

DEVELOPMENT AND VALIDATION OF A MULTIDIMENSIONAL EATING DISORDER INVENTORY FOR ANOREXIA NERVOSA AND BULIMIA

David M. Garner, Ph.D., Marion P. Olmstead, M.A.,
Janet Polivy, Ph.D.



ABSTRACT

The development and validation of a new measure, the Eating Disorder Inventory (EDI) is described. The EDI is a 64 item, self-report, multiscale measure designed for the assessment of psychological and behavioral traits common in anorexia nervosa (AN) and bulimia. The EDI consists of eight subscales measuring: 1) Drive for Thinness, 2) Bulimia, 3) Body Dissatisfaction, 4) Ineffectiveness, 5) Perfectionism, 6) Interpersonal Distrust, 7) Interoceptive Awareness and 8) Maturity Fears. Reliability (internal consistency) is established for all subscales and several indices of validity are presented. First, AN patients (N = 113) are differentiated from female comparison (FC) subjects (N = 577) using a cross-validation procedure. Secondly, patient self-report subscale scores agree with clinician ratings of subscale traits. Thirdly, clinically recovered AN patients score similarly to FCs on all subscales. Finally, convergent and discriminant validity are established for subscales. The EDI was also administered to groups of normal weight bulimic women, obese, and normal weight but formerly obese women, as well as a male comparison group. Group differences are reported and the potential utility of the EDI is discussed.



INTRODUCTION

During the past decade, anorexia nervosa and more recently bulimia in normal-weight women have been the focus of growing attention from the public sector and various health disciplines. There is a consensus that they are no longer rare disorders, but rather are prevalent with a marked preponderance in young women. A significant morbidity and mortality have been associated with anorexia nervosa while the risks of bulimia in normal-weight women have not yet been well documented. Attempts to objectively

David M. Garner, Ph.D. is Associate Professor, Department of Psychiatry and Psychology, University of Toronto, and Coordinator of Research, Department of Psychiatry, Toronto General Hospital; Marion P. Olmstead, M.A. is a Doctoral Candidate in Clinical Psychology, York University, Toronto; Janet Polivy, Ph.D. is Associate Professor, Department of Psychiatry and Psychology, University of Toronto. Please address reprint requests and correspondence to: Dr. David M. Garner, Department of Psychiatry, Toronto General Hospital, 101 College Street, Toronto, Ontario M5G 1L7.

measure response to treatment have resulted in the development of several measures of the symptoms of these eating disorders.

Slade (1973) originally proposed an observer-rating scale for assessing three dimensions of anorexic behavior in an inpatient setting. A self-report measure of the symptoms of anorexia nervosa, the Eating Attitudes Test (EAT), was developed by Garner and Garfinkel (1979), and has been recently abbreviated based on a factor analysis (Garner, Olmsted, Bohr and Garfinkel, 1982). The EAT has been used as a screening instrument for detecting cases of anorexia nervosa in groups at high risk for the disorder (Garner and Garfinkel, 1980) as well as identifying abnormal eating patterns among college students (Button and Whitehouse, 1981; Thompson and Schwartz, 1982).

Goldberg, Halmi, Eckert, Casper, Davis and Roper (1980) devised a 63-item measure of anorexic attitudes and behavior for use in an inpatient setting. A factor analysis of the Goldberg et al. (1980) scale revealed 18 factors; however, 8 of these were formed by only one or two items. Four factors were correlated with rate of weight gain during 35 days of inpatient treatment, although the association was weak and it may be argued that rate of weight gain in hospital may be unrelated to ultimate outcome. Finally, Fichter and Kessler (1980) have developed a self-rating scale for assessing several aspects of anorexic behavior; however, validation was not reported for English-speaking subjects.

Questionnaires have also been proposed for measuring the symptoms of bulimia. Hawkins and Clement (1980) developed a "binge eating scale" and reported that over two-thirds of females and one-half of males in a college sample engage in episodes of "uncontrolled" excessive eating. Self-induced vomiting was reported by 3.5% of the females. Halmi, Falk and Schwartz (1981) found that 13% of a college sample indicated all of the symptoms of bulimia (87% of these were female and 13% were male), while 10% reported self-induced vomiting (12% female; 6% male).

While recent measures permit objective assessment of symptom areas, they either have the disadvantage of being suitable only for inpatient administration (Slade, 1973; Goldberg et al., 1980), or they tend to be oriented toward behavioral/symptom parameters of anorexia nervosa (Garner and Garfinkel, 1979) or bulimia (Halmi et al., 1981; Hawkins and Clement, 1980). They do not tap psychological dimensions which have been postulated to be more fundamentally related to anorexia nervosa and bulimia.

The aim of the present study is to report on the development and validation of the Eating Disorder Inventory (EDI) which is a multifaceted instrument designed to assess psychological characteristics relevant to anorexia nervosa and bulimia. Justification for the development of the EDI is based on the growing recognition that anorexia nervosa is a multidimensional disorder with considerable psychological variability across the heterogeneous patient population (Beumont et al., 1981; Dally and Gomez, 1979; Garfinkel and Garner, 1982; Garner and Garfinkel, 1980; Palmer, 1979; Strober, 1980; 1981; in press). There has been particular interest in contrasting subgroups of anorexic patients who exclusively restrict their dietary intake with those who ex-

perience episodes of bulimia followed by self-induced vomiting and purgation (Beumont, George and Smart, 1976; Casper, Eckert, Halmi, Goldberg and Davis, 1980; Garfinkel, Moldofsky and Garner, 1980; Russell, 1979; Strober, 1981). Strober (in press) has identified homogeneous subtypes of anorexia nervosa based on clinical symptomatology and personality features derived from MMPI profiles. Delineation and more precise measurement of psychological traits differentiating subgroups may have relevance to the understanding and treatment of both anorexia nervosa and bulimia. Moreover, identifying distinct psychological typologies may reveal features which discriminate individuals with anorexia nervosa from those who display significant symptoms of the disorder, but who may be less psychologically disturbed. The EDI was devised rather than relying on existing personality measures, since conventional tests do not adequately address the cognitive and behavioral characteristics often observed clinically in anorexia nervosa.

METHODS

Questionnaire Construction

A large pool of items was generated by clinicians who were both familiar with the research literature on anorexia nervosa and who had experience treating patients with the disorder. Items were designed to measure eleven constructs; however, only eight of these dimensions met the reliability and validity requirements for the scale. A short description of the intended item content of each of the retained eight subscales and the clinical sources from which they were derived are presented below.

*Drive for Thinness** — indicates excessive concern with dieting, preoccupation with weight and entrenchment in an extreme pursuit of thinness. Bruch (1973, 1978) and others have described this as a cardinal feature of anorexia nervosa. Items reflect both an ardent wish to lose weight as well as a fear of weight gain.

*Bulimia** — indicates the tendency toward episodes of uncontrollable overeating (bingeing) and may be followed by the impulse to engage in self-induced vomiting. The presence or absence of bulimia differentiates subtypes of anorexia nervosa (Beumont et al., 1976; Russell, 1979; Casper et al., 1980; Garfinkel et al., 1980) and has been described in women with no prior history of anorexia nervosa (Pyle, Mitchell and Eckert, 1981; Russell, 1979; Johnson et

*A recent factor analysis of the EAT (Garner et al., 1982) has revealed two-item clusters of similar content to that of the EDI Drive for Thinness and Bulimia subscales. While the correlations between the respective similar subscales is relatively high (Drive for Thinness with EAT "Dieting," $N=18$, $r=.80$; Bulimia with EAT "Bulimia and Food Preoccupation," $N=18$, $r=.85$), a substantial amount of the variance between scales is not shared. Examination of the item content of the similar scales indicates that the EAT factors are broader in focus than those of the EDI. Furthermore, the subscales of the EDI were theoretically or deductively derived (followed by empirical refinement and validation) while the EAT factors were empirically or inductively derived from an initial pool of items reflecting symptoms of anorexia nervosa. Despite some conceptual and possibly predictive overlap, the EDI is not intended as a replacement for the EAT. The EAT is a sound measure of a range of symptoms common in anorexia nervosa while the EDI focuses more on the specific cognitive and behavioral dimensions which may meaningfully differentiate subgroups of patients, or which may distinguish those with serious psychopathology from extreme "dieters."

al., in press). Recent studies have found that bulimia is relatively common among college females (Wardle, 1980; Halmi et al., 1981; Hawkins and Clement, 1980); however, these studies have not employed well-standardized measures.

Body Dissatisfaction — reflects the belief that specific parts of the body associated with shape change or increased "fatness" at puberty are too large (e.g. hips, thighs, buttocks). Body dissatisfaction has been found to be related to other body image disturbances which have been considered a basic deficit in anorexia nervosa (see Garner and Garfinkel, 1981 for a review). Crisp (1977, 1980) has suggested that dieting in anorexia nervosa is a response to dissatisfaction with pubertal "fatness" and the symbolic meaning that it has for the individual.

Ineffectiveness — assesses feelings of general inadequacy, insecurity, worthlessness and the feeling of not being in control of one's life. This feature has been described by some as the fundamental disturbance in anorexia nervosa (Bruch, 1973; Selvini-Palazzoli, 1978; Strober, 1980; Wingate and Christie, 1978). While there have been attempts to operationalize this construct in terms of locus of control (Garner et al., 1976; Hood et al., 1982), it has been suggested that the concept of ineffectiveness also includes a negative self-evaluation (self-concept) component which is not addressed by locus of control (Garner et al., 1982).

Perfectionism — indicates excessive personal expectations for superior achievement. Bruch (1978) has suggested that the struggle to live up to perfectionistic achievement standards is a characteristic theme in anorexia nervosa. She interprets the patient's typical superior academic performance as an "over-compliant adaptation" which breaks down in the face of increasing pressures to succeed. We have described the perfectionism in anorexia nervosa as part of a "dichotomous" thinking style (Garner et al., 1982). The families in which anorexia nervosa occurs have been discussed as highly achievement-oriented (Kalucy et al., 1977; Dally, 1969; Bruch, 1973) and thus may magnify our culture's emphasis on success.

Interpersonal Distrust — reflects a sense of alienation and a general reluctance to form close relationships and has been identified as important in the development and maintenance of anorexia nervosa (Selvini-Palazzoli, 1978; Goodsett, 1969, 1977; Story, 1977; Strober, 1980). It is to be distinguished from paranoid thinking and relates to an inability to form attachments or feel comfortable expressing emotions toward others.

Interoceptive Awareness — reflects one's lack of confidence in recognizing and accurately identifying emotions and sensations of hunger or satiety. Bruch (1962, 1978) and Selvini-Palazzoli (1978) have described this deficiency in interoceptive labelling as fundamental to anorexia nervosa and there is some empirical support for the existence of deficits in this area (Garfinkel and Garner, 1982).

Maturity Fears — measures one's wish to retreat to the security of the preadolescent years because of the overwhelming demands of adulthood. Crisp (1965, 1980) has suggested that the central psychopathology of anorexia nervosa is an avoidance of psychological maturity through the mechanism of carbohydrate avoidance.

Scoring

The test format is similar to that of the EAT (Garner and Garfinkel, 1979) where Ss respond to six point, forced choice items by rating whether each item applies "always," "usually," "often," "sometimes," "rarely," or "never." The scoring is identical to the EAT with the most extreme "anorexic" response (always or never depending on the keyed direction) earning a score of 3; the immediately adjacent response 2, the next response 1 and the three choices opposite to the most "anorexic" response receiving no score (0). Scale scores are the summation of all item scores for that particular scale (see the appendix for instructions to Ss and sample question format).

TABLE 1
Demographic Characteristics (Means) of Anorexia Nervosa and Comparison Samples

	N	AGE	HT. (IN.)	WEIGHT (LBS.)	PERCENT OF AVERAGE WEIGHT
Total Anorexia Nervosa	113	21.8	64.1	102.4	80.0
Restricters	48	21.0	63.9	91.9	72.0
Bulimics	65	22.4	64.3	110.1	85.9
Female Comparison	577	19.9	64.9	124.1	95.5
Male Comparison	166	20.3	70.4	161.1	103.1
Normal Weight Bulimics	195	20.8	63.9	123.6	95.1
Obese	44	32.5	63.6	171.9	129.9
Formerly Obese	52	36.7	64.5	137.9	99.5
Recovered Anorexics	17	23.9	62.6	108.2	86.9

Subjects

Two groups of Ss participated in the cross-validation of the EDI. The criterion group consisted of three subsamples of female primary anorexia nervosa (AN) patients (total N=113) seen in consultation at the Clarke Institute

of Psychiatry. The AN group met a modified version of the Feighner et al. (1972) diagnostic criteria (Garfinkel and Garner, 1982) and was heterogeneous in that patients were at various stages of treatment when tested, although none could be considered recovered. At the time of testing they averaged 20% below expected weight for their age and height according to norms from Health and Welfare Canada (1954). Approximately one half of the AN subjects were of the "restrictor" subtype and the remainder had the complication of "bulimia." There were significant differences in percent of average weight ($t = -6.32, p < 0.0001$) between the bulimic and restrictor subgroups, although there were no differences in age or the duration of illness (Table 1). The female comparison group (FC) consisted of three independent subsamples of female university students (total $N=577$) from first and second year psychology courses. They were tested in their normal class sessions and although their participation was voluntary, virtually all of the subjects approached completed questionnaires. Demographic characteristics for the AN and FC samples are presented in Table 1.

RESULTS

Item Selection and Cross-Validation

The first two independent AN and FC samples were used to select items from the original pool. Retained items had to meet two statistical criteria. First, they had to demonstrate validity by significantly differentiating between the AN and FC groups. Secondly, items had to be more highly correlated with the subscale to which they were intended to belong than to any other subscale. Items in the original pool were evaluated independently in each of the first two AN and FC samples; thus the validity and homogeneity requirements for retained items were replicated. After the questionnaire had been administered to the first AN and FC sample, it was necessary to generate additional items for some subscales.* These items were evaluated on the second and third AN and FC samples. It is important to note that the item content of subscales was essentially finalized on the second AN and FC samples; although we were prepared to make minor revisions on the third trial, this turned out to be unnecessary. The third cross-validation samples merely confirmed the utility of the previously selected items.

A final requirement was that subscales have coefficients of internal consistency (Cronbach's alpha) above .80 for the AN samples. Although item-scale correlation coefficients above .40 for the AN groups were considered desirable, three items with item-total correlations below .40 were retained because they were considered conceptually important. The average item-total

*Additional items were derived for the *Interoceptive Awareness* and *Maturity Fears* subscales. Since these items were administered only to the second and third AN and FC subsamples, final N's for these two subscales are smaller than for the other six subscales.

correlation was .63 (S.D. = 0.13) indicating substantial within-scale common variance among items. Since there were no significant differences within groups across the three cross-validation trials, samples have been collapsed for presentation here. The final subscale items, item analysis results and reliability coefficients for the AN and FC groups are presented in Table 2.

TABLE 2

**DRIVE FOR THINNESS: Subscale Items, Item-Total Correlations,
Reliability Coefficients for AN and FC groups.**

Item Number	Item on Subscale	Item-Total Correlation	
		AN	FC
1.*	I eat sweets and carbohydrates without feeling nervous.	.32	.37
7.	I think about dieting.	.76	.66
11.	I feel extremely guilty after overeating.	.58	.63
16.	I am terrified of gaining weight.	.76	.67
25.	I exaggerate or magnify the importance of weight.	.43	.59
32.	I am preoccupied with the desire to be thinner.	.66	.74
49.	If I gain a pound, I worry that I will keep gaining.	.70	.66
Reliability coefficients (Standardized Cronbach's Alphas) AN = .85 FC = .85			

**INTEROCEPTIVE AWARENESS: Subscale Items, Item-Total Correlations,
Reliability Coefficients for AN and FC groups**

8.	I get frightened when my feelings are too too strong.	.40	.50
21.	I get confused about what emotion I am feeling.	.74	.51
26.*	I can clearly identify what emotion I am feeling.	.63	.19
33.	I don't know what's going on inside me.	.54	.53
40.	I get confused as to whether or not I am hungry.	.49	.04
44.	I worry that my feelings will get out of control.	.73	.48
47.	I feel bloated after eating a small meal.	.22	.06
51.	When I am upset, I don't know if I am sad, frightened or angry.	.56	.23
60.	I have feelings I can't quite identify.	.75	.51
64.	When I am upset, I worry that I will start eating.	.43	.19
Coefficients of Reliability (Standardized Cronbach's Alphas) AN = .85 FC = .66			

* indicates negatively keyed item.

TABLE 2
BULIMIA: Subscale Items, Item-Total Correlations, Reliability
Coefficients for AN and FC groups

Item Number	Item on Subscale	Item-Total Correlation	
		AN	FC
4.	I eat when I am upset.	.58	.51
5.	I stuff myself with food.	.79	.53
28.	I have gone on eating binges where I have felt that I could not stop.	.69	.64
38.	I think about bingeing (overeating).	.74	.60
46.	I eat moderately in front of others and stuff myself when they're gone.	.75	.67
53.	I have the thought of trying to vomit in order to lose weight.	.70	.42
61.	I eat or drink in secrecy.	.73	.60

Reliability Coefficients (Standardized Cronbach's Alphas) AN = .90 FC = .83

BODY DISSATISFACTION: Subscale Item, Item-Total Correlations,
Reliability Coefficients for AN and FC groups.

2.	I think that my stomach is too big.	.51	.51
9.	I think that my thighs are too large.	.69	.68
12.*	I think that my stomach is just the right size.	.66	.58
19.*	I feel satisfied with the shape of my body.	.50	.65
31.*	I like the shape of my buttocks.	.69	.68
45.	I think my hips are too big.	.78	.75
55.*	I think that my thighs are just the right size.	.73	.78
59.	I think by buttocks are too large.	.83	.73
62.*	I think that my hips are just the right size.	.70	.78

Reliability Coefficients (Standardized Cronbach's Alphas) AN = .90 FC = .91

INEFFECTIVENESS: Subscale Items, Item-Total Correlations, Reliability
Coefficients for AN and FC groups

10.	I feel ineffective as a person.	.70	.53
18.	I feel alone in the world.	.62	.54
20.*	I feel generally in control of things in my life.	.65	.59
24.	I wish I were someone else.	.51	.49
27.	I feel inadequate.	.76	.61
37.*	I feel secure about myself.	.75	.66
41.	I have a low opinion of myself.	.74	.63
42.*	I feel that I can achieve my standards.	.52	.50
50.*	I feel that I am a worthwhile person.	.79	.59
56.	I feel empty inside (emotionally).	.52	.62

Reliability Coefficients (Standardized Cronbach's Alphas) AN = .90 FC = .86

* indicates negatively keyed item.

TABLE 2

**MATURITY FEARS: Subscale Items, Item-Total Correlations,
Reliability Coefficients for AN and FC groups**

Item Number	Item on Subscale	Item-Total Correlation	
		AN	FC
3.	I wish that I could return to the security of childhood.	.72	.12
6.	I wish that I could be younger.	.66	.16
14.	The happiest time in life is when you are a child.	.67	.40
22.*	I would rather be an adult than a child.	.63	.63
35.	The demands of adulthood are too great.	.27	.25
39.*	I feel happy that I am not a child anymore.	.82	.62
48.	I feel that people are happiest when they are children.	.80	.28
58.*	The best years of your life are when you become an adult.	.72	.42

Reliability Coefficients (Standardized Cronbach's Alphas) AN = .88 FC = .65

**PERFECTIONISM: Subscale Items, Item-Total Correlations, Reliability
Coefficients for AN and FC groups**

13.	Only outstanding performance is good enough in my family.	.66	.46
29.	As a child, I tried very hard to avoid disappointing my parents and teachers.	.43	.39
36.	I hate being less than best at things.	.58	.51
43.	My parents have expected excellence of me.	.63	.52
52.	I feel that I must do things perfectly or not do them at all.	.63	.45
63.	I have extremely high goals.	.58	.41

Reliability Coefficients (Standardized Cronbach's Alphas) AN = .82 FC = .73

**INTERPERSONAL DISTRUST: Subscale Items, Item-Total Correlations,
Reliability Coefficients for AN and FC groups**

15.*	I am open about my feelings.	.76	.58
17.*	I trust others.	.42	.32
23.*	I can communicate with others easily.	.67	.41
30.*	I have close relationships.	.56	.49
34.	I have trouble expressing my emotions to others.	.60	.53
54.	I need to keep people at a certain distance (feel uncomfortable if someone tries to get too close).	.61	.45
57.*	I can talk about personal thoughts or feelings.	.71	.62

Reliability Coefficients (Standardized Cronbach's Alphas) AN = .85 FC = .76

* indicates negatively keyed item.

Response Bias

In order to examine the possible effects of "response set," the mean subtotal score of all positively keyed items was compared to that of all negatively keyed items. There were no significant differences within either the AN or FC groups. For the AN group, negative and positive mean subtotals correlated .74 ($p < .001$) and for the FC group, the correlation was .67 ($p < .001$) suggesting minimal response set bias.

Comparison Samples

Following initial scale validation, the test was administered to other comparison groups. A group of 195 women who would meet the diagnosis of bulimia (BU) according to the DSM-III (APA, 1980) diagnostic criteria, where episodes of bulimia and vomiting occurred daily to weekly, completed and returned the questionnaire by mail as part of a large scale demographic study.* These BU respondents resided throughout North America and were randomly selected from the complete 1500 subject sample, the inclusion criteria being: 1) the presence of bulimia, 2) self-induced vomiting one time a week or more often, 3) female sex, 4) a current age less than 25 (in order to match the BU sample to the AN and FC groups), and 5) no prior history of weight loss sufficient to warrant a diagnosis of anorexia nervosa. According to Russell (1979) and Palmer (1979), these BU women would share many of the psychological themes with the anorexia nervosa group. A group of 44 female *obese* (OB) subjects obtained from a local dieting group completed the questionnaire as well as 52 female *formerly obese* (FOB) subjects who had lost weight from a mean of 130% to 100% of average weight. A small group of 17 recovered AN patients were also administered the questionnaire. The final comparison group was 166 first and second year *male college* (MC) students from the University of Toronto. Demographic characteristics for the comparison groups are presented in Table 1.

Criterion-Related Validity Provided by Comparison Samples

An attempt was made to establish criterion-related validity for some of the subscales by demonstrating that the comparison groups described above scored in the theoretically expected manner on specific subscales. One-way analysis of variance and subsequent planned t-tests were employed. As expected, the bulimic AN patients scored higher than the restrictor AN patients only on the *Bulimia* and *Body Dissatisfaction* subscales ($p < .01$). Also, in accord with current theory, the BU comparison group had elevated *Drive for Thinness*, *Bulimia* and *Body Dissatisfaction* scores, and were not significantly different from the bulimic AN patients on these dimensions.

*Appreciation is extended to Dr. Craig Johnson of the Michael Reese Medical Center, Chicago for making these data available.

Both the OB and the FOB groups were administered an early version of the EDI which did not include all of the items on the *Interoceptive Awareness* and *Maturity Fears* subscales. The OB comparison group, as expected, had significantly higher *Body Dissatisfaction* scores ($x = 21.1 \pm .88$, $p < .001$) than either the AN or FC groups. The OB group was also higher than the FOB group ($x = 13.2 \pm .95$, $p < .001$) on *Body Dissatisfaction* and higher ($p < 0.001$) than the FC group on the *Bulimia* ($x = 4.6 \pm .66$) and *Drive for Thinness* ($x = 8.3 \pm .79$) subscales. The OB and FOB groups did not differ from the FC group on *Ineffectiveness*, *Interpersonal Distrust* or *Perfectionism*. The FC group scored significantly higher than males (MC) only on the eating and body attitude subscales (*Drive for Thinness*, *Bulimia* and *Body Dissatisfaction*) ($p < .003$), while the MC's were higher than the FC's on *Interpersonal Distrust* ($p < .01$). The mean subscale scores for the AN, recovered AN, FC and MC groups are presented in Table 3. In keeping with the manner in which subscale items were selected, the AN group had significantly higher scores ($p < .001$) than the FC and MC groups on all subscales. It is notable that the recovered AN group scored lower than the AN group ($p < 0.001$) on each subscale and were not significantly higher (at $p > 0.05$) than the FC group on any subscale.

Criterion-Related Validity from Other Sources

A question of further interest in determining the validity of the EDI is the agreement between the self-report patient profiles and the clinical judgements of experienced clinicians familiar with the patient's psychological presentation. One psychiatrist and one psychologist who were either primary therapists or consultants familiar with the patient's background served as raters for a subgroup ($N = 49$) of patients who had completed the EDI. For each patient, the therapist-consultant was instructed to "rate the relevancy of each of these traits or characteristics for this patient compared to other anorexics that you have treated" on an analogue scale divided into ten centile intervals. The reliability and validity of a similar type of rating method has been advocated by Folstein and Luria (1973) and others. The therapist-consultants were given the description of subscale content appearing in the methods section of the current study and they were provided with each patient's total score (sum of scale scores) percentile rank within the entire anorexic sample. Table 4 indicates the agreement between therapist-consultant ratings and the AN patients' self-report subscale scores. All correlations are significant at the $p < 0.001$ level.

For each subscale the percent of AN and FC groups correctly classified using a discriminant function analysis is also reported in Table 4. The AN group was divided into bulimic and restricter subtypes and a discriminant function analysis correctly classified 85% of AN subjects based upon their *Bulimia* subscale score.

TABLE 3

Mean Scale (\pm standard error) Scores for AN, Recovered AN, FC, and MC groups

	Anorexia Nervosa* (N=113)	Recovered Anorexia Nervosa (N=17)	Female Comparison (N=577)	Male Comparison N=166
Drive for Thinness	15.4(\pm .50)	3.6(\pm 1.3)	5.0(\pm .22)	1.6(\pm .24)
Bulimia	R=2.7(\pm .55) B=10.8(\pm .69)	0.3(\pm .14)	2.0(\pm .14)	1.0(\pm .14)
Body Dissatisfaction	R=14.2(\pm 1.0) B=17.4(\pm 1.0)	6.3(\pm 1.5)	10.2(\pm .32)	3.9(\pm .39)
Ineffectiveness	14.4(\pm .75)	3.1(\pm .95)	2.0(\pm .15)	1.6(\pm .24)
Perfectionism	10.0(\pm .47)	6.5(\pm .88)	5.2(\pm .16)	6.2(\pm .30)
Interpersonal Distrust	7.7(\pm .49)	1.9(\pm .56)	2.2(\pm .12)	3.1(\pm .24)
Interoceptive Awareness+	12.5(\pm 1.1)	2.1(\pm .86)	2.9(\pm .47)	1.4(\pm .39)
Maturity Fears+	6.0(\pm .99)	1.1(\pm .46)	2.5(\pm .33)	2.7(\pm .44)

* R=Restricters (N=48); B=Bulimics (N=65); when bulimic and restricter subgroups do not differ significantly on subscale scores, only total group means are reported.

+ N=35 for AN, N=13 for Recovered AN, N=82 for FC, N=68 for MC

Convergent and Discriminant Validity

Since several subscales of the EDI overlap conceptually with available psychological tests, convergent and discriminant validity could be determined for subsamples of AN patients. Table 5 presents the correlations for the AN group between EDI subscales and tests measuring: "anorexic" attitudes (EAT, Garner and Garfinkel, 1979), "restraint" (Herman and Polivy, 1975), overall body dissatisfaction (modified from Berscheid et al., 1973), dissatisfaction with bodily regions associated with changes at maturation (i.e. breasts, buttocks, hips and abdomen), locus of control (Reid and Ware, 1973), self-control (Reid and Ware, 1973), feelings of inadequacy (Janis and Field, 1959), depression (BDI, Beck, 1978), physical anhedonia (Chapman, Chapman and Raulin, 1976), somatization, obsessionality, anxiety, depression and interpersonal sensitivity (Hopkins Symptom Check List, HSCL, Derogotis, Lipman, Rickels, Uhlenhuth and Covi, 1974).

Because of the likelihood of such a large number of intercorrelations yielding significant findings by chance (Type I Error), an alpha level of $p < 0.001$ was chosen for each correlation. With 120 comparisons, a Bonferroni-type ad-

TABLE 4

Criterion Validity: Correlations of Anorexia Nervosa (AN) Patients' (N=49) Subscale Scores with Clinicians' Ratings and Percents of Anorexia Nervosa and Female Comparison (FC) Groups Correctly Classified in Discriminant Function Analysis

Subscale	Clinicians' Rating*	Percent of AN and FC Groups Correctly Classified
Drive for Thinness	.53	89.9
Bulimia	.57	88.3
Body Dissatisfaction	.44	87.6
Ineffectiveness	.68	92.0
Perfectionism	.47	89.2
Interpersonal Distrust	.56	90.0
Interoceptive Awareness	.51	93.1
Maturity Fears	.43	88.3
All Subscales	—	91.7

* All correlations significant ($p < 0.001$). With a Bonferroni-type adjustment and 8 individual comparisons, the family-wise error rate is 0.01 (Myers, 1979).

justment yields a family-wise error rate of .11 (Myers, 1979). Percent of average weight, established according to the Health and Welfare Canada (1954) norms, was only significantly related to the *Bulimia* ($N=113$, $r = .33$, $p < 0.001$) and the *Body Dissatisfaction* ($N=113$, $r = .36$, $p < 0.001$) subscales.

The *Drive for Thinness* scale had the highest correlation with the EAT and Restraint scale; *Bulimia* was most related to lack of self-control, restraint and body dissatisfaction; *Body Dissatisfaction* was most related to dissatisfaction with the maturational regions (breasts, buttocks, hips and abdomen); *Ineffectiveness* was related to low self-esteem, depression and external locus of control; *Perfectionism* was most related to interpersonal sensitivity on the HSCL and *Interpersonal Distrust* was related to low self-esteem and depression. Data on the revised *Interoceptive Awareness* and *Maturity Fears* subscales were only available for a small group of Ss and their correlations with other measures were generally low and all non-significant (Table 5).

The EAT was also administered to 55 female college students who had completed the EDI. The total EAT score correlated highest with the *Drive for Thinness* subscale of the EDI ($r = .88$, $p < 0.001$).

Intercorrelations among Subscales

Table 6 presents the intercorrelations between EDI subscales for the AN and FC samples. Although these correlations are presented mainly for descriptive purposes, it is worth noting that there are 56 individual correlations. With a comparison-wise alpha of 0.001 and a Bonferroni-type adjustment, the family-wise error rate is 0.05 (Myers, 1979). For the AN group, only 9 of the 28 correlations were significant, with no coefficients reaching .60. Because of the large FC sample size, most subscales were significantly correlated even though the coefficients were generally low (only three were above .60).

Construct Validity

Nunnally (1967) has indicated that construct validity can only be determined by a series of experiments which demonstrate that the theoretical construct and operational measures are indeed related to one another. The congruence between clinicians' ratings and patients' subscale scores provides some evidence of construct validity. Moreover, the demonstration of convergent and discriminant validity for subscales as well as their ability to differentiate between the AN and FC groups contribute to the construct validity of the subscales of the EDI.

TABLE 5
Convergent and Discriminant Validity: Correlations Between Subscales
and Other Psychometric Instruments for AN Patients

MEASURES	(N)	EDI SUBSCALES							
		DT	B	BD	I	P	ID	IA+	MF+
EAT	(50)	.51*	.05	.32	.28	.19	.08	.22	-.02
Restraint	(52)	.50*	.44*	.42*	.21	.22	.03	.00	-.21
Body Dissatisfaction	(35)	.29	.41*	.55*	.25	.23	.23	.16	-.03
Dissatisfaction with Maturational Regions	(35)	.45*	.44*	.69*	.38	.07	.30	.15	-.31
Self-Esteem	(33)	-.16	-.17	-.14	.76*	.04	.57*	.21	.15
Locus of Control	(66)	.23	.28	.29	.44*	.28	.26	.35	-.05
Lack of Self-Control		.18	.53*	.14	.11	.02	-.15	.15	-.29
BDI	(64)	.26	.25	.27	.50*	.12	.29	.50	-.05
Physical Anhedonia	(61)	.10	-.15	.07	.05	.01	.29	.32	.16
HSCL (Total)	(65)	.33	.22	.31	.57*	.39*	.19	.31	.07
Somatization		.32	.18	.19	.29	.19	.21	.40	-.37
Obsessionality		.30	.29	.08	.42	.37	-.04	.15	.48
Anxiety		.27	.12	.28	.45*	.33	.26	.28	-.03
Depression		.26	.11	.24	.62*	.35	.27	.34	.09
Interpersonal Sensitivity		.27	.23	.20	.43	.51*	.06	.27	-.14

* $p < 0.001$ for each comparison, for family of 120 comparisons, $p < 0.11$

+ data were available on only 23 anorexia nervosa subjects

TABLE 6

Intercorrelations between subscales
ANOREXIA NERVOSA (N=113)+

	1	2	3	4	5	6	7	8
1) Drive for Thinness		.17	.55*	.28*	.15	.26	.32*	-.25
2) Bulimia	.55*		.30*	.06	.09	-.11	.04	-.03
3) Body Dissatisfaction	.58*	.45*		.20	.08	.14	-.01	-.28
4) Ineffectiveness	.29*	.37*	.28*		.28*	.59*	.45*	.50*
5) Perfectionism	.16*	.13*	.02	.17*		.17	.30	.10
6) Interpersonal Distrust	.16*	.18*	.16*	.41*	.11		.47*	.09
7) Interoceptive Awareness	.69*	.78*	.50*	.82*	.29	.36*		.16
8) Maturity Fears	.05	.03	-.14	.08	.19	-.05	.03	

NORMAL COMPARISON GROUP (N=577)++ (below diagonal)

* $p < 0.001$ for each comparison, for family of 56 comparisons $p < 0.05$

+ N=35 for subscales 7 and 8

++ N=82 for subscales 7 and 8

DISCUSSION

The current study proposes the Eating Disorder Inventory (EDI) as a new measure of attitudinal and behavioral dimensions relevant to anorexia nervosa and bulimia. Results indicate that the EDI is a reliable (internally consistent) and valid test within the limits imposed by the samples selected for this initial study. Eight subscales were deductively derived and then empirically validated with the aim that they differentiate, with very little overlap, between patients with anorexia nervosa and females from a college comparison group. Subscales indicate two levels of disturbance considered relevant to patients with anorexia nervosa. The first three subscales (*Drive for Thinness*, *Bulimia* and *Body Dissatisfaction*) assess attitudes and/or behaviors related to eating and body shape. While disturbances in these areas are central to anorexia nervosa, they may also exist in other groups of dieters. The remaining five subscales of the EDI measure traits which have been identified by clinical theorists as fundamental aspects of the psychopathology of anorexia nervosa. These subscales have been labelled *Ineffectiveness*, *Interpersonal Distrust*, *Interoceptive Awareness*, *Perfectionism*, and *Maturity Fears*, and their content has been described in detail in the methods section of this report. Despite some consensus regarding the significance of these areas of disturbance in the pathogenesis of anorexia nervosa, there have been few attempts to operationalize or objectively assess them.

Appendix

EDI

Name: _____ Date: _____

Age: _____

Present Weight: _____ Height: _____ Sex: _____

Highest Past Weight: _____ (lbs)
(excluding pregnancy)

How Long Ago? _____ (months)

How Long Did You Weigh This? _____ (months)

Lowest Past Adult Weight: _____ (lbs)

How Long Ago? _____ (months)

How Long Did You Weigh This? _____ (months)

What Do You Consider Your Ideal Weight To Be? _____ (lbs)

Age at Which Weight Problem Began (if any) _____

Father's Occupation: _____

Instructions:

This is a scale which measures a variety of attitudes, feelings and behaviours. Some of the items relate to food and eating. Others ask you about your feelings about yourself. **THERE ARE NO RIGHT OR WRONG ANSWERS SO TRY VERY HARD TO BE COMPLETELY HONEST IN YOUR ANSWERS. RESULTS ARE COMPLETELY CONFIDENTIAL.** Read each question and place an (X) under the column which applies best for you. Please answer each question *very* carefully. Thank you.

- | ALWAYS | USUALLY | OFTEN | SOMETIMES | RARELY | NEVER | |
|--------|---------|-------|-----------|--------|-------|---|
| () | () | () | () | () | () | 1. I eat sweets and carbohydrates without feeling nervous. |
| () | () | () | () | () | () | 2. I think that my stomach is too big. |
| () | () | () | () | () | () | 3. I wish that I could return to the security of childhood. |
| () | () | () | () | () | () | 4. I eat when I am upset. |

Evidence for the validity of the subscales comes from several sources other than their ability to differentiate between anorexia nervosa and comparison groups. First, there was good agreement between patients' self-report profiles and the clinical judgements of experienced clinicians. This type of criterion validity is often difficult to demonstrate because it is influenced by both patient and clinician sources of error. Secondly, a small group of clinically recovered anorexia nervosa patients scored similarly to college females on all subscales. Thirdly, varying degrees of convergent and discriminant validity were established for the anorexia nervosa sample depending on the number of other tests administered and their relevance to the hypothesized constructs underlying each subscale. For example, the subscales tapping attitudes toward eating and shape were highly related to other available measures of these dimensions and less related to personality traits. On the other hand, subscales aimed at psychological functioning usually had minimal correlations with other measures of eating. Moreover, the subscales assessing "personality" traits had logical patterns of correlations with other trait measures. The *Ineffectiveness* subscale was most highly correlated with feelings of inadequacy, depression and external locus of control; *Perfectionism* with a measure of interpersonal sensitivity; *Interpersonal Distrust* with low self-esteem and depression. Percent of average weight was only significantly correlated with the *Bulimia* and *Body Dissatisfaction* subscales.

The EDI differentiated between individuals with anorexia nervosa and obesity as well as formerly obese subjects recruited from a weight-loss program. It may be concluded that the EDI does not simply measure concern with weight or dieting but rather indicates more disturbed attitudes. It could be postulated that the EDI would be sensitive to gross psychopathology reflected in the minority of obese individuals for whom being overweight is an overt manifestation of more pervasive emotional disturbance. This impression has been confirmed for a small number of obese patients whom we have tested and treated but not described in this report.

The EDI was administered to a large group of normal weight women with bulimia but who had not experienced sufficient weight loss to meet a diagnosis of anorexia nervosa. Similar to the anorexic sample, the bulimic group scored significantly higher than normal on EDI subscales related to *Bulimia*, *Drive for Thinness* and *Body Dissatisfaction*. In an independent comparison of bulimic anorexia nervosa patients and bulimic normal weight women with no history of anorexia nervosa, we have found that both groups score similarly on all EDI subscales except *Maturity Fears* on which the anorexia nervosa patients display greater psychopathology (Garner, Garfinkel and O'Shaughnessy, submitted).

Garner, Polivy, Olmsted and Garfinkel (submitted) have used the EDI to compare the psychological characteristics of weight-preoccupied college women with those of patients with primary anorexia nervosa. While the groups were similar in *Drive for Thinness* and, *Body Dissatisfaction* and *Perfectionism*, the most salient difference was that the anorexia nervosa sub-

jects were significantly more pathological on the *Ineffectiveness* and *Interceptive Awareness* dimensions of the EDI. This is consistent with Bruch's (1962, 1973) postulation that these traits are part of the core disturbance in anorexia nervosa.

While the EDI may have utility as a prognostic screening instrument, several cautions must be emphasized. First, like all self-report instruments, the EDI is vulnerable to distortion due to response style bias and inaccurate reporting by the subject. Moreover, the defensive structure of the patient may invalidate or distort self-evaluation data. However, self-report information has the inherent advantages of economy, actuarial scoring and access to phenomenological information that may be unavailable through conventional clinical assessments or more oblique tests. Secondly, the EDI was empirically refined based on its capability in differentiating between a criterion group and non-clinical samples. Thus it may lack external validity, in that elevated scale scores among non-clinical subjects cannot be assumed to reflect the same psychopathology inferred for the patient group. Thirdly, the EDI should not be considered to represent an exhaustive sampling of psychopathological characteristics of anorexia nervosa. Other personality features such as obsessional-ity, rigidity, compliance, depression, introversion, interpersonal sensitivity, poor ego strength, excessive control and others have been identified (Crisp et al., 1979; Strober, 1980; Smart, Beumont and George, 1976; Stonehill and Crisp, 1977; Wingate and Christie, 1978). Fourthly, while some of the psychological dimensions assessed by the EDI may have primary significance, the presence or magnitude of others may simply be by-products of the disorder. It is not justified to infer a causal relationship between the attributes observed and the development of anorexia nervosa. Finally, the EDI should not be employed as the sole means of screening for or diagnosing anorexia nervosa. Several recent reports have apparently misinterpreted these to be intended purposes of the Eating Attitudes Test (Button and Whitehouse, 1981; Williams, Hand and Tarnopolsky, 1982). Although the EDI or EAT may be useful as preliminary screening tools for identifying groups in which a high proportion of subjects have formal eating disorders, these must be confirmed by clinical diagnosis; psychological tests should be an adjunct, not a replacement, for clinical judgments.

Despite these qualifications, the EDI represents an attempt to isolate and objectively measure specific psychological features viewed as important in the anorexia nervosa syndrome and which have been previously described. Both reliability and validity data are presented which support its use as an economical instrument for evaluating behavioral and psychological traits common to individuals with eating disorders.

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