university students with a mean age of approximately 20 (Garner et al., 1983a). Since its inception, the EDI and its 91-item revision, the EDI-2 (Garner, 1991), have been used frequently with both clinical and non-clinical populations of varying ages. Among the diverse samples in which the EDI has been administered are some that differ quite dramatically from the normative sample, including community and school-based samples of youths as young as 11 years (McCarthy, Simmons, Smith, Tomlinson, & Hill, 2002; Netemeyer & Williamson, 2001; Rosen, Silberg, & Gross, 1988; Shore & Porter, 1990).

Perhaps because of a paucity of brief, quantitative measures of eating disorder core diagnostic features, it is not uncommon for researchers to use selected subscales of the EDI to assess focal eating disorder-related symptom areas (e.g., Jones, Bennett, Olmsted, Lawson, & Rodin, 2001; Vohs, Bardone, Joiner, & Abramson, 1999). Often investigators do not report the reliability and validity of individual subscales when administered alone, so the psychometric implications of this practice are unclear. Furthermore, some have noted problems with using the EDI with nonclinical samples. Factor analyses of the EDI in nonclinical samples frequently have not supported the rationally derived 8-factor solution for the EDI (e.g., Bennett & Stevens, 1997; Schoemaker, van Strien, & van

der Staak, 1994), suggesting a need for caution when using the EDI in community samples. The variability in factor congruence across samples also raises particular concern about the practice of using selected subscales of the EDI in nonclinical populations. Other clinical research suggests that several of the EDI's subscales may reflect general psychological disturbance and not pathology specific to eating disorders (Cooper, Cooper, & Fairburn, 1985; Hurley, Palmer, & Stretch, 1990). Finally, the EDI was developed for use with adults, not prepubescent children, so its language may not be readily comprehensible to those with reading abilities below the fifth grade level.

Among the other self-report scales used to assess pathology associated with eating disorders are the Eating Disorder Examination Questionnaire (EDE-Q) (Fairburn & Beglin, 1994), Eating Attitudes Test (EAT) (Garner & Garfinkel, 1979), Setting Conditions for Anorexia Scale (SCANS) (Williamson et al., 1995), Multiaxial Assessment of Eating Disorder Symptoms (MAEDS)(Anderson, Williamson, Duchmann, Gleaves, & Barbin, 1999), Bulimia Test-Revised (BULIT-R) (Thelen, Farmer, Wonderlich, & Smith, 1991), and the Stirling Eating Disorders Scales (SEDS) (Williams et al., 1994). Some of these questionnaires emphasize symptoms of either anorexia nervosa or bulimia nervosa but not both (e.g., EAT, SCANS, and BULIT-R), and all were developed for use with adults and late teenagers and so may require adaptation for use with children (Williamson et al., 1995). Comprehensibility may be problematic when using questionnaires formulated for adults with children: for example, a study of the SEDS's psychometric properties among teenagers suggested that younger participants may have had difficulty understanding certain items and concepts (Campbell, Lawrence, Serpell, Lask, & Neiderman, 2002). Questionnaires measuring children's attitudes toward eating behaviors include the Children's Eating Attitude Test (ChEAT) (Maloney, McGuire, & Daniels, 1988) and the Eating Disorder Inventory for Children (EDI-C) (Garner, 1991), an unpublished measure. No published research has assessed the psychometric performance of the ChEAT or EDI-C in adults, so their suitability for use with individuals of a wide range of ages is unknown.

In the early 1990s, the Minnesota Twin Family Study searched for a measure that would allow them to examine disordered eating longitudinally and across cohorts that ranged in age from 11 to adulthood. A comprehensive search of existing measures of eating pathology was conducted and none was found that met these specific needs. Consequently, a short self-report questionnaire was developed to assess a range of behaviors and attitudes associated with eating disorders among community individuals of varying ages, ranging from prepubescent children to adults, for use in this longitudinal study of over 700 families of adolescent twins. This measure, the Minnesota Eating Behavior Survey[1] (MEBS), was designed to (a) provide quantitative indices of behavioral and attitudinal symptoms associated with anorexia nervosa, bulimia nervosa, and binge eating disorder, (b) be brief, (c) employ a simple response format easily understood by those with limited exposure to psychological questionnaires, and (d) use relatively simple language. A brief description of the development and factor analysis of the MEBS was previously presented (Klump, McGue, & Iacono, 2000). In this paper, we give further details of the development of the MEBS, assess its factor congruence, and assess its reliability and validity in children, adolescents, and adults.

[1] The Minnesota Eating Behavior Survey (MEBS; previously known as the Minnesota Eating Disorder Inventory (M-EDI)) was adapted and reproduced by special permission of Psychological Assessment Resources, 16204 North Florida Avenue, Lutz, Florida 33549, from the Eating Disorder Inventory (collectively, EDI and EDI-2) by Garner, Olmstead, Polivy, Copyright 1983 by Psychological Assessment Resources. Further reproduction of the MEBS is prohibited without prior permission from Psychological Assessment Resources.

2. Method

2.1. Participants

Individuals eligible for this study included reared-together female twins and their mothers and fathers participating in the population-based Minnesota Twin Family Study (MTFS). The MTFS is an ongoing longitudinal study of two age cohorts of male and female adolescent twins and their parents (for a detailed description of the design and methods of this study, see Iacono, Carlson, Taylor, Elkins, & McGue, 1999). Families were recruited for study participation when the twins were aged about 11 or 17; follow-up assessments occur every three years for each cohort. The aim of the MTFS is to evaluate genetic and environmental influences on the development of substance abuse and related psychological disorders, including eating disorders.

Approximately 700 same-sex female twin pairs and their parents are taking part in this study. Participating youth gave written informed assent or consent as appropriate, and their parents gave written informed consent. An examination of characteristics of study participants relative to eligible twin families who did not participate showed few large differences between groups, with small differences in socio-economic status and no differences in parental psychopathology (Iacono et al., 1999). These results suggest that participants are broadly representative of Minnesota twin families of the same ages. For any given birth year, the MTFS has been successful at recruiting approximately 84% of twin births in the state of Minnesota for study participation (Iacono et al., 1999).

The sample for the present study includes 804 female twins in the 11-year-old ("younger") cohort, 643 female twins in the 17-year-old ("older") cohort, 735 mothers of female twins, and 650 fathers of female twins. As noted, the MTFS is a longitudinal study with 3-year assessment periods. Data for the girls and mothers of younger twins are presented from both the intake and first follow-up assessments (i.e., when the youths are about 14 and 20 years old). At follow-up, complete data were available for 85.7% of the younger cohort (n=689) and 97.7% of the older cohort (n=628). By contrast, follow-up MEBS data were not available for mothers of older twins, or for any fathers; as a result their data are limited to the intake assessment period.

Detailed information regarding the demographics of this sample at intake can be found elsewhere (Iacono et al., 1999). In brief, 97.9% of the sample was Caucasian; mean years of education were 13.7 for mothers and 14.0 for fathers. Participant mean ages were as follows: younger girls, 11.7 years (S.D.=0.5) at intake and 14.8 years (S.D.=0.6) at follow-up; older girls, 17.4 years (S.D.=0.5) at intake and 20.7 (S.D.=0.6) at follow-up; mothers, 41.9 years (S.D.=5.3) at intake and 42.7 years (S.D.=4.6) at follow-up; and fathers, 43.9 years (S.D.=6.0) at intake.

2.2. Measures

2.2.1. Development and description of the Minnesota Eating Behavior Survey (MEBS)

The MEBS is a 30-item self-report questionnaire that was originally administered to the two MTFS age cohorts of children and their parents. MEBS items came from two sources. First, a subset of 23 items assessing eating disordered cognitions and behaviors, as opposed to personality characteristics, were identified from three EDI subscales: Body Dissatisfaction, Bulimia, and Drive for Thinness. In addition, two behavioral items were drawn from the Interoceptive Awareness

subscale.[2] The language of each of these items was simplified to increase the likelihood that individuals as young as 10 years old would readily comprehend it. For example, the EDI item "I am preoccupied with the desire to be thinner" was revised in the MEBS to read, "I'm always wishing I was thinner." Second, MTFS researchers developed five items to assess compensatory behaviors not already included in the EDI, including self-induced vomiting, abuse of laxatives, diuretics, and diet pills, and exercise. The number of response alternatives was reduced to two ("true" and "false"), again to increase the simplicity of the instrument for use with the 10- and 11-year-old study participants and to ease administration and interpretation.[3]

As described in detail by Klump et al. (2000), previous exploratory factor analyses of MEBS responses from both age cohorts of girls at intake yielded four subscales. In summary, three factors produced an eigenvalue greater than 1.00, and the fourth factor (Weight Preoccupation), with an eigenvalue of 0.85, was retained because of its similarity to the EDI scale Drive for Thinness and its high internal consistency (0.78–0.81). Items were retained if they had factor loadings between +0.3 and −0.3 and did not load higher on any other factor; five items were included on subscales despite factor loadings less than 0.3 because they improved the scale's internal consistency and their content fit the factor. The four factors were labelled Body Dissatisfaction (assessing discontent with body size and shape), Compensatory Behavior (assessing the use of, and thoughts of using, self-induced vomiting and other inappropriate compensatory behaviors to control weight), Binge Eating (assessing binge eating, secretive eating, and preoccupation with food), and Weight Preoccupation (assessing preoccupation with weight, eating, and dieting).

Regarding the administration of the MEBS, the only specific instruction included is "Circle One," noted directly above columns of "T's (for true) and "F"s (for false) on the right side of the questionnaire, with one "T" and "F" corresponding to each item. No time frame is specified, but as this measure is intended to assess current disordered eating attitudes and behaviors, all questions are written in the present tense.[4]

To score the MEBS, each item answered in the symptomatic or pathological direction (usually "yes") receives 1 point and receives no point if the item was scored in the non-pathological direction (usually "no"). Four items require reverse scoring to enable interpretation of the total score and subscale scores as

[2] Note that the proportion of items derived from the EDI vs. new items presented here vary by one item from those presented in Klump et al. (2000) due to a typographical error in the previous report. The correct number of items drawn from the original EDI is 25, as noted here.

[3] At 3-year follow-up, the response format of the MEBS was changed to a 4-point scale (Definitely True, Probably True, Probably False, and Definitely False) to capture a wider range of responses. By then, all participants were at least 13 years of age and so a very simple, dichotomous response format was deemed less important. For the purposes of the present analyses, all follow-up MEBS data were recorded to correspond to the dichotomous format used at intake, thus Definitely and Probably True responses, and Definitely and Probably False responses, were combined. This modification was necessary to examine stability of responses across intake and follow-up assessments. We conducted all of the study's analyses with both the 2-point and 4-point response formats (analyses not shown). Results were essentially identical across these formats. Thus, results are reported here for the 2-point scales only.

[4] In addition to "Circle One," more complex instructions are included on the version of the MEBS with a 4-point response format. Specifically, they state, "Instructions: This questionnaire contains a series of statements that you can use to describe your perceptions about eating and your body. After each item is a scale like this: T t f F. The meaning of the four possible answers is: T=Definitely True; t=Probably True; f=Probably False; F=Definitely False. You should read each statement and decide how you feel about it. First decide if the statement is generally true or generally false of you. Then, indicate how certain you feel–is this definitely or only somewhat accurate–by circling the letter that corresponds with your answer. So, if the statement or item is definitely true for you, then you should circle the T like this: (*example of correctly circled "T" here*). If the statement or item is probably true for you (more true than false), then you should circle the t like this: (*example of correctly circled "t" here*)." Like the version with a dichotomous response format, no specific time frame is specified.

indices of pathological eating attitudes and behaviors. MEBS total scores comprise the sum of scores from all 30 items. Each of the four subscale scores is obtained by summing the scores of all items that comprise the subscale.

The following rules were followed regarding analyses of missing MEBS data. If, for any individual's MEBS total score, <10% of the items were missing, scores were prorated. If >10% of items were missing, the total score was coded as missing. MEBS subscale scores were not prorated due to the small number of items per subscale. Therefore, participants with missing values on these subscales were not analyzed in subscale analyses.

2.2.2. Eating Disorder Examination Questionnaire (EDE-Q) (Fairburn & Beglin, 1994)

We examined the convergent validity of the MEBS among girls with another measure of eating pathology, the EDE-Q (Fairburn & Beglin, 1994). The EDE-Q is a 36-item self-report measure of psychopathology specific to eating disorders that is based upon a structured interview, the Eating Disorder Examination (EDE). EDE-Q items focus on eating disordered attitudes and behaviors over the past 28 days. The EDE-Q has four subscales: Restraint, Eating Concern, Shape Concern, and Weight Concern (Cooper Cooper, & Fairburn, 1989). The EDE-Q uses a 7-point, forced-choice coding scale in which higher numbers correspond to greater severity of a particular feature. The EDE-Q subscales have excellent internal consistency and short-term test–retest reliability (Luce & Crowther, 1999). Comparisons of the EDE-Q with the EDE have found substantial correspondence in reports of individuals' eating pathology on the two measures for unambiguous symptoms such as self-induced vomiting; by contrast, more complex constructs such as binge eating seem to be over reported on the questionnaire version (Black & Wilson, 1996; Fairburn & Beglin, 1994; Wilfley, Schwartz, Spurrell, & Fairburn, 1997). Both age cohorts of girls completed the EDE-Q at the three-year follow-up assessment only, when they were aged approximately 14 and 17 years, and hence were close to the age range of previous EDE-Q research participants (Fairburn & Beglin, 1994). If any items were missing from a scale for an individual, that scale was coded as missing; thus, no EDE-Q scales were prorated. The EDE-Q was not included in the mothers' or fathers' assessments so we could not assess convergent validity for these cohorts.

2.2.3. Structured diagnostic interview

Girls were independently interviewed by MTFS staff regarding lifetime symptoms of anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED) with the Eating Disorders Questionnaire (EDQ). The EDQ is a version of Module H of the Structured Clinical Interview for DSM-III-R (SCID) (Spitzer, Williams, Gibbon, & First, 1987) that was modified to include coverage of BED symptoms, and with probes and questions added to ensure complete assessment of eating disorder symptoms. Given the low frequency of BED diagnoses among the girls, only AN and BN diagnoses were examined in the present study.

Interviews were administered in person by trained bachelor and master's degree-level interviewers or clinical psychology graduate students, who coded each symptom as present, subthreshold (in severity, frequency, or pervasiveness), or absent. A team of two or more advanced clinical psychology graduate students reviewed the structured interviews for each case, supplemented with interview audiotapes as needed. After teams reached consensus regarding the presence or absence of each symptom, lifetime diagnoses were made by computer algorithm. In the present study, *DSM-IV* (American Psychiatric Association, 1994) criteria were used to define AN and BN (American Psychiatric Association, 1994) at

two levels of certainty: *definite* (full *DSM* diagnostic criteria met) and *probable* (one criterion fewer than the minimum *definite* definition; this certainty level is equivalent to a subthreshold eating disorder diagnosis). For the diagnosis to be given at any certainty level, defining symptoms (e.g., low weight in AN and binge eating and purging in BN) and duration were required to be at least subthreshold, or just shy of the frequency criterion for BN.

Agreement for AN and BN diagnoses between consensus teams was assessed. Kappas of self-reported eating disorder diagnosis were adequate at 0.63 for AN and 0.82 for BN.

2.3. Eating disorder and control groups

Using consensus diagnoses, girls were divided into eating disorder or control groups for analyses of the discriminant validity of the MEBS. Specifically, all girls who had received a probable or definite lifetime diagnosis of AN (n=24; mean [standard deviation] age=17.8 [2.5]) or BN (n=14; mean [standard deviation] age=18.5 [2.0]) were included in the AN or BN group, respectively. A composite group, "Any Eating Disorder," included participants who had either an AN or BN diagnosis at a definite or probable level of certainty. Control groups were created by drawing from a random sample of age cohort-matched girls who had no reported eating disorder symptoms by interview, and who were not co-twins of a girl in an eating disorder group. Additionally, we ensured each control group contained no twin pairs. Data for the group of "ED girls" were included in tables where appropriate to describe the psychometric functioning of the MEBS in a group of individuals with probable or definite eating disorders.

2.4. Statistical analyses

All MEBS and EDE-Q scores were transformed ($\log_{10}x$+1) prior to analyses to correct for the positively skewed data. According to convention, however, and to facilitate interpretation, we used raw data to calculate correlations, and report raw means and standard deviations in tables. A conservative p-value of 0.01 was adopted throughout to control the Type I error that might result from the non-independent observations of twins.

To evaluate the fit of the original factor structure with different age groups and samples, following the procedure described by McCrae, Zonderman, Costa, Bond, and Paunonens (1996), we examined the congruence of the four MEBS factors identified in the initial factor analysis, which was based on responses of a subset of MTFS 17-year-old girls at intake (for details of the original factor analysis, see Klump et al., 2000). Note that we assessed factor congruence for some of the same participants from the 17-year-old cohort at a different time point (three years later), as well as several other groups of subjects for whom factor congruence had not yet been assessed. As with the original factor analysis (Klump et al., 2000), four-factor solutions with oblimin rotation were derived separately for four cohorts in the present study (younger and older girls at follow-up, mothers, and fathers). Because the small number of girls with a probable or definite eating disorder diagnosis (n=38) would lead to unstable, unreliable results in a factor analysis, we did not examine the fit of the original four-factor solution in this group. MEBS structure matrix factor loadings for the original sample were correlated with each cohort's structure matrix factor loadings to yield factor congruence coefficients.

For each cohort, to assess the consistency of participants' responses across items, we calculated coefficient alpha for the items making up the MEBS total score and each subscale score. Convergent validity with the EDE-Q and 3-year test–retest reliability between intake and follow-up were examined

using Pearson product moment correlations. We gathered evidence for criterion validity by examining differences in MEBS scores between groups of girls with lifetime probable or definite AN or BN and age-matched, non-eating disordered control participants. These analyses were run separately for identical and fraternal twins to ensure that findings were consistent across the two groups. No substantial differences were found for these two samples (analyses not shown), and thus results are reported for the combined twin sample only. We also considered using other statistical techniques (e.g., hierarchical linear models) to correct for twinship in mean comparisons across eating disordered and control groups. However, there were no co-twins in the control group, and only two and three sets of co-twins in the AN and "Any Eating Disorder" groups, respectively. Because of the very small number of twin pairs in the groups compared, we concluded that traditional *t*-tests were adequate.

3. Results

3.1. Factor congruence

The factor congruence coefficients for each cohort in the present study ranged from 0.48 to 0.97 (see Table 1). Overall, the original factor structure replicated across cohorts: the highest correlations occurred between the same factors, and typically correlations with other factors were relatively low. However, for the Compensatory Behavior factor, a substantial correlation (younger cohort, 0.52; mothers, 0.37; fathers, 0.30) existed with the Binge Eating factor.

3.2. MEBS descriptive analyses

Observed means and standard deviations for the MEBS total score and subscale scores are reported in Table 2 separately for each cohort, which includes both intake and follow-up MEBS scores for the younger and older cohorts of girls, and mothers' and fathers' scores at intake only. Intake data for the subjects with probable or definite eating disorders are also included. In general, MEBS scale means were relatively low among fathers and high among girls with eating disorder diagnoses. Apart from these groups, in general 17-year-old girls tended to report the most disordered eating symptoms and 11-

Table 1
Minnesota Eating Behavior Survey factor congruence coefficients[a] for girls (follow-up), and mothers, fathers, and girls with an eating disorder (intake)

Factors	Younger cohort, age 14 (n=664–689)[b]	Older cohort, age 20 (n=619–628)[b]	Mothers (n=717–735)[b]	Fathers (n=646–650)[b]
Factor 1: body dissatisfaction (BD)	0.89	0.97	0.85	0.86
Factor 2: compensatory behavior (CB)	0.60	0.79	0.48	0.56
Factor 3: binge eating (BE)	0.80	0.73	0.80	0.66
Factor 4: weight preoccupation (WP)	0.96	0.85	0.80	0.80

[a] Factor congruence coefficients consist of Pearson correlations of factor loadings for the original sample of 17-year-old girls with factor loadings for each of the other cohorts listed in the table.

[b] Sample sizes varied due to missing data and the decision not to prorate subscales for any participant if there were any missing values. The ranges presented represent the maximum and minimum sample sizes available for these correlational analyses for each MEBS factor within each cohort.

Table 2
Mean scores and alpha reliabilities for Minnesota Eating Behavior Survey (MEBS) scales in girls (intake and follow-up), mothers and fathers (intake), and girls with an eating disorder (intake)

MEBS scale	Younger cohort		Older cohort		Parents at intake		ED girls at intake (n=36–38)
	Age 11 (n=775–804)	Age 14 (n=664–689)	Age 17 (n=639–643)	Age 20 (n=619–628)	Mothers (n=717–735)	Fathers (n=646–650)	
Total score							
Mean (S.D.)	5.64 (4.86)	5.91 (5.69)	9.30 (6.15)	7.57 (5.80)	8.05 (5.37)	4.24 (4.01)	15.55 (6.86)
Alpha	0.86	0.87	0.89	0.89	0.87	0.84	0.91
Body dissatisfaction							
Mean (S.D.)	1.17 (1.71)	1.89 (2.09)	2.74 (2.24)	2.65 (2.29)	3.71 (2.21)	1.54 (1.69)	3.95 (2.10)
Alpha	0.83	0.85	0.85	0.87	0.85	0.77	0.82
Binge eating							
Mean (S.D.)	1.11 (1.41)	0.89 (1.34)	1.59 (1.57)	1.07 (1.40)	1.33 (1.64)	1.07 (1.28)	2.53 (2.55)
Alpha	0.69	0.68	0.65	0.68	0.75	0.65	0.73
Compensatory behavior							
Mean (S.D.)	0.09 (0.36)	0.24 (0.66)	0.52 (0.99)	0.33 (0.76)	0.19 (0.58)	0.07 (0.33)	1.53 (1.33)
Alpha	0.40	0.60	0.69	0.58	0.53	0.45	0.71
Weight preoccupation							
Mean (S.D.)	2.51 (2.24)	2.38 (2.47)	3.61 (2.51)	2.98 (2.47)	2.36 (2.27)	1.20 (1.58)	6.11 (2.28)
Alpha	0.78	0.85	0.81	0.82	0.80	0.71	0.79

ED: Eating disorder (probable or definite anorexia nervosa or bulimia nervosa).

year-old girls the least, although mothers had higher Body Dissatisfaction scores than 17-year-old girls. Table 3 includes all MEBS items, the subscales they comprise, item endorsement frequencies for each cohort, and indicates which items are reverse-scored.

Intercorrelations of the MEBS total score and subscale scores appear in Table 4. The Total Score and subscale scores were all significantly related to one another in each cohort. The Total Score tended to be substantially correlated with each subscale, especially with Body Dissatisfaction and Weight Preoccupation, subscales that focus on assessing dysfunctional beliefs, rather than behaviors, related to eating pathology. Subscale scores had weaker–yet still moderate–relationships with each other. This pattern of results suggests that subscales tap related but relatively distinct constructs within the domain of disordered eating attitudes and behaviors. Patterns of intercorrelations did not appear to vary substantially by cohort: mean correlations within cohorts were 0.51 (younger cohort, intake); 0.56 (younger cohort, follow-up); 0.60 (older cohort, intake); 0.55 (older cohort, follow-up); 0.49 (mothers); 0.51 (fathers); and 0.64 (girls with an eating disorder).

3.3. Internal consistency

Coefficient alphas for the Total Score and the Body Dissatisfaction and Weight Preoccupation subscales ranged from 0.71 to 0.85 across the different cohorts (see Table 2). Most Binge Eating alphas hovered around 0.70, whereas most Compensatory Behavior alphas were substantially lower (α=0.40–0.71). In general, few participants had endorsed items on these latter subscales, leading to a restricted

Table 3
Item endorsement frequencies for Minnesota Eating Behavior Survey scales in girls (intake and follow-up) and mothers, fathers, and girls with an eating disorder (intake) (in percent)

Item (subscale loading)	Age 11 (n=801–809)	Age 14 (n=686–691)	Age 17 (n=642–643)	Age 20 (n=626–630)	Mothers (n=733–739)	Fathers (n=648–661)	ED girls at intake (n=37–38)
1. I can eat sweets and starches (like potatoes, pasta and bread) without feeling upset or nervous.[a,b]	8.7	7.0	9.0	7.0	8.8	3.8	13.2
2. I often diet to control my weight. (WP)	13.7	15.6	25.8	24.9	23.7	9.5	52.6
3. My stomach is too big. (BD)	19.6	34.3	47.4	49.0	66.6	51.8	50.0
4. I eat when I'm upset about things. (BE)	13.7	21.7	37.2	35.7	45.0	19.7	42.1
5. I have thought about throwing up (vomiting) to lose weight. (CB)	2.1	11.9	22.2	12.9	3.4	1.8	50.0
6. Sometimes I stuff myself with food. (BE)	34.0	24.5	41.7	28.4	31.5	54.4	44.7
7. I think a lot about dieting (or losing weight). (WP)	27.8	35.2	51.6	49.4	44.3	20.3	71.1
8. My thighs are about the right size.[a] (BD)	15.4	35.3	46.2	48.1	64.4	14.4	55.3
9. Sometimes I completely stop eating for more than a day to control my weight. (CB)	4.0	6.7	13.5	6.7	4.7	2.7	34.2
10. I feel terribly guilty if I overeat. (WP)	28.8	28.7	42.3	35.1	26.2	9.2	65.8
11. I am really afraid of gaining weight. (WP)	31.5	35.0	57.9	48.9	30.1	11.6	84.2
12. The shape of my body is fine.[a] (BD)	18.0	25.9	42.0	35.2	62.0	37.5	73.7
13. Sometimes I use laxatives (like Ex-Lax or Correctol) to control my weight. (CB)	0.9	0.3	2.3	1.3	0.8	0.5	7.9
14. My weight is very important to me. (WP)	59.0	54.7	67.3	62.4	52.7	38.9	84.2
15. Sometimes I eat lots and lots of food and feel like I can't stop. (BE)	20.0	8.4	18.7	8.1	9.5	10.0	26.3
16. My butt (behind) is too big. (BD)	11.3	23.7	40.4	37.7	55.5	10.8	50.0
17. I sometimes use diet pills (like Dexatrim, Dietac or Acutrim) to control my weight. (CB)	0.4	2.0	8.2	8.3	7.2	1.8	21.1
18. I'm always wishing I was thinner. (BD)	35.9	38.6	57.5	54.9	56.6	20.5	76.3

19. I think a lot about overeating (eating a really large amount of food). (BE)	13.0	6.0	10.7	6.1	4.9	4.8	18.4
20. Sometimes I have a hard time telling if I'm hungry or not.[b]	45.5	30.2	47.6	30.8	23.4	15.5	73.7
21. I exercise to control my weight more than other women my age.[b]	23.6	16.2	27.6	16.7	15.1	16.3	36.8
22. My hips are just the right size.[a] (BD)	16.4	30.8	40.1	40.3	65.3	20.0	50.0
23. Sometimes, when I'm with other people, I won't eat much, but later, when I'm alone, I'll eat a lot. (BE)	19.6	14.8	28.6	10.7	16.2	8.6	31.6
24. I feel fat or stuffed even after eating a normal meal. (WP)	29.8	23.3	38.6	22.6	17.3	9.7	63.2
25. If I gain a pound, I worry that I will keep gaining more and more weight. (WP)	21.0	18.6	32.8	25.2	16.2	4.5	68.4
26. Sometimes I make myself throw up (vomit) to control my weight. (CB)	0.7	1.7	4.2	2.2	0.8	0.3	23.7
27. Sometimes I eat by myself so that others won't know what I'm eating. (BE)	5.8	4.6	11.4	6.4	12.2	5.4	26.3
28. When I get upset, I'm afraid that I will start eating. (BE)	5.0	8.3	11.2	11.3	14.0	4.3	34.2
29. I often weigh myself to see if I am gaining weight. (WP)	39.3	26.9	44.6	29.1	25.1	16.6	63.2
30. I sometimes use medicine that makes me lose water (diuretics like Sunril, Aqua-Ban, Pamprin, or Midol PMS) to control my weight. (CB)	0.6	0.9	1.1	1.4	1.4	0.0	5.3

ED: Eating disorder (consensus diagnosis made at probable or definite level of certainty); WP: Weight Preoccupation subscale; BD: Body Dissatisfaction subscale; BE: Binge Eating subscale; CB: Compensatory Behavior subscale.

[a] item was reverse-scored prior to analysis.

[b] item is not included on any subscale.

Table 4
Intercorrelations between Minnesota Eating Behavior Survey scales for girls (intake and follow-up) and for mothers, fathers, and girls with an eating disorder (intake)

	BD	CB	BE	WP
Younger cohort, age 11 (n=797–801)				
Total score	0.80	0.41	0.69	0.89
Body dissatisfaction (BD)	–	0.25	0.38	0.62
Compensatory behavior (CB)		–	0.23	0.33
Binge eating (BE)			–	0.45
Weight preoccupation (WP)				–
Younger cohort, age 14 (n=689)				
Total score	0.84	0.61	0.61	0.91
Body dissatisfaction (BD)	–	0.41	0.32	0.69
Compensatory behavior (CB)		–	0.31	0.52
Binge eating (BE)			–	0.41
Weight preoccupation (WP)				–
Older cohort, age 17 (n=643)				
Total score	0.82	0.67	0.66	0.88
Body dissatisfaction (BD)	–	0.43	0.39	0.63
Compensatory behavior (CB)		–	0.36	0.55
Binge eating (BE)			–	0.40
Weight preoccupation (WP)				–
Older cohort, age 20 (n=628)				
Total score	0.83	0.57	0.65	0.89
Body dissatisfaction (BD)	–	0.37	0.36	0.63
Compensatory behavior (CB)		–	0.29	0.46
Binge eating (BE)			–	0.43
Weight preoccupation (WP)				–
Mothers (n=731–734)				
Total score	0.77	0.42	0.74	0.84
Body dissatisfaction (BD)	–	0.16	0.41	0.47
Compensatory behavior (CB)		–	0.27	0.34
Binge eating (BE)			–	0.46
Weight preoccupation (WP)				–
Fathers (n=650)				
Total score	0.80	0.41	0.77	0.83
Body dissatisfaction (BD)	–	0.20	0.47	0.47
Compensatory behavior (CB)		–	0.24	0.35
Binge eating (BE)			–	0.51
Weight preoccupation (WP)				–
Eating disorder girls, intake (n=38)				
Total score	0.90	0.73	0.73	0.85
Body dissatisfaction (BD)	–	0.52	0.58	0.74
Compensatory behavior (CB)		–	0.44	0.44

Table 4 (*continued*)

	BD	CB	BE	WP
Eating disorder girls, intake (n=38)				
Binge eating (BE)			–	0.44
Weight preoccupation (WP)				–

All correlations statistically significant, $p<0.01$.

range of scores, particularly for the Compensatory Behavior subscale. Mothers' alphas for the total score and subscale scores were similar to those of the 14-, 17-, and 20-year-old girls, whereas fathers' and 11-year-old girls' alphas tended to be lower. Alphas for girls with eating disorders were very similar to those found with the 17- and 20-year-old girls, the groups closest to them in age.

3.4. Test–retest reliability

Girls from the younger and older cohorts and mothers of the younger girls completed the MEBS at intake and again at follow-up. Three-year stability Pearson correlations for these three groups, as well as for the subset of girls diagnosed with an eating disorder, appear in Table 5.[5] Correlations ranged from 0.18 to 0.80. Overall, among the large samples of girls and women, MEBS total scores were the most stable (mean (*M*)=0.67) and scales measuring attitudes (Body Dissatisfaction and Weight Preoccupation, *M*=0.63 (BD), 0.58 (WP)) were more stable than scales emphasizing behaviors (Compensatory Behavior and Binge Eating, *M*=0.33 (CB), 0.46 (BE)), and older participants' scores (mothers' *r*=0.39–0.80; *M*=0.66) were more stable than younger participants' scores (younger girls' *r*=0.21–0.59; *M*=0.43; older girls' *r*=0.39–0.61; *M*=0.51). Among girls with an eating disorder diagnosis, Body Dissatisfaction was the most stable scale. Three-year stability coefficients for the remaining three subscales (CB, BE, WP) were low and nonsignificant, suggesting a lack of stability in many eating disorder symptoms over time among girls with eating disorder diagnoses.

3.5. Concurrent validity

We assessed concurrent validity by examining correlations between MEBS scores and EDE-Q scores. These correlations appear in Table 6 for the participant groups that had completed both measures at the same assessment period. Although the MEBS and EDE-Q do not purport to measure precisely the same concepts, both questionnaires assess constructs related to disordered eating attitudes and behaviors, with the EDE-Q subscales emphasizing attitudes to a greater degree than behaviors. We hypothesized we would find highest correlations between the MEBS and EDE-Q total scores, as well as among the following sets of subscales, which measure similar constructs: MEBS Body Dissatisfaction and EDE-Q Weight Concerns and Shape Concerns subscales; MEBS Weight Preoccupation and EDE-Q Eating Concerns, Weight Concerns, and Shape Concerns, and, to a lesser degree, Restraint subscales; MEBS Binge Eating and EDE-Q Eating Concerns subscales; MEBS Compensatory Behavior and EDE-Q total score (as questions about purging on the EDE-Q are included only in a total score and not in any subscale).

[5] Note that the stability estimates previously reported in Klump et al. (2000) were based on a small subsample of the samples presented here.

Table 5
Three-year stability correlations between intake and follow-up Minnesota Eating Behavior Survey (MEBS) scores for girls, mothers of 11 year-old girls, and girls with an eating disorder (ED)

MEBS scale	Younger cohort (n=639–643)	Older cohort (n=601)	Mothers (n=309–310)	ED girls (n=36)
Total score	0.59***	0.61***	0.80***	0.47**
Body dissatisfaction	0.53***	0.61***	0.75***	0.72***
Compensatory behavior	0.21***	0.40***	0.39***	0.18
Binge eating	0.32***	0.39***	0.68***	0.23
Weight preoccupation	0.51***	0.55***	0.69***	0.24

** p<0.01.
*** p<0.001.

Correlations ranged from 0.23 to 0.83 among the younger and older girls, and ranged from 0.37 to 0.74 in the subset of girls with eating disorder diagnoses. As predicted, MEBS total scores demonstrated the strongest correlation to EDE-Q total scores (M=0.78). Correlations among MEBS and EDE-Q scales that assessed similar constructs were moderate to high. The highest correlations tended to follow the predicted patterns, although in general the scales on each measure were significantly intercorrelated. For

Table 6
Correlations of Minnesota Eating Behavior Survey (MEBS) and Eating Disorders Examination Questionnaire (EDE-Q) scores in girls and girls with an eating disorder

MEBS scales	EDE-Q total score	Restraint	Eating concerns	Shape concerns	Weight concerns
Younger cohort, age 14 (n=530–561)					
MEBS total score	0.83***	0.67***	0.73***	0.85***	0.83***
Body dissatisfaction	0.72***	0.54***	0.74***	0.74***	0.74***
Compensatory behavior	0.51***	0.44***	0.44***	0.49***	0.48***
Binge eating	0.44***	0.30***	0.54***	0.42***	0.40***
Weight preoccupation	0.80***	0.67***	0.67***	0.79***	0.78***
Older cohort, age 20 (n=465–487)					
MEBS total score	0.78***	0.58***	0.73***	0.76***	0.76***
Body dissatisfaction	0.68***	0.45***	0.56***	0.70***	0.72***
Compensatory behavior	0.49***	0.40***	0.54***	0.46***	0.46***
Binge eating	0.41***	0.23***	0.54***	0.39***	0.37***
Weight preoccupation	0.72***	0.61***	0.62***	0.70***	0.68***
ED girls, intake (n=25)					
MEBS total score	0.74***	0.62**	0.71***	0.74***	0.70***
Body dissatisfaction	0.67***	0.51*	0.56**	0.71***	0.73***
Compensatory behavior	0.43*	0.37	0.43*	0.43*	0.40*
Binge eating	0.56**	0.51**	0.63**	0.53**	0.47*
Weight preoccupation	0.53**	0.43*	0.51*	0.55**	0.51*

ED: Eating disorder (probable or definite anorexia nervosa or bulimia nervosa).
* p<0.05.
** p<0.01.
*** p<0.001.

the girls with eating disorders, correlations between MEBS and EDE-Q total and subscale scores tended to be similar to correlations involving the follow-up 14- and 20-year-old girls. Correlations were highest between the MEBS total score and EDE-Q total score and subscale scores (r=0.74–0.83), and lowest between the MEBS Binge Eating scale and all EDE-Q scales (r=0.23–0.63). Correlations were intermediate between the remaining MEBS subscales of Compensatory Behavior, Body Dissatisfaction, and Weight Preoccupation and the EDE-Q scales (r=0.37–0.79).

3.6. Criterion-related validity

We hypothesized that, in general, girls with eating disorders would report higher MEBS scores than comparison girls. An exception was our hypothesis that only girls with BN would have higher scores than controls on the Binge Eating subscale. Few AN girls reported any lifetime binge eating, whereas by definition anyone with BN has experienced a pattern of binge eating.

As Table 7 shows, girls with eating disorders tended to have higher MEBS scores than control girls. Not every subscale comparison was statistically significant, but effect sizes tended to be large, with the standardized mean difference, d, ranging from 0.63 to 1.99 for effects in which group differences were predicted. As expected, participants with AN reported levels of binge eating comparable to the control participants, even the subset of girls with AN who also reported in interviews that they had binge eaten (n=5). Low power due to small sample size probably played a role in the latter nonsignificant findings. Neither AN nor BN participants' Body Dissatisfaction scores differed significantly from those of control participants, despite the finding that means of AN and BN participants were between one-half and three-quarters of a standard deviation higher than control means. This difference was significant for the combined "any eating disorder" group, however.

Table 7
Mean differences (standard deviation) in Minnesota Eating Behavior Survey (MEBS) scores between girls with and without eating disorders

MEBS scales	AN			BN			Any eating disorder		
	Affected (n=24)	Unaffected (n=24)	$t(48)$ d[a]	Affected (n=14)	Unaffected (n=14)	$t(26)$ d[a]	Affected (n=38)	Unaffected (n=38)	$t(76)$ d[a]
Total score	13.42	7.29	3.35**	19.21	7.86	4.27***	15.55	7.50	5.01***
	(6.33)	(6.21)	0.97	(6.33)	(5.95)	1.85	(6.86)	(6.04)	1.24
Body dissatisfaction	3.54	2.17	2.39	4.64	3.00	1.54	3.95	2.47	2.82**
	(2.06)	(2.32)	0.63	(2.06)	(2.32)	0.75	(2.10)	(2.32)	0.67
Compensatory behavior	1.21	0.25	4.01***	2.07	0.36	4.68***	1.53	0.29	5.89***
	(1.18)	(0.53)	1.12	(1.44)	(0.63)	1.65	(1.33)	(0.57)	1.31
Binge eating	1.46	1.50	0.07	4.36	1.21	3.43**	2.53	1.40	1.86
	(1.82)	(2.04)	0.02	(2.65)	(1.67)	1.46	(2.55)	(1.90)	0.51
Weight preoccupation	5.83	2.75	3.42**	6.57	2.78	4.51***	6.11	2.76	5.19***
	(2.60)	(2.38)	1.24	(1.55)	(2.26)	1.99	(2.28)	(2.31)	1.46

AN: probable or definite anorexia nervosa; BN: probable or definite bulimia nervosa. The "Any Eating Disorder" category includes all girls in the AN and BN groups.

[a] Standardized effect size.

** p<0.01.

*** p<0.001.

4. Discussion

The purpose of this study was to describe details of the development and psychometric properties of a self-report questionnaire in use by the MTFS that (a) provided a quantitative measure of attitudes and behaviors symptomatic of eating disorders, (b) was brief, and (c) could be used as readily with children as young as 10 years old as with adults. Previous factor analyses yielded four factors: Binge Eating, Body Dissatisfaction, Compensatory Behavior, and Weight Preoccupation (Klump et al., 2000). The initial four-factor solution was replicated in community samples of preadolescent and adolescent girls, women, and men, and psychometric analyses generally supported the reliability and validity of this scale with community-based individuals of a range of ages. Below we discuss in detail the major results of the present study.

4.1. Factor congruence

A four-factor structure was identified previously for the MEBS, based upon a subsample of the present 17-year-old cohort of girls (Klump et al., 2000). Overall, we found that this structure was generally congruent with that found with our large community samples of girls, mothers, and fathers, as all four factors showed moderate to high congruence. The Compensatory Behavior subscale showed the least congruence across samples, likely because of the heterogeneity of its items as well as their low rates of endorsement, although correlations were still moderate. Future research involving large samples of individuals with current eating disorders should assess the fit of the four-factor solution in clinical samples.

4.2. Reliability

We examined two types of reliability: internal consistency and test–retest reliability. The MEBS's scales generally demonstrated satisfactory internal consistency, particularly given the brevity of the measure and its subscales. The MEBS's internal consistency was comparable to that of EDI control respondents (Garner et al., 1983a, 1983b). Nunnally and Bernstein (1994) proposed a cut-off of 0.70 for determining acceptable reliability of scales, and coefficient alphas for the total score and the Body Dissatisfaction and Weight Preoccupation subscales met or exceeded that cut-off. However, the Binge Eating and Compensatory Behavior subscales were less internally consistent, likely for different reasons. The Compensatory Behavior subscale includes questions about four different methods of purging (e.g., self-induced vomiting, laxative use) as well as fasting, and so is more likely to involve heterogeneous responses than the other subscales. Individuals who induce vomiting do not also necessarily use diet pills or laxatives, and vice versa, so this subscale would not be expected to manifest substantial internal consistency. As noted earlier, the construct of binge eating is notoriously difficult to assess by self-report (e.g., Fairburn & Beglin, 1994), probably because of variability in individuals' definitions of binge eating. Our finding that this subscale was less internally consistent than others corresponds with previous findings. Additionally, the lower reliabilities of this subscale for fathers and 11-year-old girls may be due in part to decreased variability because of infrequent positive responses to pathological items, particularly Compensatory Behavior items, among these cohorts.

The MEBS manifested lower reliabilities with the youngest girls (aged about 11 years) and with men. Base rates of eating disorders tend to be low in both prepubescent children and adult males (American

Psychiatric Association, 2000), resulting in infrequent endorsement of pathological eating attitudes and behaviors in these groups.

Considering the substantial time lapse between assessments, the stability of this measure was very good. The MEBS total score three-year test–retest reliability for mothers (0.80) probably demonstrates best the psychometric stability of this instrument, given the developmental stability of these adults. As children progress through the age of risk, their susceptibility to triggers for developing an eating disorder may vary; as a result, we would not expect girls' three-year stability on this measure to be as high as adults'. These three-year stability statistics compare favorably to the one-year reliabilities from the EDI-2 (range=0.44–0.75) (Garner, 1991).

4.3. Validity

We assessed both concurrent and criterion-related validity. The MEBS's concurrent validity is supported by the moderate-to-high correlations between the MEBS's subscales and those of the EDE-Q. Similarly, its criterion-related validity is supported by higher MEBS subscale scores in girls with clinical eating disorders relative to an age-matched, non-eating disorder control group. These results are consistent with previous findings of significantly higher MEBS total scores in adolescent girls and women with vs. without lifetime eating disorder diagnoses (von Ranson, Iacono, & McGue, 2002). Further evidence for the validity of the MEBS's total score and subscale scores comes from previous research that identified significantly higher correlations between monozygotic than dizygotic 17-year-old female twins, suggesting clear genetic effects for the constructs tapped by this measure (Klump et al., 2000).

4.4. Psychometrics of the MEBS among girls with eating disorders

The reliability and validity of this measure has not yet been examined in clinical samples of individuals with eating disorders. Results from reliability and validity analyses comparing 39 girls with subthreshold or threshold AN or BN diagnoses and control girls revealed patterns that were analogous to analyses that had involved the entire sample. These results–from an admittedly small sample of girls with eating disorders–suggest that MEBS is a reliable and valid assessment tool for community-based individuals with eating disorders as well as those without. Note, however, that girls with and without AN or BN did not differ on Body Dissatisfaction subscale scores. This apparently anomalous finding may be due to the lower power of these analyses due to small sample sizes (n=25 AN girls; n=14 BN girls), as group differences were noted when the AN and BN groups were combined, yielding a larger sample size (n=39 eating disordered girls). Furthermore, effect sizes were 0.63 for the AN group and 0.75 for BN group, suggesting that eating disordered girls tended to experience more body dissatisfaction than non-eating disordered girls.

4.5. Conclusions

The present study included twins as well as their parents. The MEBS performed similarly well in reliability and correlational analyses in twins as in their singleton parents, suggesting this measure is useful with a wide range of ages, and with singletons as well as twins. This measure does not provide diagnoses of eating disorders, but instead assesses the severity of global eating-related pathology and

specific areas of difficulty (Body Dissatisfaction, Compensatory Behavior, Binge Eating, and Weight Preoccupation) via subscales. As a result, the MEBS may be useful in measuring longitudinal changes in these behaviors in nonclinical populations.

Several limitations of the present study should be noted. First, certain validity analyses were not completed with all cohorts at each time period, owing to limited assessment time during participants' MTFS visits. However, sufficient reliability and validity analyses were completed with samples at highest risk for manifesting an eating disorder (such as teenage and young adult girls) to support the conclusion that the MEBS is a useful measure. Second, our analyses of criterion-related validity included small numbers of participants, as this study included an epidemiological sample rather than a clinical or treatment-seeking sample, and so included relatively few eating disorder cases. This may have limited our ability to detect significant effects in these analyses. Third, as the MTFS is an epidemiological study, participants are representative of the population of a Midwestern American state. As study participants were largely Caucasian, caution must be used when interpreting scores of individuals of other ethnicities or from other countries. Fourth, the MEBS shares with other assessment measures the problem of being potentially influenced by response biases, such as reluctance to admit certain symptoms. Future research should assess the extent to which response biases are problematic in eating pathology studies.

In sum, the MEBS appears to have potential research and clinical utility in screening for and assessing a range of eating-related pathology in children and adults, with and without clinical eating disorders. Because of its brevity and the ease of administration, the MEBS may prove particularly useful in screening for disordered eating attitudes and behaviors among community-based individuals of varying ages.

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EATING BEHAVIORS

Construct validity and reliability of the College Oriented Eating Disorders Screen (COEDS)

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Abstract

The College Oriented Eating Disorders Screen [COEDS; Nowak, J.A., Roberson-Nay, R., Strong, D.R., Bucceri, J. and Lejuez, C.W. (2003). Using item response theory in the development and validation of the College-Oriented Eating Disorders Screen. *Eating Behaviors, 4*, 345-361] was created for the purpose of identifying college students vulnerable to the development of an eating disorder. In a previous study, the COEDS was developed and tested among a college sample based on the continuum model of eating pathology. Following from this initial study, the purpose of the present study was to examine the internal consistency of the final seven-item version as well as its one month test–retest reliability and construct validity. Results indicated that the COEDS performed well when administered in its brief 7-item final format, yielding high internal consistency. Strong test–retest reliability also was observed. Finally, the COEDS demonstrated sound construct validity, showing statistically significant associations with independent measures of disordered eating beliefs and attitudes, as well as with measures assessing disordered eating behaviors. The results of this study provide further support for the use of the COEDS as a measure targeting college students who possess a vulnerability to development of an eating disorder.
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Keywords: College Oriented Eating Disorders Screen (COEDS); Anorexia nervosa; Bulimia nervosa

Anorexia and bulimia nervosa undoubtedly represent significant mental and physical health issues, with an estimated lifetime prevalence rate of approximately 0.5–1.0% for anorexia nervosa and 1.1–

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3.0% for bulimia nervosa. Beyond individuals meeting diagnostic criteria for an eating disorder, it has been estimated that over half of college women exhibit disordered eating behaviors (Mintz & Betz, 1988). Additional epidemiological data indicates that age of onset is bimodal (i.e., 14 and 18 years), with development or worsening of symptoms associated with psychosocial stress (APA, 2000). For some youth, leaving home for college is associated with considerable stress, which may partly explain the increased rates of disordered eating behaviors among college students.

To better understand similarities and differences among the various types of eating disturbances and disorders, an eating disorders continuum has been posited (Scarano & Kalodner-Martin, 1994). The eating disorder continuum was originally proposed by Nylander (1971) when he observed the high prevalence of distorted beliefs about body image and eating behaviors among female high school students surveyed in Sweden with a majority reporting they "felt fat" at some point, and almost 10% reporting at least three anorexic symptoms associated with weight loss (Nylander, 1971). A dimensional model presumes that asymptomatic, "normal," eaters are placed at one end of a continuum with individuals who have a diagnosable eating disorder at the other extreme. In between these extremes lie a range of eating behaviors varying in degree from milder eating disordered behaviors through behaviors approaching a diagnosable and pathological extreme. In all, evidence supports a dimensional model of eating pathology that ranges from nonpathological to pathological (Garner, Olmstead, Plivy, & Garfinkel, 1984; Mintz, O'Halloran, Mulholland, & Schneider, 1997; Nylander, 1971; Scarano & Kalodner-Martin, 1994; Stice, Killen, Hayward, & Taylor, 1998; Striegel-Moore, Silberstein, & Rodin, 1986; Tylka & Subich, 1999, 2003). Nonetheless, although a continuum model of eating pathology appears to best reflect the full range of the phenomenon, the clinical utility of identifying individuals with diagnosable levels of eating disorders cannot be ignored (Agras, 2003).

To date, most eating disorder measures such as the revised Bulimia Test (BULIT-R; Thelen, Farmer, Wonderlich, & Smith, 1991) and Eating Disorder Inventory (EDI; Garner, Olmsted, & Polivy, 1983) focus on diagnosis or identification of eating pathology. Although these measures are important for the assessment and diagnosis of eating disorders, they are less appropriate for the assessment of individuals at a sub-clinical level who do not currently meet diagnostic criteria. For this reason, there is a need for a measure that is capable of tapping into that continuum to identify college students who may be symptomatic and vulnerable to developing clinically significant symptoms, but who remain unidentified by studies more concerned with current symptoms and diagnosis. To meet this particular need, the College Oriented Eating Disorders Screen was developed by Nowak, Roberson-Nay, Strong, Bucceri, and Lejuez (2003) as a college-focused measure to identify individuals who possess a vulnerability to developing an eating disorder, as opposed to serving as a diagnostic measure of eating pathology. In the development of the COEDS, the researchers began with a large pool of pilot questions and used item response theory to reduce the item pool to seven highly discriminating items that reflected a unidimensional construct of body preoccupation/dissatisfaction (Mulqueen, Baker, & Dismukes, 2002; Nowak et al., 2003). Beyond its focus on more general eating concerns as opposed to clinically significant eating disordered behaviors, one significant advantage of this measure is its brevity, making it easy to administer and interpret.

Although the initial COEDS validation suggested evidence of its utility as a measure of vulnerability to eating disorders among college students, several psychometrically based questions remain. The original study supported the construct validity of the 7-item final version, but when administered within the larger 91-item original version of the measure. In this way, it remains unclear if the 7-item final version will perform as well when administered independently of the other original items. Further, no

data exists on test–retest, leaving questions regarding the stability of the measure over time. Thus, the purpose of the current study was to test the internal consistency and test–retest reliability of the 7-item final version of the COEDS, while providing further evaluation of its construct validity through its association with more standard measures of eating pathology. We predicted strong correlations between the COEDS and subscales assessing disordered eating attitudes and beliefs (e.g., EDI Drive for Thinness, BULIT-R Binging/Control/Body Image) whereas weak correlations were expected to emerge between the COEDS and subscales assessing severe disordered eating behaviors (e.g., BULIT-R Vomiting) and domains indirectly related to eating disordered pathology (e.g., EDI Maturity Fears).

1. Method

1.1. Participants

One hundred and fifty-one undergraduate students attending the University of Maryland, College Park participated in the present study. Participants ranged in age from eighteen to thirty-three (72% female; $M = 19.7$, $SD = 2.34$). Of the sample, 71% identified themselves as Caucasian, 10% as African American, 9% as Asian/Asian American, 3.3% as Latino/Latina, and the remaining participants indicated "other." Because there were only five individuals specifying Latino/Latina as their race, these individuals were placed in the "other" category for data analytic purposes. One person did not report their gender or race. Each individual received research credit in return for study participation.

1.2. Procedures

Upon arrival, participants provided written informed consent. Following the consent process, participants completed a battery of questionnaires (see questionnaires described below). All students were subsequently informed that they were eligible to return in one month to complete another packet of questionnaires for additional course credit, with the understanding that there was no penalty if they chose not to participate. The test–retest battery was distributed in the same manner as in part one of this experiment. All students were invited to return approximately one month later to complete the battery again for additional course credit; fifty-five students returned for the second administration. For both administrations, the COEDS was placed in the beginning, middle, and end in equal proportions to limit order effects.

1.3. Measures of eating disorder vulnerability

1.3.1. College oriented eating disorders screen

The COEDS (Appendix A; Nowak et al., 2003) is a seven-item self-report questionnaire constructed to tap weight concerns and body image preoccupation in college students. The initial measure consisted of 91 items that were reduced using methods based in item response theory. The final seven-item COEDS correlated with the original set of 91 items ($r = .93$, $p < .01$) and demonstrated strong relations with several eating disorder measures and their subscales (e.g., EAT, EDI, and BULIT). As further evidence of its utility as a vulnerability measure versus clinical pathology, the COEDS evidenced modest correlations with severe eating disorder behaviors as assessed by the BULIT-R Vomiting/Laxatives and BULIT-R Diuretics subscales. Internal consistency also was excellent ($\alpha = .92$; Nowak et al., 2003).

1.4. Measures of eating disorder pathology

1.4.1. Bulimia test, revised

The BULIT-R (Thelen et al., 1991) is a 28-item questionnaire that assesses bulimic behavior. This measure is scored on a 5-point Likert-type scale and a total score is derived by summing all 28 items, with a clinical cutoff score of 104. All five BULIT-R factors were evaluated including binging/control/body image, radical measures/fasting, exercise, vomiting/laxatives, and diuretics. Data indicate that the BULIT-R is highly reliable ($\alpha = .97$) and a valid indicator of bulimia (Thelen, Farmer, Wonderlich, & Smith, 1991; Thelen, Mintz, & Vander Wal, 1996).

1.4.2. Eating disorder inventory

The EDI (Garner et al., 1984) is a 64-item self-rating scale developed to assess psychological characteristics of anorexia and bulimia nervosa. Respondents rate items on a six-point scale, ranging from "always" to "never." The EDI has eight scales (i.e., drive for thinness, body dissatisfaction, perfectionism, bulimia, ineffectiveness, interpersonal distrust, interoceptive awareness, and maturity fears) that have proven to be valid and internally consistent (.80 or above within each scale). The EDI is also temporally reliable, with three-week test–retest reliabilities ranging between .65 (maturity fears) and .97 (body dissatisfaction; Wear & Pratz, 1987). As recommended by Garner and Olmstead, percentile conversions are provided for all EDI subscales as well as raw scores.

1.4.3. Eating disorders examination questionnaire

EDE-Q (Fairburn & Beglin, 1994) is a 36-item self-report measure that closely corresponds to questions of the Eating Disorders Examination, a well-established clinical interview (Fairburn & Beglin, 1994). The EDE-Q assesses disordered eating attitudes and behaviors over a 28-day time frame, using a 7-point rating scale. The EDE-Q generates an overall score as well as four subscale scores (i.e. restraint, eating concern, shape concern, and weight concern). Among a sample of women, the EDE-Q subscales have demonstrated acceptable internal consistency and test–retest reliability (restraint, $\alpha = 0.84$, $r = 0.81$; eating concern, $\alpha = 0.78$, $r = 0.87$; shape concern, $\alpha = 0.93$, $r = 0.94$; weight concern, $\alpha = 0.89$, $r = 0.92$; Luce & Crowther, 1999). Although strong agreement between the self-report and clinician administered version of the EDE have been observed for assessment of self-induced vomiting and laxative misuse, significant differences between the two measurement strategies have been identified for the frequency of binge eating (Black & Wilson, 1996; Wilfley, Schwartz, Spurrell, & Fairburn, 1997), with the EDE-Q resulting in underreporting (Fairburn & Beglin, 1994).

1.5. Affective measure

1.5.1. The center for epidemiological studies-depression scale

The CES-D (Radloff, 1977) is a 20-item self-report questionnaire rated on a four point Likert scale, ranging from 0 = rarely or never (less than 1 day in the past week) to 3 = most or all of the time (5–7 days in the past week). Included items assess different components of depressive symptomotology, such as feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. The scale has proven to be highly internally

consistent and reliable (Radloff, 1977). This measure was selected because depression tends to correlate moderately with eating disorder symtomotology. The scale has demonstrated high internal consistency in general ($\alpha = .85$) and with a patient population ($\alpha = .90$), as well as adequate test–retest reliability (Radloff, 1977).

2. Results

2.1. COEDS: normative and descriptive data

Sample means and measures of variability are presented in Table 1 for the COEDS and all other assessed measures. Several features of the COEDS scores distribution were examined including skewness and kurtosis. Results of the Kolmogorov–Smirnov one-sample test indicated that the COEDS score distribution differed significantly from the normal distribution (Kolmogorov–Smirnov $z = 1.06$, $p > .05$). Although the COEDS score distribution exhibited a positive skew, the skew was not significant and there did not appear to be significant clustering of scores as indicated by a measure of kurtosis [skew = .46, SE = .20; kurtosis = − 1.08, SE = .39; see Fig. 1].

Table 1
Means, standard deviations, and range for all eating disorder and associated psychopathology measures

	Mean (SD)		Range
COEDS	18.17 (8.10)		7.00–35.00
EDE-Q			
Dietary restraint	1.49 (1.61)		.00–6.00
Eating concern	1.04 (1.31)		.00–5.80
Shape concern	2.33 (1.80)		.00–6.00
Weight concern	2.00 (1.75)		.00–6.00
Overall	1.72 (1.52)		.00–5.50
EDI[a]			
Bulimia	2.08 (3.92)	64.49 (17.34)	.00–20.00
Body dissatisfaction	8.76 (7.54)	47.61 (27.70)	.00–27.00
Drive for thinness	4.67 (6.13)	50.86 (27.85)	.00–21.00
Ineffectiveness	2.68 (3.98)	65.99 (19.04)	.00–22.00
Interoceptive awareness	3.10 (4.69)	63.74 (21.65)	.00–28.00
Interpersonal distrust	2.54 (3.65)	74.43 (15.89)	.00–19.00
Maturity fears	3.73 (3.54)	72.11 (22.62)	.00–19.00
Perfectionism	6.42 (4.24)	59.34 (26.81)	.00–17.00
BULIT			
Binging/control/body image	48.14 (16.08)		28.00–97.00
Radical measures/fasting	10.59 (5.75)		6.00–29.00
Exercise	3.31 (1.70)		2.00–10.00
Vomiting	5.05 (1.88)		4.00–13.00
Diuretics	2.09 (0.71)		2.00–10.00
Total	69.22 (22.78)		42.00–144.00
CES-D	16.14 (10.15)		.00–49.00

[a] Note: first values represent raw scores and second values represent converted subscale scores.

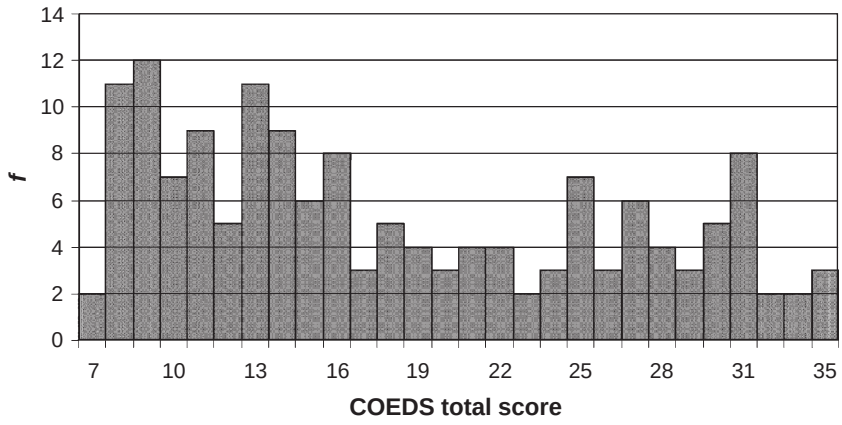

Fig. 1. COEDS score distribution across the entire sample.

2.2. COEDS and demographic relations

Analyses of potential associations between COEDS scores and various demographic factors were examined. Results indicate a statistically significant gender difference ($F(1, 148) = 36.00$, $p < .001$,

Table 2
Zero-order correlations between the COEDS and the EDE-Q, EDI, BULIT, and CES-D

	COEDS
EDE-Q	
Dietary restraint	.76**
Eating concern	.80**
Shape concern	.88**
Weight concern	.87**
Overall	.89**
EDI	
Drive for thinness	.82** (.86**)
Interoceptive awareness	.50** (.51**)
Bulimia	.60** (.72**)
Body dissatisfaction	.71** (.71**)
Ineffectiveness	.57** (.52**)
Maturity fears	.09 (.08)
Perfectionism	.15 (.15)
Interpersonal distrust	.12 (−.01)
BULIT	
Binging/control/body image	.79**
Radical measures/fasting	.71**
Exercise	.43**
Vomiting	.28**
Diuretics	.10
Total	.81**
CES-D	.40**

**$p < .001$; values in parentheses represent correlations between the COEDS and converted subscale scores of the EDI.

$\eta_2 = .20$), with women ($M = 20.38$, $SD = 8.00$) scoring higher than men ($M = 12.40$, SD = 5.08). Examination of race also yielded significant differences ($F(3, 146) = 4.73$, $p < .01$, $\eta_2 = .09$), with Caucasians ($M = 19.57$, SD = 8.40) differing significantly from Asian ($M = 14.21$, SD = 5.19) and African American ($M = 12.73$, SD = 4.42) participants but not differing from subjects in the "other" ($M = 17.87$, SD = 8.03) race category.

Given the observed race/ethnic differences in COEDS scores, correlations between the COEDS and subscales of all administered eating disorder measures were conducted for Caucasians and non-Caucasians. Correlations were then transformed to z scores using r-to-z transformations. No significant differences (all ps > .05) in z scores emerged between Caucasian and non-Caucasians, suggesting that the observed differences in group means reflect variations in the number of self-reported disordered eating symptoms rather than qualitative dissimilarities between Caucasians and non-Caucasians.

2.3. Internal consistency and convergent validity

Continuing to support the reliability of the COEDS, internal consistency in the current study was excellent ($\alpha = .92$). With regard to convergent validity, the COEDS demonstrated significant correlations with related eating disorder measures and their subscales (see Table 2 for correlation values). Strong associations were observed between the COEDS and the EDI Drive for Thinness, EDI Body Dissatisfaction, BULIT binging/control/body image subscale, BULIT radical measures/fasting, BULIT total score, and all subscales of the EDE-Q including its global score (all rs > .70, ps < .001). COEDS scores correlated moderately with the EDI Interoceptive Awareness, EDI Bulimia, EDI Ineffectiveness, and BULIT Exercise. A low association was found between the

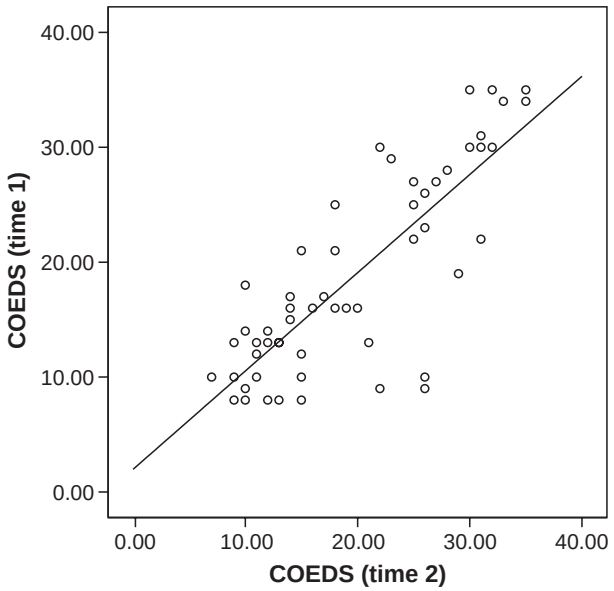

Fig. 2. COEDS test–retest scatterplot for time 1 and time 2 administrations.

COEDS and the BULIT Vomiting/Laxatives subscale while non-significant associations emerged between the COEDS and the EDI Maturity Fears, EDI Perfectionism, EDI Interpersonal Distrust, and BULIT Diuretics subscales.

2.4. Divergent validity

As expected, the COEDS correlated moderately with depressive symptoms assessed by the CES-D ($r = .37$, $p < .01$).

2.5. Test–retest reliability

Fifty-five students returned to complete the COEDS a second time. Students ($M_{COEDS} = 18.78$, SD = 8.67) completing the test–retest did not differ significantly from students ($M_{COEDS} = 17.82$, SD = 7.78) choosing not to participate in the retest with respect to time 1 COEDS scores or age ($F(1, 149) = .49$, $p > .05$; $F(1,149) = .23$, $p > .05$). Returning students (72% Caucasian; 67% female) also did not differ from non-returning students (70% Caucasian; 75% female) with respect to gender or race distribution ($\chi^2(1) = .96$, $p > .05$; $\chi^2(3) = 2.11$, $p > .05$). As illustrated in Fig. 2, strong test–retest reliability was established between the two administrations, occurring approximately one month apart ($r = .81$, $p < .01$).

3. Discussion

Research has shown that college students are at high risk for developing eating disorders, which are difficult to treat and have both physical and psychological consequences (Mann et al., 1997). The COEDS was developed as a college-based vulnerability measure. In this way, the COEDS may provide a level of assessment that might not be possible with diagnostic measures that focus more on severe and current clinical eating pathology and less on cognitions and behavioral patterns that may reflect sub-threshold eating disorder pathology, and therefore may be useful to identify sub-clinical individuals with a vulnerability to develop more severe eating pathology.

There were several goals of the current study including the examination of internal consistency, construct validity, and test–retest reliability for the final seven-item COEDS. Significant associations between the COEDS and subscales of the EDI, EDE-Q, and BULIT assessing body image preoccupation support the construct validity of the measure as does the moderate relation with depression. It is important to note that similar to Nowak et al. (2003), the COEDS was least related to subscales of the EDI that included items only indirectly related to an eating disorder (i.e., Interpersonal Distrust, Maturity Fears, and Perfectionism). Although these domains are related to eating pathology, they also are indicative of several other forms of clinical pathology and may be less necessary to tap in brief screening tools. In terms of the final goal, the current study was able to establish a high level of test–retest reliability, suggesting the stability of this measure over a short time. Taken together, the basic findings of this study provide further support for the use of the COEDS as a measure targeting individuals who may carry the beliefs and engage in the behaviors that place them at risk for development of an eating disorder.

The current study includes several limitations. First, only one-third of the original sample returned to complete a second administration of the COEDS. Although the two administrations correlated highly with one another, the limited number of returning subjects tempers the test–retest results. In addition, because it was optional for individuals to return for part two of the study, it is possible that the responses of individuals who returned may somehow be qualitatively different than students who did not return. Related, a larger test–retest sample is preferred. To address these limitations, a follow-up study is recommended in which a larger sample size and greater percentage of students complete both administrations to provide further support for the temporal consistency of the COEDS. Most importantly, although this study represents the next step in the validation of the COEDS, it should be kept in mind that the ultimate goal of this research is to identify individuals who have beliefs and engage in behaviors that we believe conveys a vulnerability to developing an eating disorder. Although our findings certainly are supportive of this possibility, it is necessary to prospectively follow individuals to determine if development of an eating disorder is related to a baseline COEDS score.

Despite these limitations, the results in this study provide additional evidence of the value of the COEDS. Further, the measure appears ready for validation in a younger sample (e.g., high school students) as well as within the context of a prospective examination. If the COEDS emerges as a valid risk measure among adolescents, this measure could be examined in a longitudinal investigation to determine to what extent the vulnerability identified by the COEDS translates into the development of clinical eating pathology. For example, the COEDS could be administered to students in high school health classes, by resident life officials in dormitories, or in other situations in an effort to identify individuals who are at risk to develop an eating disorder during the transition from high school to college, a period during which stressors can trigger an increase or onset of a clinical level eating disorder. Once the measure is administered, individuals scoring at or above an established cutoff can be targeted with intervention programs or other treatment options to prevent further progression. It is also possible that the combination of the COEDS with other risk factor measures (e.g., peer social status, family functioning) will provide significant clinical and research utility.

Appendix A. The final version of the College Oriented Eating Disorders Screen (COEDS)

Directions: Circle the number that best describes your thoughts and behaviors for each question.

	Never	Sometimes	Half the time	Often	Always
1. I am embarrassed when I am with a group of people and I am the only one ordering food.	1	2	3	4	5
2. I compare my body to other women's/men's bodies when I go to a social gathering.	1	2	3	4	5
3. I get very upset when I weigh myself and I have gained a few pounds.	1	2	3	4	5
4. I can see my body getting fatter after I eat a meal.	1	2	3	4	5
5. I believe I am fatter than most people say I am.	1	2	3	4	5
6. I feel very competitive with other women/men who have better bodies than I do.	1	2	3	4	5
7. I feel guilty or sad after I eat something fatty.	1	2	3	4	5

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EATING BEHAVIORS

The comparative utility of statistically derived eating disorder clusters and DSM-IV diagnoses: Relationship to symptomatology and psychiatric comorbidity at intake and follow-up

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Abstract

Introduction: The classification of eating disorders has been a matter of considerable debate. The present paper extends previous work and aimed to compare the utility of statistically derived clusters of eating disorders and conventional diagnoses.
Methods: Adult female eating disorder patients who had previously been classified on the basis of cluster analysis of key diagnostic variables were examined on measures of eating disorder symptomatology and psychiatric comorbidity at intake ($N=601$) and subsequent follow-up after 6 and 36 months ($N=349$, $N=322$, respectively).
Results: Compared to DSM-IV diagnoses, clusters demonstrated greater utility in terms of more distinct between-group differences and higher effect sizes in relation to a wide range of variables. The greater utility of clusters was in important respects due to the reallocation of EDNOS patients to more relevant alternative categories and to a greater emphasis on psychological and behavioural features of eating disorders.
Conclusions: In order to achieve a better classification of eating disorders, it will be important to place increased emphasis on common psychological features. There is a need to move away from increased use of subtypes and toward a definition of eating disorder per se.
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Keywords: Anorexia nervosa; Bulimia nervosa; Classification; Comorbidity; Diagnosis; Eating disorders

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1. Introduction

The classification of eating disorders is unsatisfactory in several important respects. Prevailing diagnostic criteria for these disorders used within the DSM (APA, 1994) and ICD (WHO, 1992) systems tend to be based on clinical opinion and consensus. As such, they tend to be arbitrary and do not necessarily reflect empirically derived truths about the utility of these criteria. The DSM system, which is most often used by both researchers and clinicians, has undergone considerable revision during the past quarter century. Revisions of criteria relating to the eating disorders have largely focused on achieving increased precision pertaining to the two major eating disorder syndromes, namely, anorexia nervosa (AN) and bulimia nervosa (BN). This has meant becoming more specific about weight (AN) and defining thresholds in terms of frequency and duration for criteria relating to amenorrhoea (AN), binge eating (BN) and compensatory behaviour after binges (BN).

For example, DSM-III specified weight loss of at least 25% of original body weight as a criterion for AN, which meant that in extreme cases, even patients who were overweight but had experienced rapid and extreme weight loss could fulfil this criterion. DSM-IV has been amended to specify 15% of expected weight, which has led to the establishment of cut-off points, usually computed in terms of body mass index (BMI). Since the advent of DSM-III-R amenorrhoea for at least three consecutive menstrual cycles has been required for a diagnosis of AN among females. As regards BN, which was not described until the seminal article of Russell (1979), and which first entered the DSM system the following year as bulimia, a number of specifications have occurred. Among other criteria, DSM-III-R specified episodes of binge eating that occurred at least twice weekly over the past 3 months along with regular use of compensatory behaviour (e.g., vomiting, use of laxatives, excessive exercise, fasting) to limit weight gain. In DSM-IV, this latter criterion was amended in a similar fashion to the binge-eating criterion and now specifies compensatory behaviour that occurs at least twice weekly over the past 3 months. Another addition to DSM-IV was the criterion that "self-evaluation is unduly influenced by shape and weight". This criterion was added after much controversy in order to emphasise what many researchers saw as an essential similarity between BN and AN.

At best, a system of classification should provide categories that are mutually exclusive and collectively exhaustive. However, the present DSM system largely fails these tests (Palmer, 2003). Categories overlap or are prevented from doing so only by arbitrary rules, and individuals may move from one diagnosis to another over time. Perhaps the most unsatisfactory aspect of the current DSM-IV diagnostic system is its reliance on the residual category of eating disorder not otherwise specified (EDNOS). Patients consigned to this sizable "rag bag" category have clear eating problems but do not fulfil criteria for the two major syndromes. The diagnosis may, for example, cover patients of extremely low weight who fail to meet the amenorrhoea criterion for AN, or overweight patients who binge and use compensatory behaviour, but not sufficiently frequently to fulfil criteria for BN. According to recent studies (Fairburn & Harrison, 2003; Turner & Bryant-Waugh, 2004), roughly half of all patients seeking help with an eating disorder do not fulfil criteria for AN or BN and must therefore be assigned to the EDNOS category.

Empirical attempts at clarifying the classification of eating disorders have focused on the use of factor analysis and cluster analysis and have been reviewed in our previous work (Clinton, Button, Norring, & Palmer, 2004). Both techniques have been used for many years by psychiatric researchers investigating problems of diagnosis (Everitt & Landau, 1998). While factor analysis reveals patterns among variables, cluster analysis focuses on groupings of individuals. Although these studies provide some useful

empirical indicators about the classification of eating disorders, they also have important shortcomings. They have tended to focus on specific diagnoses (Hay, Fairburn, & Doll, 1996) or sub-groups of diagnoses (Grilo, Masheb, & Berman, 2001; Mizes & Sloan, 1998; Stice & Agras, 1999) rather than the entire spectrum of eating disorders. Samples have often been small (Grilo et al., 2001; Mizes & Sloan, 1998; Van der Ham, Meulman, van Strien, & van Engeland, 1997) or based on non-clinical cases with doubtful relevance to clinical eating disorders (Bulik, Sullivan, & Kendler, 2000). The latter study utilised latent class analysis as opposed to cluster analysis in their taxometric approach. This method was also recently used by Keel et al. (2004) who found that a four-class solution supported some of the distinctions drawn by DSM-IV, while introducing new features to better define eating disorder phenotypes.

Our approach to the question of how eating disorders can best be classified has been based on cluster analysis (Everitt, Landau, & Leese, 2001). In previous work by the present authors (Clinton et al., 2004), we used cluster analysis to explore natural groupings of patients who present a wide range of eating disorder services, using data on key diagnostic variables routinely collected on a series of patients presented to 15 different centres in Sweden and to 1 centre in England. Our results suggested that the classification of eating disorders in both samples could be approached most fruitfully from the standpoint of three distinct clusters of patients. The largest cluster in both samples was termed "generalised eating disorder" and was characterised by high levels of eating disorder psychopathology on all key diagnostic variables except weight and menstrual functioning. The second cluster of "anorexics" was characterised by low weight, amenorrhoea and the absence of binge eating and seemed to correspond to the clinical picture of restricting anorexia nervosa. The third cluster of "overeaters" was characterised by high weight and moderate levels of binge eating and compensatory behaviour. It was concluded that the patterns from both countries resembled, but were not identical to, existing diagnostic categories.

Our findings are worth comparing with the recent work of Sloan, Mizes, and Epstein (2005), who also utilised cluster analysis to explore the classification of eating disorders among 159 patients from five distinct clinics. Instead of using key diagnostic variables as we did in our previous paper, the Sloan group clustered patients on the eight EDI subscales along with data on weight, binge eating, and purging. Although the Sloan study suffered a number of statistical shortcomings (i.e., no attempt was made to exclude outliers prior to cluster analysis; no statistical criteria were used to help determine the optimal number of clusters; and no use was made of non-hierarchical cluster techniques), their results are not dissimilar to our own. They identified four clusters of patients and concluded that there is a relatively poor fit between empirically derived groupings of patients and clinical diagnoses.

Although previous work by others and ourselves sheds light on questions pertaining to the natural grouping of patients with eating disorders, these studies say nothing about the comparative utility of statistically derived clusters in relation to conventional diagnoses. This is an important issue since if we are to consider alternative schemes of classification, any such alternatives must be shown to have greater practical utility. Utility can be explored by examining the relationship of clusters and diagnoses to relevant measures of eating disorder symptoms and comorbidity at initial assessment and over time. If one of the systems demonstrates greater differentiation of categories, along with an ability to explain a higher percentage of variation, at intake and follow-up, then we have evidence of the comparative utility of that particular scheme of classification. The present study attempts to address this issue and expands our previous work using the data collected in Sweden, which offered both a wider variety of comorbidty measures and follow-up data than the English data did. Primary aims of the study were to explore the

clinical utility of previously defined statistically derived clusters of eating disorder patients by comparing clusters and DSM-IV diagnostic categories on important aspects of comorbidity assessed initially at intake and subsequently after 6 and 36 months.

2. Methods

2.1. Participants

Adult female eating disorder patients from Sweden who were studied in our previous work participated in the present study ($N=601$). The sample was collected within the framework of the Co-ordinated Evaluation and Research at Specialist Units for Eating Disorders in Sweden (CO-RED) Project, a longitudinal naturalistic study of the treatment of eating disorders at 15 specialist centres. Units offer a wide variety of treatment forms such as inpatient, day patient, outpatient, individual psychotherapy, family and group therapy, psychoactive drugs, expressive forms of treatment, etc. The distribution of DSM-IV diagnoses was AN ($N=137$, 22.8%), BN ($N=240$, 39.9%), BED ($N=31$, 5.2%), and EDNOS, ($N=193$, 32.1%). All subjects provided informed consent to take part in the CO-RED study. Age ranged from 14 to 49 years ($M=24.5$ years, S.D.$=6.4$). Mean duration of eating disorder at presentation was 8.2 years (S.D.$=6.7$). Data were subsequently obtained on the same measures after 6 months ($N=349$) and after 36 months ($N=322$). Since only 58% of patients could be followed up after 6 months and 54% after 36 months, dropout analysis was conducted. When patients who could be assessed at follow-up were compared with dropouts on the measures used in the study using one-way ANOVA, both groups were virtually indistinguishable with only a few exceptions. Patients who attended 6-month follow-up had previously reported significantly less (i.e., $p<.05$) fear of weight gain and laxative abuse at initial assessment. At 36-month follow-up, patients who could be assessed had previously reported significantly greater disturbed body image and had scored significantly higher on EDI Asceticism. The distribution of initial DSM-IV diagnoses at 6-month follow-up sample was AN ($N=86$, 24.6%), BN ($N=132$, 37.8%), BED ($N=24$, 6.9%), and EDNOS ($N=107$, 30.7%). Among the patients assessed after 36 months, the distribution of initial DSM-IV was AN ($N=75$, 23.3%), BN ($N=126$, 39.1%), BED ($N=16$, 5.0%), and EDNOS ($N=105$, 32.6%).

2.2. Instruments

The Rating of Anorexia and Bulimia Interview (RAB) was used to assess key diagnostic variables (Clinton & Norring, 1999; Nevonen, Broberg, Clinton, & Noring, 2003). The RAB is a 56-item semi-structured interview with graded response formats covering a wide range of eating disorder symptoms, concomittant psychopathology and background variables; it generates operational DSM-IV eating disorder diagnoses and is widely used in Sweden. It has satisfactory internal consistency and inter-rater reliability; kappa ranged from .47 to .92 ($M=.74$) for the variables used in the present study (Nevonen et al., 2003). From the RAB, 10 essential clinical variables for the diagnosis of eating disorders according to DSM-IV were selected for subsequent cluster analysis. These variables were BMI, fear of weight gain, restriction of food intake, avoidance of fattening foods, binge eating, self-induced vomiting, abuse of laxatives, compulsive exercise, amenorrhea, and body image disturbance. The RAB was also used to obtain interview-based measures of comorbidity pertaining to drug and

alcohol problems, suicidal behaviour and self-harm, as well as relationship problems. Follow-up versions of the RAB involved asking the same questions as were asked at intake, but in relation to the patient's present state at the time. In the case of the 6-month follow-up, a shortened version of the RAB was used with questions only relating to eating disorder symptoms. This was done in order to shorten the time staff and participants needed to complete assessments. Full interviews were conducted at 36 months. Further assessment of eating disorder symptoms was made using the self-report questionnaire Eating Disorders Inventory-2 (EDI-2) (Garner, Olmsted, & Polivy, 1983). Psychiatric symptoms were measured using a shortened (63-item) version of the self-report questionnaire Symptom Check List-90 (SCL-90) (Derogatis, Lipman, & Covi, 1973). The SCL was shortened by removing the subscales for Phobic Anxiety, Paranoid Ideation, Psychoticism and Additional Scales.

2.3. Procedure

Data were collected by staff from participating units. Interviewers had long experience in the assessment of eating disorders in a clinical setting using the respective instruments. For the most part, interviewers were either qualified psychiatrists or clinical psychologists, although other professionals, such as experienced nurses and social workers, also took part. Training of interviewers took place at participating units. Centrally arranged project meetings and workshops were also used for training of interviewers and for making checks on how instruments were being used once the project was underway. Administration of interviews and self-report measures first took place at diagnostic assessment prior to treatment, or within 2–4 weeks of commencing treatment at the latest. These measures were subsequently administered after 6 and 36 months.

2.4. Data analysis

Using the 10 key diagnostic variables, cluster analysis was conducted in a series of three steps using SLEIPNER (Bergman & El-Khouri, 1998). These steps have been detailed previously (Clinton et al., 2004) and resulted in a three-cluster classification of eating disorder patients (i.e., "generalised eating disorder", "anorexics," and "overeaters"). This three-cluster solution was used as a point of departure in the present study, allowing clusters to be compared with DSM-IV diagnoses on data pertaining to psychiatric comorbidity.

3. Results

3.1. Comparisons at intake

In order to aid comparisons of clusters and diagnoses, results of our previous cluster analysis for the Swedish sample are summarised in Table 1; the table presents data for the three clusters on the key diagnostic variables used for clustering. Comparisons between clusters and diagnoses on intake data were then made on the same key diagnostic variables, interview-based measures of co-morbidity, EDI-2 and the SCL-90 (63-item version). Results of one-way ANOVA (F-values, significance, and effect size) are presented in Table 2. Graphic comparisons of clusters and diagnoses are given for key diagnostic variables in Fig. 1a and b.

Table 1
Standard scores on key clinical variables in relation to three-cluster solution following non-hierarchical relocation analysis

Key diagnostic variables	Generalised eating disorder (GED) ($N=216$)	Clusters	
		Overeaters ($N=193$)	Anorexics ($N=192$)
BMI	.03	.65	−.68
Weight phobia	.39	−.36	−.07
Binge eating	.60	.28	−.96
Restriction	.47	−1.03	.51
Avoidance of fattening food	.48	−.88	.35
Vomiting	.68	.01	−.78
Laxative abuse	.32	−.25	−.11
Compulsive exercise	.26	−.49	.20
Amenorrhoea	−.24	−.33	.61
Disturbed body image	.64	−.63	.29

F-values were naturally significant across the board for virtually all of the key diagnostic variables used for cluster analysis; this was true for both clusters and diagnoses. What is most interesting, however, is a comparison of the effect sizes (h^2) of these variables in relation to clusters and diagnoses. A comparison of effect size gives an indication of how well the two approaches perform in their ability to account for variation in key eating disorder symptoms. When variables are examined in relation to DSM-IV diagnoses, high effect sizes were found in both samples for BMI, binge eating, vomiting, and amenorrhoea, which would suggest that the DSM system is, not surprisingly, primarily relying on these variables to explain the variance in diagnostic categories. When variables are examined in relation to clusters, effect sizes were, on the whole, even higher and more evenly distributed across a wider range of variables. The only instances where variables achieved notably higher effect sizes in relation to diagnoses compared to clusters were BMI. Slightly higher effect sizes in relation to diagnoses were found for binge eating and amenorrhoea. In contrast, effect sizes were considerably higher for restriction and avoidance of fattening food in relation to clusters as opposed to diagnoses in both samples. Higher effect sizes of a somewhat lesser magnitude were found for weight phobia, compulsive exercise, and disturbed body image.

On the interview-based assessment of co-morbidity, clusters were distinguished by markedly higher effect sizes in relation to suicidal behaviour and self-harm; when pair-wise differences were examined on this variable using Scheffé tests ($p<.05$), patients in the "generalised eating disorder" cluster scored significantly higher than "anorexics" and "overeaters." On the EDI-2 and SCL-90 (63-item version), levels of significance and effect sizes were generally markedly greater for clusters compared to diagnoses. On the EDI, this was especially true of the psychological subscales. When pair-wise differences were examined for clusters using Scheffé tests, "overeaters" scored for the most part significantly lower than patients in the "generalised eating disorder" cluster, while the latter scored significantly higher than "overeaters" and "anorexics." An important exception to this trend was found for the Bulimia subscale where "overeaters" scored significantly higher than "anorexics." On the SCL-90 (63-item version), significant differences between diagnostic categories were only found for the depression subscale, while all between-cluster differences were significant. When pair-wise comparisons were made for clusters, patients in the "generalised eating disorder" cluster scored significantly higher than "overeaters" on all subscales. "Anorexics" scored

Table 2
Comparisons of clusters and DSM-IV diagnoses at initial assessment on one-way ANOVA

	Clusters[a]			DSM diagnoses[b]		
	F	*p*	h^2	*F*	*p*	h^2
Key diagnostic variables						
BMI	119.5	<.001	.29	153.8	<.001	.44
Weight phobia	32.3	<.001	.10	8.5	<.001	.04
Binge eating	247.8	<.001	.45	198.1	<.001	.50
Restriction	301.2	<.001	.50	33.8	<.001	.14
Avoidance of fattening food	175.8	<.001	.37	19.7	<.001	.09
Vomiting	168.0	<.001	.36	89.0	<.001	.31
Laxative abuse	19.2	<.001	.06	2.0	NS	.01
Compulsive exercise	38.5	<.001	.11	9.7	<.001	.05
Amenorrhoea	62.8	<.001	.17	65.0	<.001	.25
Disturbed body image	69.9	<.001	.19	11.4	<.001	.05
Interview measures of co-morbidity						
Drug and alcohol problems	6.3	<.01	.02	3.9	<.01	.02
Suicidality	26.0	<.001	.08	2.5	NS	.01
Relationship problems	1.8	NS	.01	2.2	NS	.01
EDI-2						
Drive for thinness	32.5	<.001	.10	15.2	<.001	.07
Bulimia	165.9	<.001	.36	76.6	<.001	.28
Body dissatisfaction	15.7	<.001	.05	13.3	<.001	.06
Ineffectiveness	17.0	<.001	.05	4.6	<.01	.02
Perfectionism	9.2	<.001	.03	0.7	NS	.00
Interpersonal distrust	7.7	<.001	.02	0.9	NS	.00
Introceptive awareness	18.2	<.001	.06	2.7	<.05	.01
Maturity fears	8.4	<.001	.03	6.5	<.001	.03
Asceticism	14.9	<.001	.05	3.3	<.05	.02
Disturbed impulse regulation	7.9	<.001	.03	2.8	<.05	.01
Social insecurity	7.3	<.001	.02	2.5	NS	.01
Total ED subscales	64.4	<.001	.18	39.1	<.001	.17
Total psychological subscales	22.5	<.001	.07	3.9	<.01	.02
Total score	40.0	<.001	.12	10.4	<.001	.05
SCL 63						
Somaticism	20.0	<.001	.06	1.5	NS	.01
Obsession–compulsion	8.3	<.001	.03	1.7	NS	.01
Interpersonal sensitivity	19.0	<.001	.07	1.2	NS	.01
Depression	12.4	<.001	.04	1.9	NS	.01
Anxiety	14.3	<.001	.05	3.7	<.05	.02
Anger	5.7	<.01	.02	0.5	NS	.00
Symptom index	20.5	<.001	.06	2.3	NS	.01

[a] Clusters: generalised eating disorder (GED), overeaters, anorexics.
[b] DSM diagnoses: AN, BN, BED, EDNOS.

significantly higher than "overeaters" on Somaticism, and Interpersonal sensitivity. "Anorexics" also scored significantly lower than "generalised eating disorder" patients on Somaticism, Interpersonal sensitivity, Depression, Anxiety, and Anger. Graphic comparisons between clusters and diagnoses on the EDI-2 are presented in Fig. 2a and b, while comparisons on the SCL-90 (63-item version) are presented in Fig. 3a and b.

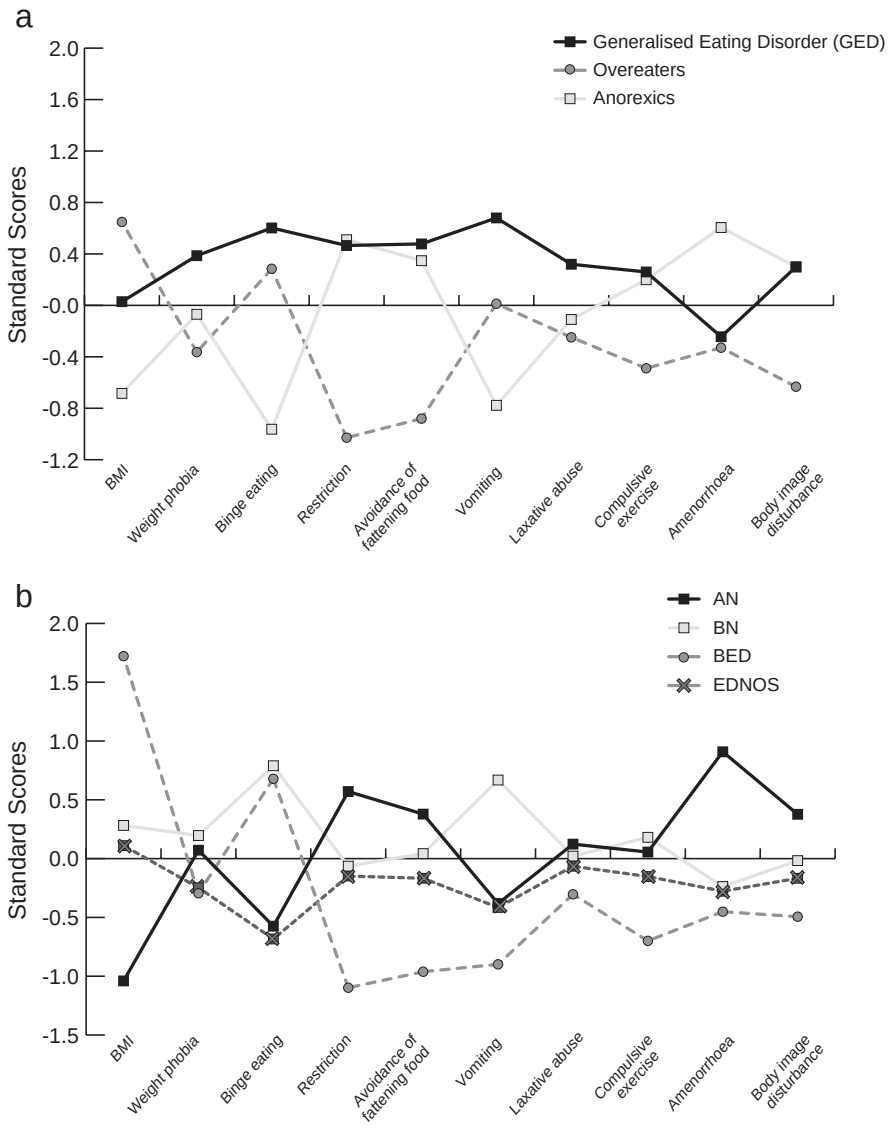

Fig. 1. (a) Comparisons of clusters on key diagnostic variables. (b) Comparisons of DSM-IV diagnoses on key diagnostic variables.

3.2. Comparisons after 6 and 36 months

Further comparisons of clusters and diagnoses were made by examining patients who had been followed up after 6 and 36 months. Results of one-way ANOVA (F-values, significance, and effect size) are presented in Tables 3 (after 6 months) and 4) (after 36 months).

After 6 months, levels of significance and effect sizes were diminished for both clusters and diagnoses but were still considerably greater for clusters compared to diagnoses. Between-cluster differences were still significant on all key diagnostic variables, but only half of the between-diagnosis differences. Effect

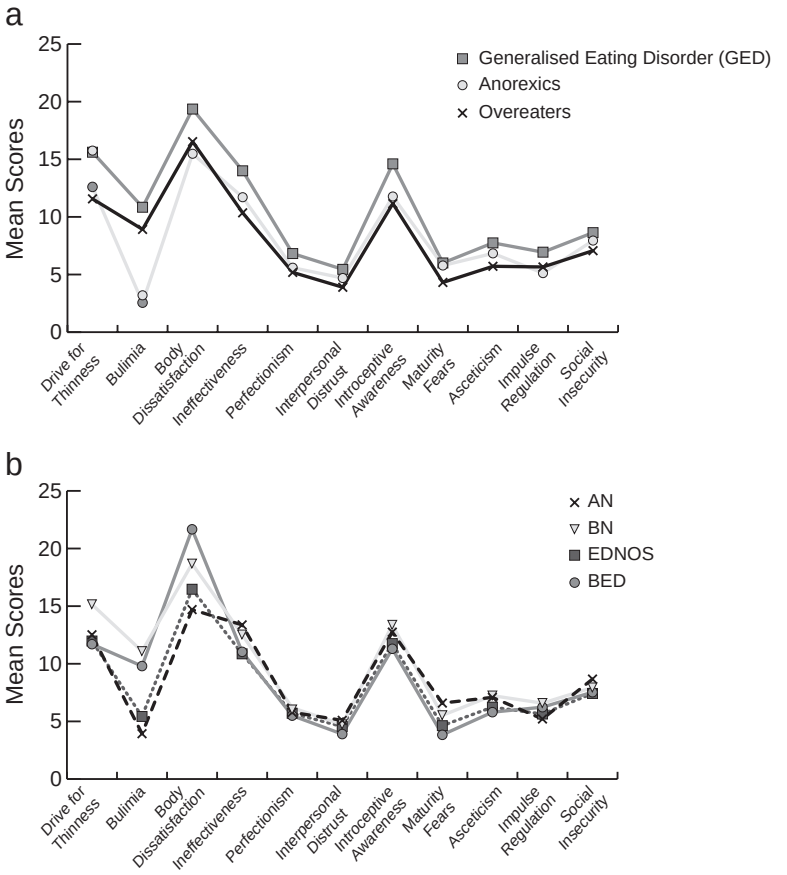

Fig. 2. (a) Mean scores for clusters on the EDI-2 at initial assessment. (b) Mean scores for diagnoses on the EDI-2 at initial assessment.

sizes were greater for diagnoses on BMI and amenorrhoea, but roughly at least double for clusters on the remaining key variables. On the SCL-90 (63-item version), one-way ANOVA was significant on all subscales for clusters but none of the comparisons attained significance for diagnoses. After 36 months, the patterns that had been marked at assessment and still present after 6 months had been largely diminished. On key diagnostic variables, effect sizes were still greater for diagnoses on BMI and amenorrhoea, but still roughly twice as large for clusters on the remaining variables. On the EDI-2, significant between-cluster differences were still present on the Bulimia subscale, while significant between-diagnosis differences were found on Maturity fears. On the SCL-90 (63-item version), Anger was still significant for clusters.

4. Discussion

We have attempted to clarify the nosology of eating disorders by comparing the clinical utility of DSM-IV diagnoses with an alternative classification derived statistically in our previous work (Clinton et al.,

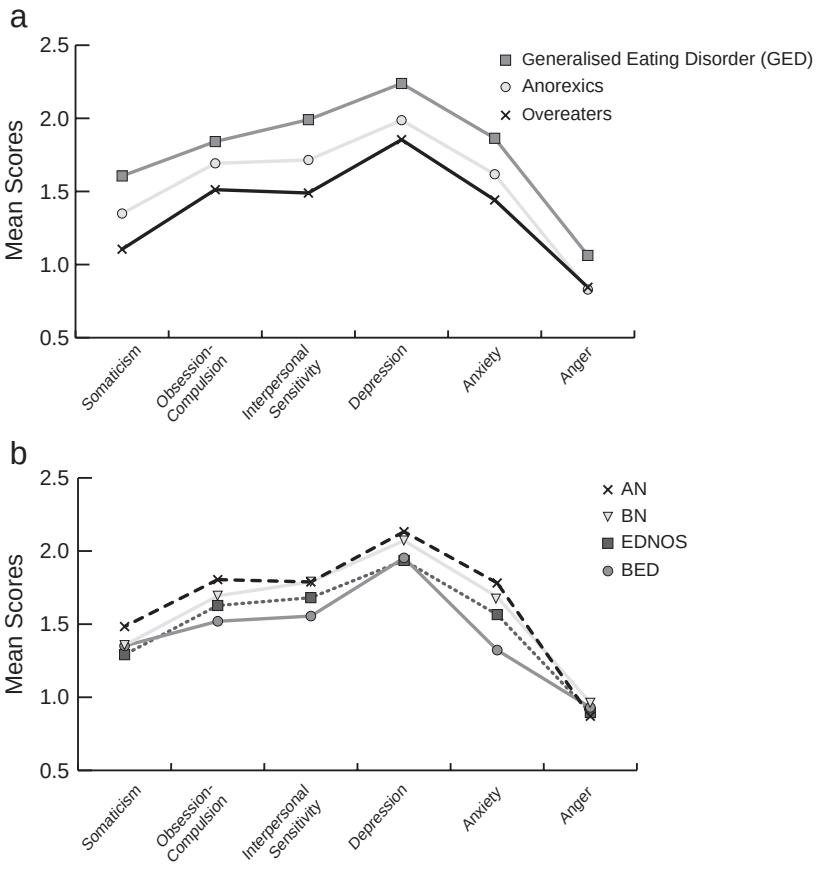

Fig. 3. (a) Mean scores for clusters on the SCL-90(63-item version) at initial assessment. (b) Mean scores for diagnoses on the SCL-90(63-item version) at initial assessment.

2004). In our previous study, using a large heterogeneous sample of eating disorder patients with a broad spectrum of diagnoses from both Sweden and the UK, we found clinically recognisable clusters of patients. These were labelled "anorexics," "overeaters," and "generalised eating disorder." Compared to DSM-IV diagnoses, clusters placed greater emphasis on psychological and behavioural features of eating disorders and generated a large category of patients who were suffering from a cross section of eating disorder symptoms (i.e., those classified as "generalised eating disorder"). In particular, patients who were classified as "generalised eating disorder" tended to present with a more distinct array of symptoms compared to patients diagnosed as EDNOS. The former constituted a group with high levels of symptomatology in almost every respect, except for weight and menstrual functioning, while the latter tended to constitute a group of patients without distinguishing features on any of the key diagnostic variables.

The present study takes our previous work a step further and suggests that cluster analysis did not just generate a classification of considerable heuristic value. It also generated categories that demonstrated a higher degree of utility than conventional diagnoses. The higher degree of association between key eating disorder symptoms and clusters as opposed to diagnoses suggests that clusters "out-performed" diagnoses in their ability to account for variability in important symptoms. This was the case at intake, as

Table 3
Comparisons of clusters and DSM-IV diagnoses at 6-month follow-up on one-way ANOVA

	Clusters[a]			DSM diagnoses[b]		
	F	*p*	h^2	*F*	*p*	h^2
Key diagnostic variables						
BMI	44.1	<.001	.25	52.5	<.001	.37
Weight phobia	5.0	<.01	.03	1.4	NS	.01
Binge eating	34.1	<.001	.17	12.3	<.001	.10
Restriction	8.8	<.001	.05	2.6	NS	.02
Avoidance of fattening food	16.9	<.001	.09	1.5	NS	.01
Vomiting	32.3	<.001	.16	10.5	<.001	.08
Laxative abuse	4.0	<.05	.02	0.9	NS	.01
Compulsive exercise	3.3	<.05	.02	1.4	NS	.01
Amenorrhoea	33.0	<.001	.17	43.1	<.001	.28
Disturbed body image	6.4	<.01	.04	2.6	<.05	.02
EDI-2						
Drive for thinness	11.5	<.001	.06	3.6	<.05	.03
Bulimia	20.5	<.001	.11	5.9	<.001	.05
Body dissatisfaction	4.1	<.05	.02	3.5	<.05	.03
Ineffectiveness	4.9	<.01	.03	3.7	<.05	.03
Perfectionism	2.0	NS	.01	0.4	NS	.00
Interpersonal distrust	5.2	<.01	.03	1.8	NS	.01
Introceptive awareness	12.2	<.001	.06	2.9	<.05	.02
Maturity fears	5.0	<.01	.03	4.8	<.01	.04
Asceticism	4.7	<.01	.03	1.4	NS	.01
Disturbed impulse regulation	2.6	NS	.01	0.9	NS	.01
Social insecurity	2.4	NS	.01	2.0	NS	.02
Total ED subscales	12.0	<.001	.07	4.8	<.01	.04
Total psychological subscales	7.6	<.001	.04	3.6	<.05	.03
Total score	9.8	<.001	.05	3.5	<.05	.03
SCL-63						
Somaticism	5.5	<.01	.03	1.6	NS	.01
Obsession–compulsion	5.7	<.01	.03	1.1	NS	.01
Interpersonal sensitivity	7.1	<.001	.04	2.3	NS	.02
Depression	7.1	<.001	.04	2.5	NS	.02
Anxiety	9.3	<.001	.05	1.8	NS	.01
Anger	6.1	<.01	.02	1.6	NS	.01
Symptom index	8.9	<.001	.06	1.5	NS	.01

[a] Clusters: generalised eating disorder (GED), overeaters, anorexics.
[b] DSM diagnoses: AN, BN, BED, EDNOS.

well as at short-term follow-up after 6 months. It was also the case in relation to both a wider range of eating disorder psychopathology and important aspects of comorbidity. Even when variables that were not used for cluster analysis were compared, a more distinct and homogeneous pattern of between-group differences emerged, and effect sizes were greater in relation to clusters as opposed to diagnoses.

The ability of the cluster approach to generate a more homogeneous and powerful classification may be due to two important factors. Firstly, cluster analysis attached greater importance to a wider range of features, in particular psychological and behavioural characteristics of eating disorders in order to classify cases, as opposed to a more singular emphasis of weight, menstrual functioning, and binge eating.

Table 4
Comparisons of clusters and DSM-IV diagnoses at 36-month follow-up on one-way ANOVA

	Clusters[a]			DSM diagnoses[b]		
	F	*p*	h^2	*F*	*p*	h^2
Key diagnostic variables						
BMI	119.5	<.001	.29	153.8	<.001	.44
Weight phobia	32.3	<.001	.10	8.5	<.001	.04
Binge eating	247.8	<.001	.45	198.1	<.001	.50
Restriction	301.2	<.001	.50	33.8	<.001	.14
Avoidance of fattening food	175.8	<.001	.37	19.7	<.001	.09
Vomiting	168.0	<.001	.36	89.0	<.001	.31
Laxative abuse	19.2	<.001	.06	2.0	NS	.01
Compulsive exercise	38.5	<.001	.11	9.7	<.001	.05
Amenorrhoea	62.8	<.001	.17	65.0	<.001	.25
Disturbed body image	69.9	<.001	.19	11.4	<.001	.05
Interview measures of co-morbidity						
Drug and alcohol problems	6.3	<.01	.02	3.9	<.01	.02
Suicidality	26.0	<.001	.08	2.5	NS	.01
Relationship problems	1.8	NS	.01	2.2	NS	.01
EDI-2						
Drive for thinness	2.6	NS	.02	0.9	NS	.01
Bulimia	4.2	<.05	.03	0.1	NS	.00
Body dissatisfaction	0.8	NS	.00	0.5	NS	.00
Ineffectiveness	0.2	NS	.00	2.0	NS	.02
Perfectionism	2.1	NS	.01	1.1	NS	.01
Interpersonal distrust	0.8	NS	.00	0.9	NS	.01
Introceptive awareness	1.9	NS	.01	0.3	NS	.00
Maturity fears	0.9	NS	.01	4.5	<.01	.04
Asceticism	0.4	NS	.00	0.9	NS	.01
Disturbed impulse regulation	0.3	NS	.00	0.4	NS	.00
Social insecurity	0.7	NS	.00	0.8	NS	.01
Total ED subscales	1.7	NS	.01	0.2	NS	.00
Total psychological subscales	0.3	NS	.00	1.1	NS	.01
Total score	0.1	NS	.00	0.3	NS	.00
SCL-63						
Somaticism	2.6	NS	.02	0.6	NS	.00
Obsession–compulsion	2.7	NS	.02	1.4	NS	.01
Interpersonal sensitivity	1.5	NS	.01	1.5	NS	.01
Depression	0.3	NS	.00	0.7	NS	.01
Anxiety	1.7	NS	.01	0.7	NS	.01
Anger	3.1	<.05	.02	0.1	NS	.00
Symptom index	1.7	NS	.01	0.7	NS	.01

[a] Clusters: generalised eating disorder (GED), overeaters, anorexics.
[b] DSM diagnoses: AN, BN, BED, EDNOS.

Moreover, cluster analysis put comparatively greater emphasis on restriction of eating, avoidance of fattening foods, weight phobia, disturbed body image, compulsive exercise and laxative abuse. Secondly, cluster analysis succeeded in reallocating patients consigned to the residual diagnostic category of EDNOS to more relevant categories. This in itself is of importance since this sizable group of patients has proved largely unamenable to classification by conventional means. On the whole, our results raise the question of

making changes to prevailing diagnostic systems. Essentially, we are faced with two alternatives to the status quo. On the one hand, we might consider revisions and refinements of prevailing criteria in the direction of less specificity. On the other, we might be tempted by a more radical approach and contemplate moving towards a new system that is more phenomenologically and clinically relevant.

Over the years, the DSM system has tended to revise the criteria of eating disorders in terms of increased precision and specificity of AN and BN. Although this has undoubtedly helped to distinguish AN from BN, it may have also resulted in definitions of these syndromes that are too narrow and not therefore in touch with clinical reality. Our results suggest that greater clinical utility might in fact be achieved by loosening some of the criteria used for diagnosing AN and BN. For example, in AN, we might consider discarding Criterion D (i.e., the absence of at least three consecutive menstrual cycles in females). Alternatively, instead of requiring current amenorrhoea for a diagnosis of AN, this criterion might be added to a list of other key criteria of which a specified number of these would be required to establish a diagnosis. Criterion B (i.e., intense fear of gaining weight or becoming fat, even though underweight) could be amended to reflect a common criterion for all eating disorders, such as an "over-investment of eating restraint." In BN, we might consider being less restrictive in relation to questions of frequency and duration. Criterion C (i.e., occurrence of binge eating and compensatory behaviours at least twice a week for 3 months) might be dropped or amended to specify a minimal frequency without a minimal duration. Criterion D (i.e., the undue influence of body shape and weight for self-evaluation) could also be changed to reflect a common criterion for all eating disorders.

Recent empirical attempts at revisions and refinements of prevailing diagnostic criteria have focused on widening criteria. Weston and Harnden-Fischer (2001) have advocated going beyond axis 1 to include relevant personality dimensions to better classify eating disorders. Studies by Bulik et al. (2000) and Crow, Agras, Halmi, Mitchell, and Kraemer (2002), suggest that present diagnostic classes are too narrowly defined, and that the relocation of a proportion of the patients diagnosed as EDNOS might be aided by the widening of criteria for the two primary syndromes of AN and BN. Andersen, Bowers, and Watson (2001) experimented with the specific revisions of criteria. They eliminated the criterion for amenorrhoea in AN and required a 20% loss of weight rather than a weight level 15% under normal weight. For BN, they eliminated the criteria concerning the frequency and duration of binge eating and compensatory behaviour. These changes resulted in a reduction of the EDNOS group to less than 20% of its original size, as well as an increase in the AN group by more than 50%, while the BN group remained roughly the same size. In a replication of the study by Andersen et al. using data from our own CO-RED project ($N=806$), the EDNOS group was reduced to approximately a third of its original size, while the AN group increased by 150%, the BN group was reduced by 15%, and the BED group was reduced by more than half (Norring, 2002). In terms of symptoms, the most notable result of this reallocation was that the AN group came to comprise a number of patients who were not obviously underweight, and the EDNOS patients who remained in the EDNOS category reported markedly lower scores on the EDI compared to patients with other eating disorder diagnoses. Changes such as these in specific criteria for eating disorders might help in some ways, but it is doubtful whether they would be met with enthusiasm by clinicians, or whether they would result in a more clinically relevant system of diagnosis.

We tend to agree with Beumont, Garner, and Touyz (1994) when they reviewed proposed changes for DSM-IV and concluded, "The solution of the diagnostic muddle is unlikely to come from tinkering with the criteria once again. The composite package approach, listing and defining specific groups of symptoms, has exhausted its usefulness." This brings us to the second alternative to the status quo involving a new approach to the diagnosis of eating disorders. In the present study, the largest group of patients fell into the

"generalised eating disorder" cluster. The predominance of this cluster could be taken as suggesting the need to amend diagnostic systems to accommodate such a category. Although such a category is arguably both clinically useful and phenomenologically accurate with its close attention to core features of eating disorders, the "generalised eating disorder" cluster can also be interpreted differently. The cluster may in fact be an apt reminder that the time is ripe to seriously contemplate a move away from increased sub-categorising of eating disorders toward defining a diagnosis of eating disorder per se. Such a move, it should be pointed out, would not necessarily involve abandoning the sub-type approach, but complementing it with categories that emphasise the common characteristics of eating disorders.

Waller (2005) argues that we need to "abandon our efforts to create subcategories and get used to working with the core features of eating disorders." Attempts are being made in this direction. Recently, Fairburn and Walsh (2002) proposed that an eating disorder be defined as "a persistent disturbance of eating behaviour or behaviour intended to control weight, which significantly impairs physical health or psychosocial functioning." Whether the emphasis should be placed on weight concern or behaviour intended to control weight is, however, open to debate. Palmer (1993) argued that although weight concern has clear applicability to the diagnosis of AN and BN, it has important problems as a general criterion. He drew attention to what he called "eating restraint that is over-invested." Amongst other things, he argued that eating restriction (or attempts at eating restriction) appears to be a universal finding in the histories of patients presenting for treatment of an eating disorder. Once we have defined eating disorders, it will be possible to specify typical clusters of symptoms, or even dimensions of symptoms, and thereby also identify meaningful subgroups. Clinically, we are already seeing the consequences of an increased focus on the core features of eating disorders. Fairburn, Cooper, and Shafran (2003) have put forward a "transdiagnostic theory" of eating disorders, which is based around the idea that eating disorders, regardless of subtype, are maintained by the same psychopathological processes. He argues that this has important clinical implications and has developed a modified and flexible form of CBT that can be applied across specific diagnoses.

Solving the problem of the classification of eating disorders will require both further research and careful deliberation. At present, there is increasing evidence that the way ahead will require a move away from increased subtyping and toward a definition of eating disorder per se. It will be important for such a definition to pay close attention to the psychological features of these disorders. Empirically, there is still important work to be done. Future studies need to examine the issue of utility in relation to other variables (e.g., personality and outcome measures), as well as explore other variables than those used for clustering in the present study. Paying increased attention to the interaction of personality disorders and eating disorder symptoms in relation to classification will be a particularly important area of future research. When we have gathered data on the merits of alternative schemes of classification, it will be possible to define and test these alternatives and compare them to conventional criteria. Together, these steps will help move us toward a rational system of classifying eating disorders based on more accurate phenomenology and greater clinical utility.

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